

**AFRICA REGION**

**DATA COLLECTION SURVEY  
RELATING TO  
INFRASTRUCTURE AND EQUIPMENT  
DEVELOPMENT  
UNDER THE CARD INITIATIVE IN  
AFRICA  
FINAL REPORT**

**FEBRUARY 2023**

**JAPAN INTERNATIONAL COOPERATION AGENCY  
(JICA)**

**NTC INTERNATIONAL CO., LTD.  
TASK CO., LTD.**

<b>E D</b>
<b>J R</b>
<b>23-003</b>



## **SUMMARY**

### **1. Background of the Survey**

The first phase of the Coalition for African Rice Development (CARD) initiative which launched in 2008 achieved the desired goals i.e. increase of rice production from 14 millions to 28 millions and ended timely in 2018. However, in order to address the increasing demand, the second phase of this initiative was started in 2019, with a new target of further doubling rice production in Africa i.e. from 28 million to 56 million tons by 2030. The Japan International Cooperation Agency (JICA) has been implementing many technical cooperation projects under CARD initiative. The expansion of technical cooperation is no doubt vital to attain the target of doubling rice production in Phase 2 of CARD but substantial development such as the improvement of facilities and equipment is also essential. The aim of the present ‘Data Collection Survey’ relating to Infrastructure and Equipment Development under the CARD initiative in Africa (hereinafter referred to as the “Survey”) is to evaluate the necessity and the importance of proposing a CARD Package, composed of grant aid projects, that would enhance a synergy between JICA technical cooperation and the improvement of related infrastructure and equipment in CARD recipient countries. The expected components of this package are described in the figure herein below.

Meanwhile, while taking into account the impact of the new Coronavirus Disease 2019 (COVID-19) and target to the 8th Tokyo International Conference on African Development (TICAD) held in Tunisia in 2022, it was also decided to evaluate the necessity of ordinary Grant Aid project that are not specifically related to the CARD package. In line with this, it was decided that the mechanism and way of proceeding with the survey and the work process would be discussed and revised based on the situation in each country and JICA's own considerations.

FVC	Sub-Sector	Challenges	Ongoing JICA Technical Projects	Choice of components for grant aid projects under the CARD Initiative
Inputs	Seed Production	<ul style="list-style-type: none"> <li>◆ Poor and insufficient certified seed</li> <li>◆ Insufficient personnel for seed certification</li> </ul>	<ul style="list-style-type: none"> <li>◆ Capacity building of rice researchers for seed certification</li> <li>◆ Farmers seed production training</li> </ul>	<ul style="list-style-type: none"> <li>◆ Seed production field, installation of necessary equipment</li> </ul>
	Mechanization	<ul style="list-style-type: none"> <li>◆ Lack of technology and business models to sustain machinery farming services</li> <li>◆ Lack of qualified operators</li> <li>◆ Lack of qualified maintenance technicians</li> </ul>	<ul style="list-style-type: none"> <li>◆ Training of farming machinery operators</li> </ul>	<ul style="list-style-type: none"> <li>◆ Exhibition and running test of Japanese agricultural machinery (tractors)                             <ul style="list-style-type: none"> <li>&gt; Provide machinery lease services to farming companies and individuals*</li> <li>&gt; Supply of machinery to public agencies</li> </ul> </li> </ul>
	Irrigation	<ul style="list-style-type: none"> <li>◆ Lack of irrigation system</li> <li>◆ Insufficient land consolidation and difficulty in field water management</li> </ul>	<ul style="list-style-type: none"> <li>◆ Training on irrigation methods and land consolidation creation with establishment of model plot</li> </ul>	<ul style="list-style-type: none"> <li>◆ Small scale irrigation rehabilitation of rice fields between 10 and 30ha rice field</li> <li>◆ Rural road development and model plot establishment</li> </ul>
Production	Practical Techniques	<ul style="list-style-type: none"> <li>◆ Habit of random re-planting</li> <li>◆ Inappropriate application of fertilizer and pesticide</li> </ul>	<ul style="list-style-type: none"> <li>◆ Training of farmers in seed production, repotting, fertilizer application and harvest skills</li> </ul>	<ul style="list-style-type: none"> <li>◆ Fertilizer distribution to farming companies and individuals*</li> <li>◆ Certified seed distribution to farming companies and individuals*</li> </ul>
Transformation	Harvest and Post Harvest	<ul style="list-style-type: none"> <li>◆ Little harvest optimization capacity due to fully manual harvesting</li> <li>◆ Lack of harvesting skills (high loss caused wet field cuttings)</li> </ul>	<ul style="list-style-type: none"> <li>◆ Training on post-harvest techniques</li> </ul>	<ul style="list-style-type: none"> <li>◆ Exhibition and running test of Japanese agricultural machinery (thresher)                             <ul style="list-style-type: none"> <li>&gt; Provide machinery lease services to business and individual*</li> <li>&gt; Supply of machinery to public agencies*</li> </ul> </li> </ul>
	Rice Milling	<ul style="list-style-type: none"> <li>◆ Old type rice milling machines</li> <li>◆ Lack of rice stone sorting machines</li> <li>◆ Lack of financial means for procurement of rice mills</li> </ul>	<ul style="list-style-type: none"> <li>◆ Training of rice to produce quality rice (dosing of water content, storage and package)</li> <li>◆ Credit fund for procurement of paddy fields</li> </ul>	<ul style="list-style-type: none"> <li>◆ Exhibition and running test of Japanese agricultural machinery (milling machine and storage)                             <ul style="list-style-type: none"> <li>&gt; Provide machinery lease services to farming companies and individual*</li> <li>&gt; Supply of machinery to public agencies</li> </ul> </li> </ul>
Marketing	Transport	<ul style="list-style-type: none"> <li>◆ Low product sales and high transportation costs</li> <li>◆ Rice quality degraded by inappropriate storage</li> </ul>	<ul style="list-style-type: none"> <li>◆ Strengthen the Value Chain (by linking farmers to traders, transporters, and processors)</li> <li>◆ Training of vendors and distributors in packaging, labeling, storage and bookkeeping.</li> </ul>	<ul style="list-style-type: none"> <li>◆ (Rural road development)</li> </ul>
	Rice Distribution	<ul style="list-style-type: none"> <li>◆ Instable supply of high quality rice which discourages the promotion of local rice</li> </ul>	<ul style="list-style-type: none"> <li>◆ Improvement of rice quality</li> </ul>	<ul style="list-style-type: none"> <li>◆ Installation of equipment for rice inspection</li> </ul>
	Product Branding	<ul style="list-style-type: none"> <li>◆ Insufficient marketing skills in urban area</li> <li>◆ No labels to indicate rice quality and production area</li> </ul>	<ul style="list-style-type: none"> <li>◆ To conduct market research on consumers' preferences</li> <li>◆ Promotion of local rice in caravans</li> </ul>	-

\* Profits generated from machinery lease services as well as sale of fertilizers and qualified seeds, shall be re-invested in the revolving funds for other rice development businesses.

**Figure 1 Expected Components of CARD Grant Aid Package (in Initial Stage)**

## 2. Survey Outline

### (1) Survey Period

From April 2020 to February 2023 (35 months)

### (2) Survey Approach

The Survey is divided into two (2) stages. The target countries and objectives of each stage are listed herein below.

**Stage I:** The first stage of the survey comprises of: a comprehensive data collection survey in 12 target countries amongst the 32 CARD member countries and an interview with the CARD Secretariat in Kenya.

**The 12 concerned target countries are** (in alphabetical order): Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Liberia, Madagascar, Nigeria, Rwanda, Senegal, Sierra Leone, Uganda, and Zambia

**Stage II:** The second stage comprises of an additional survey of 11 countries except Liberia and the proposition of project plans for the Grant Aid.



### **3. Survey Program**

#### **(1) Stage I**

- Preparation and proposal of Country Profile as direction of cooperation based on the field survey results
- Proposal of a general support-package that can be used as development guidelines for the rice sector in Sub-Saharan Africa (SSA)
- Identification of a number of countries with high potential for the formulation of the Grant Aid, in total 11 countries

#### **(2) Stage II**

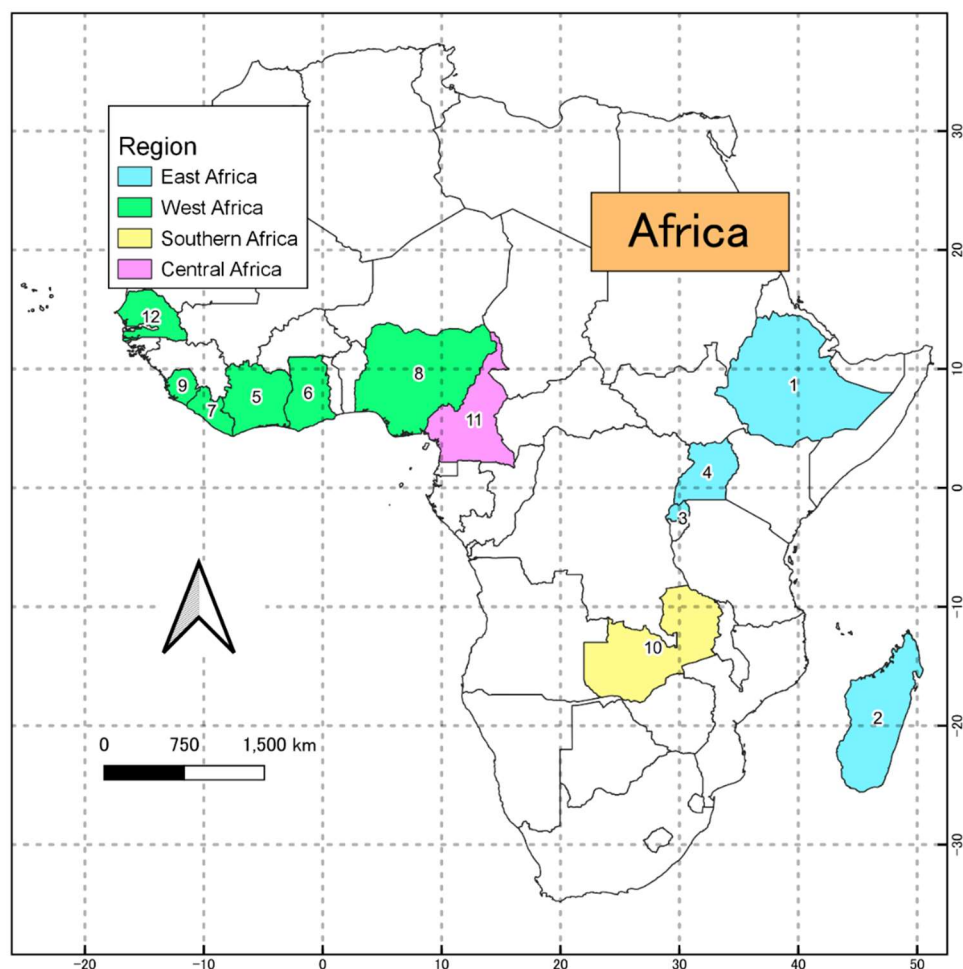
- Proposal of a project plan for the improvement of rural infrastructure, agricultural machinery/equipment such as post-harvest processing facilities and materials such as fertilizers for the 11 countries identified

### **4. List of Proposed Project Plans**

The titles of the proposed project plans for the 11 countries are shown in the table herein below.

**Table 1 List of Proposed Project Plan**

No.	Country	Title of Proposed Project Plan
1	Ethiopia	Project for Support of Promotion of Rice Mechanization
2	Madagascar	Project for Development of Seed Production Field and Facilities
3	Rwanda	Project for Increasing Total Factor Productivity through Promotion of Mechanization
4	Uganda	Project for the National Agricultural Innovations and Skills Enhancement Center
5	Cote d'Ivoire	Project for Strengthening of Rice Value Chain
6	Ghana	Project for Enhancement of Rice Seed Multiplication System
7	Nigeria	Project for Enhancement of Rice Seed Multiplication System
8	Senegal	Project for Development of Seed Production Field, Inspection, sorting and Training Facilities
9	Sierra Leone	Project for Development of Seed Production Field and Rehabilitation of Research and Training Facilities
10	Zambia	Project for Development of Seed Production Field and Training Facilities
11	Cameroon	Project for Enhancement of Rice Value Chain



**Location Map**

No.	Country	Region
1	Ethiopia	East Africa
2	Madagascar	East Africa
3	Rwanda	East Africa
4	Uganda	East Africa
5	Cote d'Ivoire	West Africa
6	Ghana	West Africa
7	Liberia	West Africa
8	Nigeria	West Africa
9	Senegal	West Africa
10	Sierra Leone	West Africa
11	Zambia	Southern Africa
12	Cameroon	Central Africa

**Data Collection Survey relating to Infrastructure and Equipment Development  
under the CARD Initiative in Africa**

**FINAL REPORT**

**Table of Contents**

**Summary**

**Location Map**

**Table of Contents**

**Units and Currency**

**List of Abbreviations**

	Page
<b>CHAPTER 1 SURVEY OVERVIEW .....</b>	<b>1-1</b>
1.1 Background.....	1-1
1.2 Objectives .....	1-1
1.3 Target Area .....	1-2
1.3.1 CARD Phase II Target Countries.....	1-2
1.3.2 Survey Target Countries .....	1-2
1.4 Survey Approach in Targeted 12 Countries .....	1-3
1.4.1 Change of Survey Approach.....	1-3
1.4.2 Discussions through Online and Face-to-Face Meetings.....	1-3
1.4.3 Additional Field Survey .....	1-5
1.5 Direction toward Finalisation of Survey.....	1-5
1.5.1 Change of Basic Policy of Survey based on Context of CARD Package Grant-Aid...	1-5
1.5.2 Process toward Finalization of Survey.....	1-5
<b>CHAPTER 2 PROPOSED PROJECT PLAN .....</b>	<b>2-1</b>
2.1 List of Proposed Project Plan .....	2-1
2.2 Proposed Project Plan in Ethiopia: Project for Support of Promotion of Rice Mechanization.....	2-1
2.2.1 Summary of Proposed Project Plan .....	2-1
2.2.2 Background of Project Planning .....	2-1
2.2.3 Project Site .....	2-2
2.2.4 Implementation/Responsible Agency .....	2-2
2.2.5 Components .....	2-2
2.2.6 Project Cost Estimation.....	2-3
2.2.7 Expected Outputs .....	2-3
2.2.8 Obligation of Recipient Country .....	2-4
2.2.9 Points to Note.....	2-4
2.3 Proposed Project Plan in Madagascar: Project for Development of Seed Production Field and Facilities.....	2-4
2.3.1 Summary of Proposed Project Plan .....	2-4
2.3.2 Background of project formulation.....	2-4
2.3.3 Project Site .....	2-5
2.3.4 Implementation/Responsible Agency .....	2-5
2.3.5 Components .....	2-5
2.3.6 Project Cost Estimation.....	2-6
2.3.7 Expected Outputs .....	2-6
2.3.8 Obligation of Recipient Country .....	2-6
2.3.9 Points to Note.....	2-6
2.4 Proposed Project Plan in Rwanda: Project for Increasing Total Factor Productivity through Promotion of Mechanization .....	2-7

2.4.1 Summary of Proposed Project Plan .....	2-7
2.4.2 Background of Project Planning .....	2-7
2.4.3 Project Site .....	2-8
2.4.4 Implementation/Responsible Agency .....	2-8
2.4.5 Components .....	2-8
2.4.6 Project Cost Estimation.....	2-9
2.4.7 Expected Outputs .....	2-9
2.4.8 Obligation of Recipient Country .....	2-9
2.4.9 Points to Note.....	2-10
2.5 Proposed Project Plan in Uganda: Project for the National Agricultural Innovations and Skills Enhancement Center.....	2-10
2.5.1 Summary of Proposed Project Plan .....	2-10
2.5.2 Background of Project Planning .....	2-10
2.5.3 Project Site .....	2-11
2.5.4 Implementation/Responsible Agency .....	2-11
2.5.5 Components .....	2-11
2.5.6 Project Cost Estimation.....	2-13
2.5.7 Expected Outputs .....	2-13
2.5.8 Obligation of Recipient Country .....	2-13
2.5.9 Points to Note.....	2-13
2.6 Proposed Project Plan in Cote d'Ivoire: Project for Strengthening of Rice Value Chain ....	2-14
2.6.1 Summary of Proposed Project Plan .....	2-14
2.6.2 Background of Project Planning .....	2-14
2.6.3 Project Site .....	2-14
2.6.4 Implementation/Responsible Agency .....	2-14
2.6.5 Components .....	2-15
2.6.6 Project Cost Estimation.....	2-15
2.6.7 ExpectedOutputs .....	2-16
2.6.8 Obligation of Recipient Country .....	2-16
2.6.9 Points to Note.....	2-16
2.7 Proposed Project Plan in Ghana: Project for Enhancement of Rice Seed Multiplication System .....	2-17
2.7.1 Summary of Proposed Project Plan .....	2-17
2.7.2 Background of Project Planning .....	2-17
2.7.3 Project Site .....	2-17
2.7.4 Implementation/Responsible Agency .....	2-18
2.7.5 Components .....	2-18
2.7.6 Project Cost Estimation.....	2-19
2.7.7 Expected Outputs .....	2-19
2.7.8 Obligation of Recipient Country .....	2-19
2.7.9 Points to Note.....	2-19
2.8 Proposed Project Plan in Nigeria: Project for Enhancement of Rice Seed Multiplication System .....	2-20
2.8.1 Summary of Proposed Project Plan .....	2-20
2.8.2 Background of Project Planning .....	2-20
2.8.3 Project Site .....	2-21
2.8.4 Implementation/Responsible Agency .....	2-21
2.8.5 Components .....	2-21
2.9 Proposed Project Plan in Senegal: Project for Development of Seed Production Field, Inspection, sorting and Training Facilities .....	2-23
2.9.1 Project summary .....	2-23
2.9.2 Background of Project Planning .....	2-23
2.9.3 Project site.....	2-23
2.9.4 Implementation/Responsible Agency .....	2-24
2.9.5 Components .....	2-24

---

2.9.6 Project Cost Estimation.....	2-26
2.9.7 Expected Outputs .....	2-26
2.9.8 Obligation of Recipient Country .....	2-26
2.9.9 Points to Note.....	2-27
2.10 Proposed Project Plan in Sierra Leone: Project for Development of Seed Production Field and Rehabilitation of Research and Training Facilities.....	2-27
2.10.1 Summary of Proposed Project Plan .....	2-27
2.10.2 Background of Project Planning .....	2-27
2.10.3 Project Site .....	2-28
2.10.4 Implementation/Responsible Agency .....	2-28
2.10.5 Components .....	2-28
2.10.6 Project Cost Estimation.....	2-30
2.10.7 Expected Outputs .....	2-31
2.10.8 Obligation of Recipient Country .....	2-31
2.10.9 Points to Note.....	2-31
2.11 Proposed Project Plan in Zambia: Project for Development of Seed Production Field and Training Facilities.....	2-32
2.11.1 Summary of Proposed Project Plan .....	2-32
2.11.2 Background of Project Planning .....	2-32
2.11.3 Project Site .....	2-33
2.11.4 Implementation/Responsible Agency .....	2-33
2.11.5 Components .....	2-33
2.11.6 Project Cost Estimation.....	2-35
2.11.7 Expected Outputs .....	2-35
2.11.8 Obligation of Recipient Country .....	2-35
2.11.9 Points to Note.....	2-35
2.12 Proposed Project Plan in Cameroon: Project for Enhancement of Rice Value Chain.....	2-36
2.12.1 Summary of Proposed Project Plan .....	2-36
2.12.2 Background of Project Planning .....	2-36
2.12.3 Project Site .....	2-36
2.12.4 Implementation/Responsible Agency .....	2-37
2.12.5 Components .....	2-37
2.12.6 Project Cost Estimation.....	2-38
2.12.7 Expected Outputs .....	2-38
2.12.8 Obligation of Recipient Country .....	2-39
2.12.9 Points to Note.....	2-39

### **CHAPTER 3 LESSONS LEARNED AND RECOMMENDATIONS FOR PROJECT FORMULATION FROM THE SURVEY ..... 3-1**

3.1 General Support Packages across Sub-Saharan Africa.....	3-1
3.1.1 Direction of Support Package for Promotion of Rice Sector in Sub-Saharan Africa ..	3-1
3.1.2 Linkage with Direction of Support Menu for Promotion of Rice Sector in Target Countries and JICA Technical Cooperation Projects .....	3-3
3.1.3 Assumptions and specific examples regarding the content and scale of the proposed menu .....	3-5
3.2 Efficient and Effective Survey Approach.....	3-10
3.2.1 Involvement of Focal Point Persons and Task Force Members on National Rice Development Strategy.....	3-10
3.2.2 Points for Environmental and Social Considerations.....	3-12
3.3 Lessons Learned from Previous Similar Projects and Application to Project Plan .....	3-12

#### **List of Tables**

Table 1.1	List of CARD Phase II Target Countries .....	1-2
Table 1.2	List of Meetings .....	1-3
Table 1.3	Direction toward Finalization of Proposed Project Plans in Targeted 12 Countries. 1-5	

---

Table 2.1	List of Proposed Project Plans.....	2-1
Table 2.2	Components of Proposed Project Plan in Ethiopia.....	2-3
Table 2.3	Proposed Estimated Project Cost in Ethiopia.....	2-3
Table 2.4	Proposed Quantitative Outputs of Project Plan in Ethiopia .....	2-4
Table 2.5	Components of Proposed Project Plan in Madagascar.....	2-5
Table 2.6	Proposed Quantitative Outputs of Project Plan in Madagascar.....	2-6
Table 2.7	Components of Proposed Project Plan in Rwanda .....	2-8
Table 2.8	Proposed Estimated Project Cost of CARD Grant Aid in Rwanda.....	2-9
Table 2.9	Components of Proposed Project Plan for NaCRRI in Uganda .....	2-11
Table 2.10	Components of Proposed Project Plan for ZARDIs in Uganda .....	2-12
Table 2.11	Components of Proposed Project Plan for DAIMWAP in Uganda.....	2-12
Table 2.12	Components of Proposed Project Plan for NAISE Center in Uganda.....	2-12
Table 2.13	Components of Proposed Project Plan in Cote d'Ivoire.....	2-15
Table 2.14	Proposed Estimated Project Cost in Cote d'Ivoire .....	2-15
Table 2.15	Proposed Quantative Outputs of Project Plan in Cote d'Ivoire .....	2-16
Table 2.16	Components of Proposed Project Plan in Ghana.....	2-18
Table 2.17	Estimated project cost for CARD grant aid in Ghana .....	2-19
Table 2.18	Proposed quantitative Outputs of the CARD grant aid project in Ghana.....	2-19
Table 2.19	Components of Proposed Project Plan in Nigeria .....	2-21
Table 2.20	Proposed Estimated Project Cost in Nigeria .....	2-22
Table 2.21	Proposed Quantitative Output of Project Plan in Nigaria.....	2-22
Table 2.22	Purpose, Functions and Components (Seed production fields in Ndiol station)	2-24
Table 2.23	Purpose, Functions and Components (Fanaye station) .....	2-24
Table 2.24	Purpose, Functions and Components for CTS .....	2-25
Table 2.25	Purpose, Functions and Components at CIFA .....	2-25
Table 2.26	Proposed Estimated Project Cost of CARD Grant Aid in Senegal .....	2-26
Table 2.27	Components of Proposed Project Plan for Magbolontho FS Production Field in Sierra Leone.....	2-28
Table 2.28	Components of Proposed Project Plan for RARC Experimental Field in Sierra Leone .....	2-29
Table 2.29	Components of Proposed Project Plan for Improve Equipment to strengthen Capacity for Rice research and Training Functions in RARC in Sierra Leone .....	2-30
Table 2.30	Proposed Estimated Project Cost in Sierra Leone.....	2-31
Table 2.31	Components of Proposed Project Plan for ZARI Mount Makulu Central Research Station in RARC in Zambia .....	2-33
Table 2.32	Components of Proposed Project Plan for ZARI Mansa Research Station in RARC in Zambia.....	2-34
Table 2.33	Proposed Estimated Project Cost in Zambia .....	2-35
Table 2.34	Indicators for Quantitative Outputs of Project Plan in Zambia .....	2-35
Table 2.35	Components of Proposed Project Plan in Cameroon .....	2-37
Table 2.36	Estimated Project Cost in Cameroon.....	2-38
Table 3.1	List of Contents of Proposed Project Plan in 11 Countries .....	3-1
Table 3.2	List of CARD Project in Targeted 12 Countries .....	3-3
Table 3.3	Proposed Menu of Support Package for Promotion of Agricultural Machinery (Condition 1).....	3-5
Table 3.4	Proposed Menu of Support Package for Promotion of Agricultural Machinery (Condition 2).....	3-6
Table 3.5	Proposed Menu of Support Package for Promotion of Agricultural Machinery (Condition 3).....	3-7
Table 3.6	Proposed Menu of Support Package for Increasing Production of Quality Seed (Condition 1) .....	3-7
Table 3.7	Proposed Menu of Support Package for Increasing Production of Quality Seed (Condition 2) .....	3-8
Table 3.8	Proposed Menu of Support Package for Increasing Production of Quality Seed (Condition 3) .....	3-10

---

Table 3.9	List of FPs in Targeted 12 Countries as September 2020 .....	3-11
-----------	--	------

**Annexes:**

1. Country Profiles prepared by Survey
2. List of Proposed Needs for CARD Package Grant-Aid
3. Survey Results in 12 Countries

### **Units and Currency**

kg	kilogram
t, MT	Metric tons = 1,000 kg
h	hour
mm	millimeter
cm	centimeter
km	kilometer
ha	hectare
HP	Horsepower
km <sup>2</sup> , sq.km	square kilometer
m <sup>3</sup>	cubic meter
MCM	million cubic meter
MSL	Mean Sea Level
MW	mega Watt
LPS, l/s	litters per second
mm/mon	millimeter per month
mm/d	millimeter per day
m/s	meter per second
m <sup>3</sup> /s	cubic meter per second
°C	degrees centigrade
%	percent
US\$	United States of America Dollar
EUR	EURO



### List of Abbreviations

Abbreviations	English (French)
<b>AGRA</b>	Alliance for a Green Revolution in Africa
<b>ARC</b>	Agricultural Research Center
<b>BS</b>	Breeder Seed
<b>CARD</b>	Coalition for African Rice Development
<b>CENEEMA</b>	Center of studies and experimentation of agricultural machinery ( <i>Centre d'études et d'expérimentation du machinisme agricole</i> )
<b>CMS</b>	Seed Multiplication Center ( <i>Centre de multiplication de semences</i> )
<b>COVID-19</b>	Coronavirus Disease 2019
<b>CS</b>	Certified Seed
<b>DAIMWAP</b>	Department of Agricultural Infrastructure, Mechanisation and Water for Agricultural Production
<b>E-COBSI</b>	Support for Sustainable Community Based Irrigation Development Project
<b>EIAR</b>	Ethiopian Institute of Agricultural Research
<b>Ethio-rice</b>	Project for Functional Enhancement of the National Rice Research and Training Centre
<b>FMARD</b>	Federal Ministry of Agriculture and Rural Development
<b>FOFIFA</b>	National Center for Applied Research on Rural Development ( <i>Foibe Fikarohana momba ny Fambolena sy FiompianaAmpiharina ho Fampandrosoana ny eny Ambanivohitra</i> )
<b>FP</b>	Focal Point Person
<b>FS</b>	Foundation Seed
<b>GIDA</b>	Ghana Irrigation Development Authority
<b>IC/R</b>	Inception Report
<b>ICT</b>	Information and Communication Technology
<b>IT</b>	Information Technology
<b>IVS</b>	Inland Valley Swamp
<b>JICA</b>	Japan International Cooperation Agency
<b>KIS</b>	Project for Enhancing Market-Based Agriculture by Smallholders and Private Sector Linkages in Kpong Irrigation Scheme
<b>MAAIF</b>	Ministry of Agriculture, Animal Industry and Fisheries
<b>MAEP</b>	Ministry of Agriculture, Livestock and Fisheries ( <i>Ministère de l'Agriculture et de l'Élevage et de la Pêche</i> )
<b>MINADER</b>	Ministry of Agriculture and Rural Development ( <i>Ministère de l'Agriculture et du Développement Rural</i> )
<b>MoA</b>	Ministry of Agriculture
<b>MoFA</b>	Ministry of Food and Agriculture
<b>MOReDeP</b>	Market-Oriented Rice Development Project
<b>NAISE Center</b>	National Agricultural Innovation and Skills Enhancement
<b>NARO</b>	National Agriculture Research Organization
<b>NCRI</b>	National Cereal Research Institute
<b>NRDS</b>	National Rice Development Strategy
<b>NRRTC</b>	National Rice Research And Training Center
<b>OA</b>	Office Automation
<b>PAPRiz2</b>	Project for Rice Productivity Improvement and Management of Watershed and Irrigated Area (PAPRIZ Phase2)
<b>PAPRIZ3</b>	( <i>Projet de renforcement de la chaîne de valeur rizicole dans la vallée du fleuve Sénégal</i> )
<b>PPRS</b>	Plant Protection and Regulatory Service Directorate
<b>PRiDe2</b>	Promotion of Rice Development Project
<b>PRODERIP</b>	Project for the upland rice and irrigation rice development ( <i>Projet de développement de la riziculture irriguée et pluviale</i> )
<b>PRORIL2</b>	Local Rice Promotion Project in Côte d'Ivoire ( <i>Projet de promotion du riz local en République de Côte d'Ivoire</i> )
<b>RAB</b>	Rwanda Agriculture and Animal Resources Development Board

<b>Abbreviations</b>	<b>English (French)</b>
<b>SARI</b>	Savanna Agriculture Research Institute
<b>SLARI</b>	Sierra Leone Agricultural Research Institute
<b>SOC</b>	National Seed Production Company ( <i>Service Officiel de Contrôle des Semences et matériel végétal</i> )
<b>SRPP</b>	Sustainable Rice Production Project
<b>SSA</b>	Sub-Saharan Africa
<b>TENSUI2</b>	Sustainable development of Rain-fed Lowland Rice Production Project, PHASE TWO
<b>TICAD</b>	Tokyo International Conference on African Development
<b>TF</b>	Task Force
<b>UNVDA</b>	Upper Nun Valley Development Authority
<b>WAMCAB</b>	Project for Water Management and Capacity Building
<b>ZARDI</b>	Zonal Agricultural Research and Development Institute
<b>ZARI</b>	Zambia Agricultural Research Institute
<b>2KR</b>	Kennedy Round Two
<b>The Survey</b>	Data collection survey for enhancement of CARD initiative on rice sector infrastructure and equipment in Africa

## **Chapter 1 Survey Overview**

### **1.1 Background**

The strong demand for rice has led to increasing imported rice in Africa since the late 1990s. With soaring prices of cereals in the world, food insecurity has become a threat to vulnerable population, especially those living in poverty. The urgent need for mid to long-term solutions is evident. Rice is the only major cereal consumed in Africa that has high potential for regional production. The development of the rice sector, through the mobilization of international assistance, will help to address several issues, namely global food crisis, rural development and poverty reduction, in an efficient and sustainable way.

Given this context, the Japan International Cooperation Agency (JICA), together with the Alliance for a Green Revolution in Africa (AGRA) established the Coalition for African Rice Development (CARD) at the Fourth Tokyo International Conference on African Development (TICAD IV) in May 2008. CARD is a consultative group, composed of technical and financial partners, that supports the expansion of rice production in Africa; the initial aim set for the period between 2008 and 2018 was to double rice production in Africa (from 14 million tons to 28 million tons). The first phase of CARD initiative ended timely in 2018 with the achievement of the set goals. The second phase, started in 2019, aims at further doubling the rice production from 28 million to 56 million tons by 2030.

Several technical cooperation projects were implemented within the CARD framework. These interventions were important for the achievement of the targeted goals. Likewise, the expansion of technical cooperation in Phase 2 of CARD (CARD Phase II) is no doubt vital to attain the target of doubling rice production, but substantial development such as the improvement of small-scale facilities and equipment is also essential. The main focus of the ‘Data Collection Survey’ relating to Infrastructure and Equipment Development under the CARD Initiative in Africa, hereinafter referred to as the Survey, will be to address the challenges identified in the rice sector with the proposal of solutions that take into consideration infrastructure and equipment improvement.

### **1.2 Objectives**

The objectives of the Survey are:

1. To collect data and information for an in-depth understanding of the current situation and issues relating to the rice sector in the 12 selected African countries.
2. To provide the outline of grant aid projects proposing the details of project components for the number of countries.

On the other hand, additional response changes were required, as the aim was to formulate a deal with a view to the 8th TICAD to be held in Tunisia in 2022, along with food security concerns in the impact of the new Coronavirus Disease 2019 (COVID-19).

## 1.3 Target Area

### 1.3.1 CARD Phase II Target Countries

The list of the 32 member countries (in alphabetical order) in Sub-Saharan Africa (SSA) for the Phase II of CARD is shown in Table 1.1.

**Table 1.1 List of CARD Phase II Target Countries**

No.	Country	Country Classification by CARD	Region
1	Angola	Group 3	Southern Africa
2	Benin	Group 2	West Africa
3	Burkina Faso	Group 2	West Africa
4	Burundi	Group 3	East Africa
5	Cameroon	Group 1	Central Africa
6	Central African Republic	Group 2	Central Africa
7	Chad	Group 3	Central Africa
8	Congo (Republic of the)	Group 3	Central Africa
9	Cote d'Ivoire	Group 2	West Africa
10	Democratic Republic of the Congo	Group 2	Central Africa
11	Ethiopia	Group 2	East Africa
12	Gabon	Group 3	Central Africa
13	Gambia	Group 2	West Africa
14	Ghana	Group 1	West Africa
15	Guinea	Group 1	West Africa
16	Guinea-Bissau	Group 3	West Africa
17	Kenya	Group 1	East Africa
18	Liberia	Group 2	West Africa
19	Madagascar	Group 1	East Africa
20	Malawi	Group 3	Southern Africa
21	Mali	Group 1	West Africa
22	Mozambique	Group 1	Southern Africa
23	Niger	Group 3	West Africa
24	Nigeria	Group 1	West Africa
25	Rwanda	Group 2	East Africa
26	Senegal	Group 1	West Africa
27	Sierra Leone	Group 1	West Africa
28	Sudan	Group 3	East Africa
29	Togo	Group 2	West Africa
30	Uganda	Group 1	East Africa
31	United Republic of Tanzania	Group 1	East Africa
32	Zambia	Group 2	Southern Africa

### 1.3.2 Survey Target Countries

The 12 target countries were selected from the list of CARD member countries. The selection of these target countries for the field survey was based on the feasibility of grant aid projects, the formulation of the National Rice Development Strategy (NRDS) as well as the sectorial strategy, geographical balance, rice production volume and implementation agency, of each member country.

The selected countries are listed below in an alphabetical order and by geographical region.

Four (4) countries in the Eastern Africa Region: Ethiopia, Madagascar, Rwanda, Uganda  
Six (6) countries in the Western Africa Region: Côte d'Ivoire, Ghana, Liberia, Nigeria, Senegal, Sierra Leone  
One (1) country in the Southern Africa Region: Zambia  
One (1) country in the Central Africa Region: Cameroon

## 1.4 Survey Approach in Targeted 12 Countries

### 1.4.1 Change of Survey Approach

At the beginning of this survey (as of April 2020), it was expected that the Survey would be divided into two stages, with each objective being followed. On the other hand, in view of the impact of COVID-19, it was decided that the survey process and activities of the preliminary field survey and field survey, which were to be carried out after the pre-survey from Japan in the first stage, would be conducted as far as possible remotely from Japan also. Through exercising such process, a country profile (Annex 1) summarising the direction of cooperation in each country and the needs of the CARD Package Grant-Aid (Annex 2) were prepared. As discussed below, both files were prepared for 11 countries other than Senegal, which was not included in the CARD Package Grant-Aid initially, but was aimed at ordinary grant aid, and joined the target countries of the Survey in the month of July 2022. In addition, the possibility of additional fieldwork, including remotely, was considered and discussed, and was carried out in the four (4) countries mentioned latter.

### 1.4.2 Discussions through Online and Face-to-Face Meetings

Comprehensive information-gathering surveys were conducted using online and face-to-face meeting. The table below shows the list of meetings in each country.

**Table 1.2 List of Meetings**

No.	Target	With Japanese Concerned	With Targeted Countries' Concerned	Style of Meeting
1	CARD Secretariat	<u>2020</u> 1 <sup>st</sup> : April 28 <sup>th</sup> , 2 <sup>nd</sup> : June 15 <sup>th</sup>	<u>2020</u> 1 <sup>st</sup> : July 21 <sup>st</sup> , 2 <sup>nd</sup> : July 22 <sup>nd</sup>	Online
2	Ethiopia	<u>2020</u> 1 <sup>st</sup> : June 16 <sup>th</sup> <u>2021</u> 2 <sup>nd</sup> : January 28 <sup>th</sup> , 3 <sup>rd</sup> : February 3 <sup>rd</sup> , 4 <sup>th</sup> : March 12 <sup>th</sup> , 5 <sup>th</sup> : April 2 <sup>nd</sup> , 6 <sup>th</sup> : April 16 <sup>th</sup>	<u>2020</u> 1 <sup>st</sup> : October 22 <sup>nd</sup> <u>2021</u> 3 <sup>rd</sup> & 4 <sup>th</sup> : April 12 <sup>th</sup> , 5 <sup>th</sup> & 6 <sup>th</sup> : April 13 <sup>th</sup> , 7 <sup>th</sup> : April 14 <sup>th</sup> , 8 <sup>th</sup> & 9 <sup>th</sup> : April 15 <sup>th</sup> , 10 <sup>th</sup> : April 16 <sup>th</sup>	Ditto
3	Madagascar	<u>2020</u> 1 <sup>st</sup> : June 15 <sup>th</sup>	<u>2020</u> 1 <sup>st</sup> : October 1 <sup>st</sup>	Ditto
4	Rwanda	<u>2020</u> 1 <sup>st</sup> : June 11 <sup>th</sup> <u>2021</u> 2 <sup>nd</sup> : January 28 <sup>th</sup> , 3 <sup>rd</sup> : July 12 <sup>th</sup>	<u>2020</u> 1 <sup>st</sup> : September 29 <sup>th</sup> <u>2021</u> 1 <sup>st</sup> : June 4 <sup>th</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> & 4 <sup>th</sup> : June 7 <sup>th</sup> , 5 <sup>th</sup> : June 9 <sup>th</sup> , 6 <sup>th</sup> : June 10 <sup>th</sup> , 7 <sup>th</sup> : June 11 <sup>th</sup> , 8 <sup>th</sup> : June 14 <sup>th</sup> , 9 <sup>th</sup> : June 15 <sup>th</sup> , 10 <sup>th</sup> : June 16 <sup>th</sup> , 11 <sup>th</sup> : June 17 <sup>th</sup> , 12 <sup>th</sup> : June 18 <sup>th</sup> , 13 <sup>th</sup> & 14 <sup>th</sup> : June 21 <sup>st</sup> , 15 <sup>th</sup> : July 16 <sup>th</sup>	Online and face-to-face
5	Uganda	<u>2020</u> 1 <sup>st</sup> : May 29 <sup>th</sup> , 2 <sup>nd</sup> : September 16 <sup>th</sup>	<u>2020</u> 1 <sup>st</sup> : October 7 <sup>th</sup>	Online
6	Cote d'Ivoire	<u>2020</u> 1 <sup>st</sup> : June 4 <sup>th</sup> <u>2021</u> 2 <sup>nd</sup> : January 20 <sup>th</sup>	<u>2020</u> 1 <sup>st</sup> : September 9 <sup>th</sup>	Ditto
7	Ghana	<u>2020</u>	<u>2020</u>	Ditto

No.	Target	With Japanese Concerned	With Targeted Countries' Concerned	Style of Meeting
		1 <sup>st</sup> : May 28 <sup>th</sup> , 2 <sup>nd</sup> : July 2 <sup>nd</sup> , 3 <sup>rd</sup> : December 23 <sup>rd</sup> <u>2021</u> 4 <sup>th</sup> : March 11 <sup>th</sup>	1 <sup>st</sup> : September 2 <sup>nd</sup>	
8	Liberia	<u>2020</u> 1 <sup>st</sup> : June 10 <sup>th</sup>	<u>2020</u> 1 <sup>st</sup> : October 28 <sup>th</sup>	Ditto
9	Nigeria	<u>2020</u> 1 <sup>st</sup> : June 8 <sup>th</sup> <u>2021</u> 2 <sup>nd</sup> : January 18 <sup>th</sup> , 3 <sup>rd</sup> : January 27 <sup>th</sup>	<u>2020</u> 1 <sup>st</sup> : October 13 <sup>th</sup>	Ditto
10	Senegal	<u>2022</u> 1 <sup>st</sup> : July 5 <sup>th</sup> , 2 <sup>nd</sup> : August 19 <sup>th</sup> , 3 <sup>rd</sup> : August 23 <sup>rd</sup> , 4 <sup>th</sup> : September 16 <sup>th</sup>	<u>2022</u> 1 <sup>st</sup> : August 10 <sup>th</sup> , 2 <sup>nd</sup> & 3 <sup>rd</sup> : August 12 <sup>th</sup> , 4 <sup>th</sup> : August 15 <sup>th</sup> 5 <sup>th</sup> : August 16 <sup>th</sup> , 6 <sup>th</sup> & 7 <sup>th</sup> : August 17 <sup>th</sup> , 8 <sup>th</sup> : August 18 <sup>th</sup> , 9 <sup>th</sup> : August 25 <sup>th</sup> , 10 <sup>th</sup> & 11 <sup>th</sup> : August 29 <sup>th</sup> , 12 <sup>th</sup> & 13 <sup>th</sup> : September 8 <sup>th</sup> , 14 <sup>th</sup> & 15 <sup>th</sup> : September 9 <sup>th</sup> , 16 <sup>th</sup> , 17 <sup>th</sup> & 18 <sup>th</sup> : September 12 <sup>th</sup> , 19 <sup>th</sup> & 20 <sup>th</sup> : September 13 <sup>th</sup> , 21 <sup>st</sup> , 22 <sup>nd</sup> & 23 <sup>rd</sup> : September 14 <sup>th</sup> , 24 <sup>th</sup> : September 15 <sup>th</sup> , 25 <sup>th</sup> & 26 <sup>th</sup> : September 19 <sup>th</sup> , 27 <sup>th</sup> : September 20 <sup>th</sup> , 28 <sup>th</sup> : September 21 <sup>st</sup> , 29 <sup>th</sup> : September 22 <sup>nd</sup> , 30 <sup>th</sup> : September 26 <sup>th</sup> , 31 <sup>st</sup> : September 27 <sup>th</sup> , 32 <sup>nd</sup> & 33 <sup>rd</sup> : September 28 <sup>th</sup> , 34 <sup>th</sup> & 35 <sup>th</sup> : September 29 <sup>th</sup>	Face-to-face
11	Sierra Leone	<u>2020</u> 1 <sup>st</sup> : June 5 <sup>th</sup> , 2 <sup>nd</sup> : June 26 <sup>th</sup> <u>2022</u> 3 <sup>rd</sup> : May 26 <sup>th</sup> , 4 <sup>th</sup> : June 8 <sup>th</sup> , 5 <sup>th</sup> : June 24 <sup>th</sup> , 6 <sup>th</sup> : July 22 <sup>nd</sup>	<u>2020</u> 1 <sup>st</sup> : November 11 <sup>th</sup> <u>2022</u> 2 <sup>nd</sup> , 3 <sup>rd</sup> & 4 <sup>th</sup> : June 9 <sup>th</sup> , 5 <sup>th</sup> : June 10 <sup>th</sup> , 6 <sup>th</sup> & 7 <sup>th</sup> : June 13 <sup>th</sup> , 8 <sup>th</sup> & 9 <sup>th</sup> : June 14 <sup>th</sup> , 10 <sup>th</sup> & 11 <sup>th</sup> : June 15 <sup>th</sup> , 12 <sup>th</sup> , 13 <sup>th</sup> & 14 <sup>th</sup> : June 17 <sup>th</sup> , 15 <sup>th</sup> & 16 <sup>th</sup> : June 20 <sup>th</sup> , 17 <sup>th</sup> , 18 <sup>th</sup> , 19 <sup>th</sup> & 20 <sup>th</sup> : June 21 <sup>st</sup> , 21 <sup>st</sup> & 22 <sup>nd</sup> : June 23 <sup>rd</sup> , 23 <sup>rd</sup> & 24 <sup>th</sup> : June 27 <sup>th</sup> , 25 <sup>th</sup> : June 28 <sup>th</sup> , 26 <sup>th</sup> & 27 <sup>th</sup> : June 29 <sup>th</sup> , 28 <sup>th</sup> : June 30 <sup>th</sup> , 29 <sup>th</sup> & 30 <sup>th</sup> : July 6 <sup>th</sup> , 31 <sup>st</sup> & 32 <sup>nd</sup> : July 7 <sup>th</sup> , 33 <sup>rd</sup> : July 8 <sup>th</sup> , 34 <sup>th</sup> : July 12 <sup>th</sup> , 35 <sup>th</sup> & 36 <sup>th</sup> : July 13 <sup>th</sup> , 37 <sup>th</sup> & 38 <sup>th</sup> : July 14 <sup>th</sup> , 39 <sup>th</sup> & 40 <sup>th</sup> : July 15 <sup>th</sup> , 41 <sup>st</sup> : July 18 <sup>th</sup> , 42 <sup>nd</sup> : July 19 <sup>th</sup> , 43 <sup>rd</sup> , 44 <sup>th</sup> , 45 <sup>th</sup> & 46 <sup>th</sup> : July 20 <sup>th</sup> , 47 <sup>th</sup> : July 21 <sup>st</sup> , 48 <sup>th</sup> : July 23 <sup>rd</sup>	Online and face-to-face
12	Zambia	<u>2020</u> 1 <sup>st</sup> : June 3 <sup>rd</sup> , 2 <sup>nd</sup> : June 23 <sup>rd</sup> <u>2021</u> 3 <sup>rd</sup> : January 22 <sup>nd</sup>	<u>2020</u> 1 <sup>st</sup> : September 17 <sup>th</sup>	Online
13	Cameroon	<u>2020</u> 1 <sup>st</sup> : December 14 <sup>th</sup> <u>2021</u> 2 <sup>nd</sup> : January 26 <sup>th</sup> , 3 <sup>rd</sup> : March 18 <sup>th</sup>	-	Ditto

### **1.4.3 Additional Field Survey**

In order to refine the project plan, field survey and/or remote survey by Japanese survey team were conducted in four (4) countries i.e. Ethiopia, Rwanda, Senegal and Sierra Leone based on discussions with the relevant JICA departments.

## **1.5 Direction toward Finalisation of Survey**

### **1.5.1 Change of Basic Policy of Survey based on Context of CARD Package Grant-Aid**

Based on the remote meetings, the needs for a CARD Package Grant-Aid was summarized, but there were two (2) changes in the basic policy on the necessity of grant-aid. The aim was to collect the information for an ordinary grant aid contributing to CARD2, rather than a CARD Package Grant-Aid as initially expected.

### **1.5.2 Process toward Finalization of Survey**

In November 2020, the restart of overseas travel under JICA operations in target countries came under consideration, which had been restricted since the start of the survey. The restart of travel was not uniform across countries and was determined by the status of COVID-19 infection in each country. In addition, the decision on whether or not to allow local travel by the Survey team was left to the availability of domestic travel movements in each country, as well as the need for such travel. This was due to the need to conduct effective and efficient field survey additionally within a limited period and the fact that many of the targets in the proposed project plan were not based in the capital but in rural areas, such as areas suitable for rice cultivation. In addition, as mentioned above, it was necessary to select the target countries for overseas travel within the time constraints of the 8<sup>th</sup> TICAD to be held in 2022. Based on the above, the proposed project plans for the 12 countries were compiled in the direction shown in the table below.

**Table 1.3 Direction toward Finalization of Proposed Project Plans in Targeted 12 Countries**

<b>No.</b>	<b>Country</b>	<b>Direction</b>
1	Ethiopia	Based on the existing information, the needs were summarized through interviews with the Economic Development Department, the Africa Department, the Financial Cooperation Implementation Department under JICA, the JICA Ethiopia Office, the JICA agricultural adviser, members of the JICA technical cooperation project for Functional Enhancement of the National Rice Research and Training Centre (Ethio-rice), NRDS Focal Point Persons (NRDSFPs) and Task Force (TF) members, etc. The additional field survey was also carried out remotely by Japanese Survey members.
2	Madagascar	Based on the existing information, the needs were summarized through interviews with the Economic Development Department, the Africa Department, the Financial Cooperation Implementation Department under JICA, the JICA Madagascar Office, the JICA agricultural and rural adviser, members of the JICA technical cooperation project for Rice Productivity Improvement and Management of Watershed and Irrigation Area (PAPRiz2), NRDS FPs and TF members, etc.

No.	Country	Direction
3	Rwanda	Based on the existing information, the needs were summarized through interviews with the Economic Development Department, the Africa Department, the Financial Cooperation Implementation Department under JICA, JICA Rwanda Office, JICA agricultural policy adviser, members of the JICA technical cooperation project for Water Management and Capacity Building (WAMCAB), NRDS FPs and TF members, etc. The additional field survey was also carried out by Japanese Survey members.
4	Uganda	Based on the existing information, the needs were summarized through interviews with the Economic Development Department, the Africa Department, the Financial Cooperation Implementation Department under JICA, JICA Uganda Office, members of the JICA technical cooperation projects for Promotion of Rice Development Project Phase 2 (PRiDe2) and for Sustainable Utilization, Operation and Management of Irrigation System in Atari Basin Area, NRDS FPs and TF members, etc.
5	Cote d'Ivoire	Based on the existing information, the needs were summarized through interviews with the Economic Development Department, the Africa Department, the Financial Cooperation Implementation Department under JICA, JICA Cote d'Ivoire Office, members of the JICA technical cooperation project for Local Rice Promotion Project Phase 2 (PRORIL2), NRDS FPs and TF members, etc.
6	Ghana	Based on the existing information, the needs were summarized through interviews with the Economic Development Department, the Africa Department, the Financial Cooperation Implementation Department under JICA, JICA Ghana Office, members of the JICA technical cooperation projects for Enhancing Market-Based Agriculture by Smallholders and Private Sector Linkages in Kpong Irrigation Scheme (KIS) and for Sustainable development of Rain-fed Lowland Rice Production, PHASE TWO (TENSUI2), NRDS FPs and TF members, etc.
7	Liberia	Based on the existing information, the needs were summarized through interviews with the Economic Development Department under JICA, JICA Liberia Field Office (FO), JICA Ghana Office which incharge of Liberia FO, NRDS FPs and TF members, etc. On the other hand, during the study and planning phase of the JICA technical cooperation project for Improving Rice Production for Smallholders (LibRice), which started in 2021, JICA pointed out the lack of capacity in the implementation system on Liberian side and that it was too early to discuss a project plan, so a detailed survey was not carried out.
8	Nigeria	Based on the existing information, the needs were summarized through interviews with the Economic Development Department, the Africa Department, the Financial Cooperation Implementation Department under JICA, the JICA Nigeria Office, the JICA policy adviser, NRDS FPs and TF members, etc.
9	Senegal	Based on the existing information, the needs were summarized through interviews with the Economic Development Department, the Africa Department under JICA, JICA Senegal Office, members of the JICA technical cooperation project for 'Projet de renforcement de la chaine de valeur rizicole dans la vallée du fleuve Sénégal (PAPRIZ3)', etc. An additional field survey was also carried out by Japanese Survey members.
10	Sierra Leone	Based on the existing information, the needs were summarized through interviews with the Economic Development Department under JICA, JICA Sierra Leone Office, JICA Ghana Office which incharge of Sierra Leone Office, members of the JICA technical cooperation project for Sustainable Rice Production Project (SRPP), NRDS FPs and TF members, etc. An additional field survey was also carried out by Japanese Survey members.
11	Zambia	Based on the existing information, the needs were summarized through interviews with the Economic Development Department, the Africa Department, the Financial Cooperation Implementation Department under JICA, JICA Zambia Office, JICA advisor, members of the JICA technical cooperation projects for Market-Oriented Rice Development Project (MOReDeP) and for Support for Sustainable Community Based Irrigation Development Project (E-COBSI), NRDS FPs and TF members, etc. An additional field survey was also carried out by Japanese Survey members.
12	Cameroon	Based on the existing information, the needs were summarized through interviews with



No.	Country	Direction
		the Economic Development Department, the Africa Department, the Financial Cooperation Implementation Department under JICA, JICA Cameroon Office, members of the JICA technical cooperation project for the upland rice and irrigation rice development (RODERIP), NRDS FPs and TF members, etc. An additional field survey was also carried out by Japanese Survey members.

Based on the above, the proposed project plans for the 11 countries, excluding Liberia, which was excluded from the target, are described in the next chapter.



## Chapter 2 Proposed Project Plan

### 2.1 List of Proposed Project Plan

The titles of the proposed project plans for the 11 countries are shown in the table herein below.

**Table 2.1 List of Proposed Project Plans**

No.	Country	Title of Proposed Project Plan
1	Ethiopia	Project for Support of Promotion of Rice Mechanization
2	Madagascar	Project for Development of Seed Production Field and Facilities
3	Rwanda	Project for Increasing Total Factor Productivity through Promotion of Mechanization
4	Uganda	Project for the National Agricultural Innovations and Skills Enhancement Center
5	Cote d'Ivoire	Project for Strengthening of Rice Value Chain
6	Ghana	Project for Enhancement of Rice Seed Multiplication System
7	Nigeria	Project for Enhancement of Rice Seed Multiplication System
8	Senegal	Project for Development of Seed Production Field, Inspection, sorting and Training Facilities
9	Sierra Leone	Project for Development of Seed Production Field and Rehabilitation of Research and Training Facilities
10	Zambia	Project for Development of Seed Production Field and Training Facilities
11	Cameroon	Project for Enhancement of Rice Value Chain

The proposed project plans for the 11 countries are presented below. The background to the project plans in each country including the situation in countries where Kennedy Round Two (2KR) program has been implemented in the past and the support needs are provided in the Annex. The descriptions of the proposals made by the Survey team are given herein below. For Madagascar, Cote d'Ivoire, Ghana, Nigeria and Zambia, JICA has revised the proposed project plans, and preparatory surveys for new cooperation have been carried out.

### 2.2 Proposed Project Plan in Ethiopia: Project for Support of Promotion of Rice Mechanization

#### 2.2.1 Summary of Proposed Project Plan

The project aims to support the promotion of rice mechanization by providing necessary agricultural equipment and materials for the development, training, and introduction of appropriate technologies for agricultural mechanization at the National Rice Research and Training Center (NRRTC) and the Agricultural Research Center (ARC). The total cost of the project is roughly estimated to be 400 million yen.

#### 2.2.2 Background of Project Planning

The NRDS2 sets the goal of improving rice productivity and quality in order to reach 100% self-sufficiency in rice by 2030, compared to the current rate of 20%. Based on this, the NRDS Task Force has identified three priority areas: rice cluster commercialisation promotion, solar pump irrigation development and mechanisation promotion. Meanwhile, the supply and use of pre-harvest, harvest and

post-harvest mechanisation technologies for rice is considered to be at an infant stage. JICA is implementing the Ethio-Rice project to strengthen research and training functions for the NRRTC established by the Ethiopian Institute of Agricultural Research (EIAR) in Fogara, Amhara region, which is a suitable rice growing area. As the previous support had focused on research and training in rice cultivation at the NRRTC, Ethio-Rice 2, the second phase of the Ethio-Rice, will train NRRTC staff as trainers and disseminate the technology to farmers in Amhara region, with a view to disseminating the knowledge to external stakeholders. At the same time, the project plans to strengthen cooperation among stakeholders, including rice stakeholders other than NRRTC, and promote the use of small-scale irrigation and agricultural machinery and its proper operation and maintenance in the three priority areas mentioned above. In the area of agricultural machinery, It is planned to conduct (i) selection and development of appropriate technologies, preparation of training materials and implementation of training in NRRTC, and (ii) support for demonstration of agricultural machinery, its O&M and inspection in rice extension training areas, in order to internalise a certain level of general O&M functions of agricultural machinery into the NRRTC, which were previously outsourced while specialising in rice production. Taking into account the past findings and future activities, the draft project plan aims to equip the NRRTC as well as the ARC responsible for rice promotion in other regions with the necessary equipment including agricultural machinery and maintenance equipment to carry out these activities. On the other hand, during the interview phase, the development of production fields, including the development of solar pump irrigation, was also raised as a need, but was excluded as it is difficult to include in the proposed project plan as rice is still a new crop and the capacity of farmers to take responsibility for its operation and maintenance is still unknown.

### **2.2.3 Project Site**

The target sites are Amhara, Oromia, and two other provinces.

- NRRTC: Fogera, Amhara Region;
- ARC: Gambella, Gambella Region; Jimma, Oromia Region; Tepi, Southern Nations Region

### **2.2.4 Implementation/Responsible Agency**

Ethiopian Institute of Agricultural Research (EIAR) will be the implementing agency for the project, and NRRTC will have responsibility for operate and maintain the project after its implementation.

### **2.2.5 Components**

#### **(1) Facility and Equipment**

The following table shows the components.

**Table 2.2 Components of Proposed Project Plan in Ethiopia**

Target	Item	Specification
NRRTC	Tractor	Tractor (100HP), disk plow, rotary tiller, harrow, seeder, broadcaster
	Tractor	Tractor (40-50HP), rotary tiller, harrow, seeder, broadcaster, trailer
	Transplanter	6-row transplanter, seeder for seedling tray, seedling tray
	Combined harvester	Reaper width 2m
	Batch type mobile dryer	Batch capacity 2 tons
	Machine tools	Lathe, milling machine, drilling machine, welding machine, bending machine, thread saw
	Pick-up truck	3 L Diesel engine
	Station wagon	3 L Diesel engine
	Forklift	1.5ton
	Truck for equipment	4-ton truck with aluminum bridge for loading equipment
	Laboratory equipment (paddy)	
	Inspection equipment	White rice and seed inspection equipment
	Tools for maintenance	Tool set, maintenance tools
ARC	Tractor	Tractor (100HP), disk plow, harrow
	Laboratory equipment (paddy)	
	Inspection equipment	White rice and seed inspection equipment
	Tools for maintenance	Tool set, maintenance tools

## (2) Soft Component

- Technical guidance on operation and maintenance of equipment: guidance on the basic knowledge and skills required to operate and maintain equipment related to various agricultural machineries, post-harvest processing and machine tools.

### 2.2.6 Project Cost Estimation

The total project cost is estimated at 400 million yen.

**Table 2.3 Proposed Estimated Project Cost in Ethiopia**

	Item	Amount (million JPY)
1)	Cost for equipment	341
2)	Soft component	-
3)	Costs for detailed design and supervision	25
4)	Contingency	34
	Total	400

### 2.2.7 Expected Outputs

#### (1) Quantitative Outputs

The quantitative evaluation assumes the following.

**Table 2.4 Proposed Quantitative Outputs of Project Plan in Ethiopia**

Indicator	Baseline value (actual value in 202X)	Target value (202X) (3 years after project completion)	Remark
Total number of trainees (persons/year)	To be confirmed		-
Total number of training session (times/year)			-

## (2) Qualitative Output

Dissemination of mechanization of rice farmers in the vicinity through training and introduction of new technologies conducted within and outside the NRRTC (details to be confirmed in the next stage).

### 2.2.8 Obligation of Recipient Country

- Assignment of a person in charge during project implementation
- Installation of commercial power supply to the facility
- Maintenance of facilities and equipment after construction

### 2.2.9 Points to Note

- Facility construction projects where the period of stay of Japanese experts exceeds eight (8) months were excluded from the scope of this project in consideration of local conditions.
- Two local sites were remotely surveyed as samples. However, the three candidate sites, which were not surveyed during this survey should be surveyed at an early stage of the preparatory survey to confirm the components.

## 2.3 Proposed Project Plan in Madagascar: Project for Development of Seed Production Field and Facilities

### 2.3.1 Summary of Proposed Project Plan

The project aims to increase the production of highly productive certified seeds by improving and renovating the facilities and equipment of the institution responsible for the production and management of certified rice seeds and the original seeds necessary for the production of certified seeds, thereby achieving self-sufficiency and increasing the production of rice in the country. The total estimated project cost is approximately 1,000 million yen.

### 2.3.2 Background of project formulation

The production system for certified seed is described as follows: National Center for Applied Research on Rural Development (FOFIFA) develops the production plan for the registered seed required for the production of certified seed and actually produces the raw seed. In addition, the Seed Production Company (SOC) is in charge of seed quality control and under its guidance, Seed Multiplication Center (CMS), seed production companies, farmer groups and individual farmers produce certified seed from

the registered seed, which is then sold to rice producers. On the other hand, the FOFIFA headquarters, the two experimental and seed production sites located in Alaotra-Mangoro Province, which accounts for 50-60% of the certified seed production in the country, and Bongolava Province in the mid-western Central Highlands, which accounts for about 20%, are not productive due to deterioration of irrigation facilities, non-leveling of the fields, and lack of agricultural machinery and equipment. As a result, they are not performing to half of their expected seed production capacity. In addition, the lack of research equipment for certification and dilapidated laboratories at SOC, which is in charge of seed certification management, have made seed certification inefficient and its management system problematic. Furthermore, the CMS in Alaotra-Mangoro Province, which produces about 20% of the certified seeds in the country, owns 500 ha of paddy fields and has a production capacity of 2,000 tonnes, but productivity improvement is also an issue due to deteriorated irrigation facilities, unlevelled fields and a lack of agricultural machinery. Based on the above background, the objective of the project is to contribute to stabilising and strengthening a certified seed production.

### **2.3.3 Project Site**

Target areas are one of the headquarters (HQs) of National Center for Applied Research on Rural Development (FOFIFA) and National Seed Production Company (SOC) in Antananarivo Province, FOFIFA Research Institute and Seed Multiplication Center (CMS) in Alaotra-Mangoro Province, and FOFIFA Research Institute in Bongolava Province

### **2.3.4 Implementation/Responsible Agency**

The project implementing agency is Ministry of Agriculture and Livestock (MAEP).

### **2.3.5 Components**

#### **(1) Facility and Equipment**

The following table shows the components.

**Table 2.5 Components of Proposed Project Plan in Madagascar**

<b>Objectives</b>		
To improve the production of certified seed needed to increase rice production, the project will renovate and upgrade irrigation facilities at the original seed production center and for certified seed growers.		
<b>Components</b>		
<b>Item</b>	<b>Facilities</b>	<b>Content</b>
Seed production plots	FOFIFA Bongolava Province	2 ha
	FOFIFA Alaotra-Mangoro Province	2 ha
	CMS	550 ha
Rehabilitation of existing irrigation facilities	FOFIFA Alaotra-Mangoro Province	1 reservoir
	FOFIFA Bongolava Province	1 Permanent weir and reservoir

Rehabilitation of existing facilities	FOFIFA Head Quater	Office, etc.
	FOFIFA Alaotra-Mangoro Province	Research building, seed laboratory , seed storage, etc.
	FOFIFA Bongolava Province	Research building, seed laboratory
	CMS	Office, seed storage
Machinery	FOFIFA Alaotra-Mangoro Province	Agricultural machinery (rice transplanters, tractors, etc.)
	FOFIFA Bongolava Province	Inspection equipment for seed certification (dryers, chemical testing equipment, etc.), agricultural machinery (rice transplanters, tractors, etc.)
	SOC	

## (2) Soft Component

The soft component will plan the following item related to the agricultural machinery to be installed.

- Strengthening the maintenance and management systems of facilities

### 2.3.6 Project Cost Estimation

The total project cost is roughly estimated as 1,000 million yen.

### 2.3.7 Expected Outputs

The quantitative evaluation assumes the following outputs, details of which will be confirmed in the next stage.

**Table 2.6 Proposed Quantitative Outputs of Project Plan in Madagascar**

Indicator	Reference value (Actual result in 20XX)	Target value (202X) (3 years after the project completion)	Remarks
Certified seed production (tons)	To be confirmed		
Number of seed tests by SOC (times)			

### 2.3.8 Obligation of Recipient Country

- Assignment of a person in charge during project implementation

### 2.3.9 Points to Note

- The effect of the rainy season needs to be taken into account when considering the schedule of civil works.



## **2.4 Proposed Project Plan in Rwanda: Project for Increasing Total Factor Productivity through Promotion of Mechanization**

### **2.4.1 Summary of Proposed Project Plan**

The project aims to promote agricultural mechanisation in the region through operational trials of agricultural machinery, demonstration of operation for youth, cooperatives and service providers, and training for operators and technicians in the area around RAB's regional stations, together with other government initiatives to support the introduction of agricultural machinery.

### **2.4.2 Background of Project Planning**

Promotion of mechanisation is raised in the NRDS2 as an important initiative to improve rice productivity and quality, alongside the dissemination of modern agricultural technologies, particularly the use of quality seeds and chemical fertilisers. RAB, which is the implementation agency for the rice sector, conducts demonstrations and training using agricultural machinery in several areas to promote mechanisation, but the quantity of agricultural machinery is not sufficient for effective dissemination and promotion, and the rapid decentralisation in Rwanda results in a limited number of officials, including technicians in the RAB. Therefore, in terms of improving access to agricultural machinery except for demonstrations and training, the government is responsible for the maintenance and management of the machineries, but the RAB has taken measures to involve the private sector, such as service providers and cooperatives, to provide services to farmers. Some succeeded private service providers in this approach have purchased machines themselves and operate mechanisation services completely independent of the government, but their absolute numbers remain limited and there are disparities between areas. To further promote mechanisation, it is important to increase the number of private service providers working in partnership with the government, and more agricultural machinery is needed to achieve this. Based on “The study on sustainable rural and agricultural development in Bugesera District, eastern province in the Republic of Rwanda”, JICA has implemented a technical cooperation project “Project for Increasing Crop Production with Quality Extension Services in the Eastern Province” and its successor, “Smallholder market-oriented agriculture project in the Republic of Rwanda (SMAP)”, to strengthen the capacity of cooperatives handling horticultural crops and cereals, and grant aid projects on irrigation development (“The Project for Development of Irrigation Scheme in Ngoma District” and “The Project for Rehabilitation of Irrigation Facilities in Rwamagana District”) have been implemented in two target districts. In addition, the Project for Water Management and Capacity Building (WAMCAB) is under implementation, utilising the results of an SMAP and grant aid projects. In order to further the promotion of rice, it is necessary to develop a new approach of cooperation to promote high value-added and business-oriented agriculture through the effective use of existing irrigation facilities. WAMCAB is working on both policy aspects and capacity development of organisations, such as organisation management, O&M, water management and farming, with a view to improving irrigation water management capacities. The promotion of mechanisation in farming, which

is proposed as one of the new approach of cooperation, is not currently included in WAMCAB. However, the draft project plan is prepared based on the assumption that it could be included in WAMCAB in the future and is designed for RAB as an implementation agency that currently work in cooperation with WAMCAB.

### **2.4.3 Project Site**

The target districts are the main rice production areas around Huye, Nyagatare, Ngoma, Nyamasheke, Kikukiro and Muhanga districts, where RAB's regional stations are located, and three of such target districts are covered by Project for Water Management and Capacity Building in the Republic of Rwanda (WAMCAB).

### **2.4.4 Implementation/Responsible Agency**

#### **(1) Project Implementation Agency**

The project implementing agency, RAB, is the body responsible for agricultural practices, with an Agricultural Development Department and a Livestock Resources Development Department.

#### **(2) Operation and Maintenance Structure**

RAB Stations are responsible for operation and maintenance for the project equipment.

### **2.4.5 Components**

#### **(1) Facility and Equipment**

**Table 2.7 Components of Proposed Project Plan in Rwanda**

<b>Purpose and Function</b>
Install equipment to improve rice productivity and quality in areas surrounding RAB stations in the WAMCAB target areas and in the main rice production areas.
<b>Component</b>
<b>【Equipment】</b> Equipment for improving rice productivity: 3 large tractors , 24 medium tractors, 20 transplanters, 12 boom sprayers, 20 harvesters, 31 threshers, 31 winnowers, 15 combine harvesters, 14 dryers, 11 trailers, 1 pick-up truck, 6 sets of maintenance equipment.
<b>Contents</b>
<ul style="list-style-type: none"><li>• Equipment for improving rice productivity</li><li>• Maintenance tools</li><li>• Spare parts</li></ul>

## **(2) Soft Component**

The soft components assume the following cooperation related to the agricultural machinery to be installed.

- Guidance on equipment operation and maintenance methods: Provide technical guidance on the operation and maintenance of various types of equipment.
- Preparation of equipment maintenance plans: Prepare annual maintenance plans for equipment in line with plans for research, training and demonstrations.

### **2.4.6 Project Cost Estimation**

The total project cost is estimated at 400 million yen and breakdown of costs item wise which included the construction cost covered by Rwandan government are listed in the following table.

**Table 2.8 Proposed Estimated Project Cost of CARD Grant Aid in Rwanda**

	<b>Item</b>	<b>Amount (million JPY)</b>
1)	Construction costs	-
2)	Cost for equipment	730
3)	Soft component	20
4)	Costs for detailed design and supervision	22
5)	Contingency	0
	Total	772

### **2.4.7 Expected Outputs**

Through the proposed project, the following benefits are expected in the targeted areas.

- Through training and demonstration after confirming local adaptability, labour productivity in smallholder plots is increased and land productivity is improved as a result of timely operation of improved equipment operational capacity of youth, farmers' organisations and agricultural machinery service providers.

### **2.4.8 Obligation of Recipient Country**

- Dispatch of the responsible person in charge during project implementation
- Selection of target operators.
- Construction of garage and warehouses for agricultural machineries to store the equipment provided by the project.

#### **2.4.9 Points to Note**

- A roadmap of the promotion plan for agricultural mechanisation activities in rice cultivation, such as ploughing services and equipment rental services will be developed. Furthermore, in order to clarify the roles of the government, private operators and farmers' groups, the feasibility of these services should be confirmed through pilot projects and the content of the grant aid project should be reviewed based on the results.
- To confirm in advance that the budget for the operation and maintenance of the equipment and materials provided by the project will be allocated appropriately by the host government.

### **2.5 Proposed Project Plan in Uganda: Project for the National Agricultural Innovations and Skills Enhancement Center**

#### **2.5.1 Summary of Proposed Project Plan**

The objective is to continue to promote and establish the 'RICE model'<sup>1</sup> based on research and extension collaboration, and to extend this model to other agricultural products as far as possible. In this context, central government, regional centres and local government will work together to provide appropriate training to extension service providers and farmers based on regional characteristics, and to develop a system to accumulate various types of information for central government.

#### **2.5.2 Background of Project Planning**

The NRDS positions rice as an important grain for improving farmers' income and food security, and aimed to increase production and productivity, and it is assumed that NRDS2 will continue to aim for the same goals along with the higher level policies and strategies. Although JICA has supported the increase in rice production through the Promotion of Rice Development Project (PRiDe) by improving the research and development capacity of rice-related research institutions based at National Crops Resources Research Institute (NaCRRI) and disseminating technology to rice farmers, rice productivity still needs to be raised. In addition, the challenge was to strengthen the capacity to produce high-quality rice in order to further increase the distribution volume of domestically produced rice. From the above, PRiDe 2, Phase 2 of PRiDe, supports the development of research, training and extension systems to improve rice productivity and quality, and proactively develop rice farmers' human resources. Although the NaCRRI as a base was developed through the Rice Research and Training Centre construction programme, there is an urgent need to strengthen and expand the functions of the 11 Zonal Agricultural Research and Development Institutes (ZARDIs) in the country together with NaCRRI in order to promote cultivation methods adapted to the different climatic conditions and to develop rice farmers who can adapt to these methods, along with the progress of rice promotion in Uganda. In addition, there is a need to introduce a remote training system connecting the three rice-related experimental stations at

---

<sup>1</sup> A model for development of training materials in collaboration with research and extension, and research and extension collaboration model that packages train-the-trainer and farmer training

the central and regional levels in order to further improvement of training quality and efficiency for human resource development, and the proposed project plan is designed to strengthen the functions of these PRiDe2.

### **2.5.3 Project Site**

Candidate sites are Kampala, Wakiso District in Central region, Bulambuli, Mayuge and Mbale District in Eastern region, Arua District in Northern region, and Kabarole District in the Western region

### **2.5.4 Implementation/Responsible Agency**

The project is designed to be managed directly by the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Directorate of Agricultural Extension Services, and National Agriculture Research Organization (NARO) will play the role of host. Activities will be carried out to cover broadly three (3) main components: (1) training implementation, (2) promotion of digital transformation (DX) in agriculture and (3) operation of regional centers. The role of the responsibility for regional centers is expected to be played by Zonal Agricultural Research and Development Institute (ZARDI) under NARO, as the Directorate of Agricultural Extension Services does not have mandate/ function to manage regional units.

### **2.5.5 Components**

#### **(1) Facility and Equipment**

##### **1) National Crops Resources Research Institute (NaCRRI)**

**Table 2.9 Components of Proposed Project Plan for NaCRRI in Uganda**

<b>Purpose and Functions</b>	
Establish a seed processing unit to enable the supply of quality seed to private seed companies, in addition to the supply of seed to service providers. Expand and rehabilitate training and demonstration plots through field development. Through the installation of research and training equipment and materials, it will be possible to strengthen collaboration in research and extension, and to enable for providing remote training.	
<b>Components</b>	
<b>【Facility】</b> Farm land consolidation	
<b>【Equipment】</b> Seed processing Unit, Research and training equipment and materials	
<b>Contents</b>	
Farm land consolidation	To be identified
Seed processing Unit,	To be identified
Research and training equipment and materials	To be identified

##### **2) ZARDIs**

**Table 2.10 Components of Proposed Project Plan for ZARDIs in Uganda**

<b>Purpose and Functions</b>	
Provide research and training equipment and materials to develop training materials through enhanced collaboration on research and extension among NaCRRI, other central institutions and ZARDI, and to achieve to develop a framework that enables the remote training to be implemented.	
<b>Components</b>	
<b>【Equipment】</b>	
Research and training equipment and materials	
<b>Contents</b>	
Research and training equipment and materials	-

### 3) Department of Agricultural Infrastructure, Mechanisation and Water for Agricultural Production (DAIMWAP) in MAAIF

**Table 2.11 Components of Proposed Project Plan for DAIMWAP in Uganda**

<b>Purpose and functions</b>	
The RICE model will be supplemented with an irrigated rice farming component and technical assistance will be provided to irrigated rice farming areas in the country through the NAISE centres. (Potential target areas: Atari Irrigation scheme, Mbuku Irrigation scheme, Olweny Irrigation scheme and others).	
<b>Components</b>	
<b>【Equipment】</b>	
Equipment and Machinery for land consolidation and irrigation development	
<b>Contents</b>	
Equipment and Machinery for land consolidation and irrigation development	Construction equipment (bulldozers (including laser leveling equipment)), Backhoes, truck trailers, Mobile repair vehicles, spare parts), Agricultural machinery (tractors, spare parts)

### 4) National Agricultural Innovation and Skills Enhancement (NAISE) Center

**Table 2.12 Components of Proposed Project Plan for NAISE Center in Uganda**

<b>Purpose and functions</b>	
The NAISE Centre will be established as a platform for training implementation, including the use of research and educational institution, and the Centre will comprehensively manage the various types of training that have been conducted by individual service providers, accumulate knowledge and develop an efficient and effective training implementation platform.	
<b>Components</b>	
<b>【Facility】</b>	
Office building / Training facility / Accommodation facility	
<b>【Equipment】</b>	
Solar power generation systems/ IT infrastructure / related equipment	
<b>Contents</b>	
Office building	Office, Board room ,Recording room, Warehouse, Canteen / Office kitchenette
Accommodation facility	More than 30 rooms, Kitchenette, Meeting room, Administrative room, Warehouse
Training facility	Class room, ICT room, Maternity room, Pray room
IT infrastructure	Installation of fiber optic cable from the Kampala.
Solar power generation systems	The scale of electricity generation is assumed to be large enough to supply the entire facility.

## **(2) Soft Component**

The soft components required are yet to be determined.

### **2.5.6 Project Cost Estimation**

The estimated project cost and the breakdown of the costs are yet to be determined.

### **2.5.7 Expected Outputs**

Through the proposed project, the following benefits are expected in the targeted areas.

As the objective of the project is to establish a training platform, it is planned to strengthen the system by increasing the number of partners in a step-by-step manner. Therefore, the following Outputs are expected from this project.

- To establish the 'RICE Model' as a system, promote extension activities in collaboration with the central government, regional centres and local governments, and develop an environment in which training-related information can be accumulated in the central government.
- Aim to develop the 'RICE model' for other agricultural products as far as possible.
- Build up a role as a hub, for example by presenting solutions to challenges identified at the farmer level and also facilitating research to arrange the finding of solutions to challenges for which no solutions have been found, through research promotion.
- To strengthen the packaging and other aspects besides farming techniques in collaboration with other institutions, such as universities.

In addition, the Directorate-General for Extension will establish a system to manage formal training in an integrated framework.

### **2.5.8 Obligation of Recipient Country**

- Allocation of activity budgets and acquisition of project codes for this purpose
- Hiring and staffing of new permanent staff for the operation of NAISE centres

### **2.5.9 Points to Note**

- The effect of the rainy season needs to be taken into account when considering the schedule of civil works.

## **2.6 Proposed Project Plan in Cote d'Ivoire: Project for Strengthening of Rice Value Chain**

### **2.6.1 Summary of Proposed Project Plan**

The project aims to increase local rice production that can compete with imported rice by producing superior rice seeds, improving rice productivity, and improving harvesting and post-harvest processing techniques. The total estimated project cost is approximately 825 million yen.

### **2.6.2 Background of Project Planning**

The revised SNDR sets targets to achieve self-sufficiency through high-quality domestic rice by 2025 and to become a rice exporter to other African countries by 2030. The SNDMA, a sectoral strategy document on mechanisation, emphasises the use of the private sector, in particular improving farmers' access to agricultural mechanisation services, providing training to actors in the agricultural machinery sector, improving relevant regulations, and proposes support to PMEAs working as service providers. JICA implemented PRORIL to improve rice production and milling practices, improve access to inputs such as quality seeds and credits, strengthen collaboration among value chain actors, and increase rice production and sales through domestic rice marketing promotion activities. As a result, the project has achieved a 50% increase in the production and sales volume of target farmers compared to the before the project, promoted the involvement of financial institutions in the rice sector, and strengthened collaboration among value chain actors. PRORIL2, which was launched based on these results, aims to improve the quality of domestic rice to competitive with rice imports from Asia and further promote domestic rice value chain, and continues efforts through technical guidance and institution building for the PMEAs that form the core of the project. It is expected that increasing number of experienced companies and machinery owners will be able to further promote mechanisation based on the continuation of the Government's programme promotion activities and capacity development activities by PRORIL2, although the number of PMEAs providing agricultural mechanisation services in the rice sector remains at 13 companies. The draft project plan is associated with this government policy and expectations and the project activity of PRORIL2, which is well timed and will accelerate it.

### **2.6.3 Project Site**

Target areas are Local Rice Promotion Project in Côte d'Ivoire Phase 2 (PRORIL2) target regions and surrounding areas.

- PRORIL 2 target regions: Yamoussoukro / Gbêkê / Berrié
- Major rice producing areas around the above target regions

### **2.6.4 Implementation/Responsible Agency**

The project implementing agency is the Ministry of State and Agriculture and Rural Development



(MEMINADER).

## 2.6.5 Components

### (1) Facility and Equipment

**Table 2.13 Components of Proposed Project Plan in Cote d'Ivoire**

<b>Objectives</b>
In the target areas of PRORIL2 and surrounding areas, equipment will be installed to achieve the following objectives: - Improve labor and land productivity in rice fields - Improvement of rice milling quality in small and medium scale local rice millers
<b>Components</b>
<b>【Equipment】</b> (1) Equipment for improving rice productivity Medium size tractor + Related attachments <30 units> Large size tractor + Related attachments <10 units> Small size combine harvester <10 units> (2) Equipment for improving milled rice quality Paddy dryer <20 units> Destoner <30 units> Color sorters <5 units>
<b>Contents</b>
Equipment for improving rice productivity, Equipment for improving milled rice quality, Maintenance tools / Replacement parts

### (2) Soft Component

The soft component is expected to include the following content related to the agricultural machineries to be installed.

- Technical guidance on operation and maintenance of equipment: Provide guidance on the basic knowledge and techniques required to operate and maintain various types of agricultural machinery and post-harvest processing machinery.

## 2.6.6 Project Cost Estimation

The approximate total project cost is estimated at 847 million yen.

**Table 2.14 Proposed Estimated Project Cost in Cote d'Ivoire**

	<b>Items</b>	<b>Million Yen</b>
1)	Construction Cost	0
2)	Equipment Procurement Costs	787
3)	Soft Component Cost	10
4)	Detailed design and design supervision costs	25
5)	Preliminary expenses	25
	<b>Total</b>	<b>847</b>

## 2.6.7 ExpectedOutputs

The implementation of the project is expected to produce the following results in the target areas.

- Improvement of labor productivity of small-scale rice farmers through the improved equipment operation capacity of agricultural machinery service providers and improvement of land productivity through timely field work
- Improvement of milled rice quality in small and midde scale rice milling factories

The following are proposed indicators in terms of quantitative Outputs of the project.

**Table 2.15 Proposed Quantative Outputs of Project Plan in Cote d'Ivoire**

Indicators	Standard Value (Year 2019)	Target Value (Year 202X) (3 years after project completion)	Remarks
Improvement of rice milling quality	Not available	To be confirmed	<ul style="list-style-type: none"> <li>➤ Percentage of broken rice</li> <li>➤ Percentage of stone</li> <li>➤ Percentage of colored grains</li> </ul>
Decrease in rice production costs	Not available		<ul style="list-style-type: none"> <li>➤ Cost of field preparation</li> <li>➤ Cost of harvest</li> </ul>

## 2.6.8 Obligation of Recipient Country

- Assignment of a person in charge of the project at the time of implementation
- Selection of target business operators

## 2.6.9 Points to Note

- Confirm the current leasing system of agricultural machinery operated by Rice Development Agency (ADERIZ)
- Propose modifications of the leasing system in case it is required.
  - It is necessary to confirm whether the selection criteria (in particular, experience and ability required for continuous business operation, availability of a business plan, availability of sufficient working capital, securing customers, availability of operators and other human resources) and method for the selection of private agricultural machinery service providers to be involved in the project are clear.
  - It is necessary to confirm the details of the leasing system, such as the duration of the equipment lease, the leasing fee, the cost of parts and repairs in case of breakdowns, and the process for dealing with violation matters.

## **2.7 Proposed Project Plan in Ghana: Project for Enhancement of Rice Seed Multiplication System**

### **2.7.1 Summary of Proposed Project Plan**

The project aims to increase the production of quality seeds (mainly certified seeds) and improve rice productivity by procuring necessary equipment and seed storage equipment to produce and improve the quality of quality seeds in four (4) irrigation schemes under the Ghana Irrigation Development Authority (GIDA) by procuring the necessary equipment and seed storage facilities to increase the production and quality of quality seed under GIDA, which supplies seeds (breeder seeds, foundation seeds and certified seeds). The total estimated project cost is approximately 528 million yen.

### **2.7.2 Background of Project Planning**

NRDS1 has been prepared in line with Food and Agriculture Sector Development Policy (FASDEP), the top-level policy for the agricultural sector, and Medium Term Agriculture Sector Investment Plan (METASIP), the policy's action plan. Issues such as quality seeds were identified in the review of NRDS 1 results in 2019, and a seed strategy was expected to be proposed in NRDS 2. JICA implemented the Sustainable Development of Rain-fed Lowland Rice Production Project (TENSUI) to increase rice production by increasing the yield and area under cultivation, and in TENSUI and its successor, TENSUI2, JICA carried out technology development and dissemination of rainfed rice cultivation. Furthermore, the capacity development of Ghana Irrigation Development Authority (GIDA) in facility operation and management, establishment and operation of water users' associations and dissemination of improved technologies for irrigated rice cultivation were carried out in Project for Enhancing Market-Based Agriculture by Smallholders and Private Sector Linkages in Kpong Irrigation Scheme (MASAPS-KIS). Ghana Rice Production Improvement Project (GRIP) was planned to be launched as a successor to the two technical cooperation projects TENSUI2 and KIS. In addition to activities such as the establishment and operation of water users' associations and the dissemination of improved methods of irrigated rice cultivation, the GRIP was also planned to strengthen quality seed production and management systems to increase rice yield, and the proposed project plan proposed to supplement the GRIP as a means of procuring equipment to increase the effectiveness of these activities.

### **2.7.3 Project Site**

The target area are four (4) irrigation districts in rural areas supervised by GIDA.

- Kpong irrigation scheme: Greater Accra Region
- Tono irrigation scheme: Upper East Region
- Bontanga irrigation scheme: Northern Region
- Weta irrigation scheme: Volta Region

## 2.7.4 Implementation/Responsible Agency

The project implementing agencies are expected to be Ministry of Food and Agriculture (MoFA), GIDA, and Savanna Agriculture Research Institute (SARI). The same institutions are also expected to be in charge of operation and maintenance after the project implementation.

The irrigation scheme facilities, agricultural machinery and seed storage facilities are under the jurisdiction of GIDA, which will be responsible for the maintenance system. For the seed drying and sorting plant, the MoFA Plant Protection and Regulatory Services Department (PPRSD) will be responsible for the maintenance of the two Bontanga-Tono sites attached to the irrigation scheme. In addition, only one seed storage unit is expected to be supported by SARI, and the institute will be responsible for the operation of such equipment, along with its maintenance.

## 2.7.5 Components

### (1) Facility and Equipment

**Table 2.16 Components of Proposed Project Plan in Ghana**

<b>Purpose and Function</b>
To introduce necessary agricultural machinery and seed storage equipment to each of the four irrigation districts under the jurisdiction of the Ghana Irrigation Development Corporation in order to improve the production and quality of quality seed in the four irrigation districts.
<b>Component</b>
<b>Equipment</b> (1) Equipment for seed cultivation: One medium-sized (40-50 hp) tractor + various work equipment (disk plow, rotary, paddy wheels, trailer), one combine harvester (2m wide), and one combine harvester (2m wide). 1 combine harvester (cutting width: 2 m), 1 tiller (12 hp) 1 tiller (12 hp) + various work equipment (cage wheels, trailer) (2) Equipment for post-harvest processing of seeds: 1 stationary dryer (3 tons) with coarse sorter, 1 seed sorting plant (2 tons) One set of seed sorting plant (2 tons), one set of low-temperature humidity-controlled storage (upstream) Low-temperature humidity-controlled storage (for upstream seed storage) Rice milling and seed inspection equipment Maintenance equipment, etc.
<b>Content</b>
Equipment for seed cultivation and post-harvest processing Equipment for rice milling and seed inspection

### (2) Soft Component

The soft component envisages the following measures and cooperation related to the agricultural machinery to be installed

- Preparation of seed production plan: A new seed production plan will be prepared for the expansion of seed cultivation and post-harvest processing facilities.
- Guidance on seed production: To ensure efficient production of high quality seeds, the project will provide practical guidance on how to properly operate the facilities and equipment to be introduced. In addition, guidance on seed cultivation techniques will also be provided.

- Technical guidance on the operation and maintenance of equipment: Provide guidance on the knowledge and techniques required for the operation and maintenance of various agricultural machinery and post-harvest processing equipment.

## 2.7.6 Project Cost Estimation

The estimated total project cost is 528 million yen.

**Table 2.17 Estimated project cost for CARD grant aid in Ghana**

	Item	Total(million yen)
1)	Construction cost	0
2)	Equipment Procurement Costs	480
3)	Soft Component	23
4)	Implementation Design and Design Supervision Costs	25
5)	Preliminary expenses	0
	Total	528

## 2.7.7 Expected Outputs

This cooperation is expected to stabilize the production base of quality seeds and increase production. The quantitative Outputs will be measured in terms of seed production and rice production as shown in the table herein below.

**Table 2.18 Proposed quantitative Outputs of the CARD grant aid project in Ghana**

Indicator	Reference value (Actual result in 2019)	Target value(202X) (3 years after the project completion)	Remarks
Certified seed (CS) production in the target irrigated areas (tons/year)	To be confirmed		
Rice (fresh rice) yield (tons/ha) in the target irrigated area	Central Research Institute: XX tons		

Qualitative Outputs: Improvement of rice quality and productivity, livelihood of small farmers.

## 2.7.8 Obligation of Recipient Country

The following items shows obligation of recipient country.

- Assignment of a person in charge at the time of project implementation
- Installation of commercial power supply to the facility
- Maintenance of equipment after construction

## 2.7.9 Points to Note

Issues and points to be considered in the future implementation of the preparatory survey for cooperation and this proposed cooperation menu are described herein below.

- Regarding field machinery, since each irrigation office does not have functional own service business provision with equipment and does not conduct rice cultivation on its own, it is assumed that facilities related to equipment checks, equipment and tools for operation and maintenance, and human resources such as operators and maintenance personnel have not been secured. Therefore, it is necessary to fully consider the possibility of human resource development through the soft component and the linkage with the technical cooperation projects in the long term.
- Regarding field machinery and post-harvest processing equipment for seeds, since operation and maintenance will require labor costs, parts procurement/inspection and repair, fuel and utility costs, it is necessary to provide an estimate of the budget required and secure the confirmation that the government can allocate the budget.

## **2.8 Proposed Project Plan in Nigeria: Project for Enhancement of Rice Seed Multiplication System**

### **2.8.1 Summary of Proposed Project Plan**

The project aims to renovate facilities and provide equipment and materials for cultivation and post-harvest processing at the National Cereal Research Institute (NCRI) and its regional stations, which are the source of seeds foundation seed, basic seed, and certified seed) needed to increase rice production. The total estimated project cost is approximately 1,200 million yen.

### **2.8.2 Background of Project Planning**

FMARD aimed to achieve self-sufficiency of rice by 2020 based on the NRDS and related policies, but has not yet achieved it. Therefore, Federal Ministry of Agriculture and Rural Development (FMARD) has set a target in the NRDS2 to double domestic production of rice by 2030, and it has identified the development of a sustainable seed production system as one of its priorities, in addition to the improvement of rice productivity and mechanisation. The quality and supply of certified seed used by rice farmers for cultivation is particularly important for increasing rice production. In Nigeria, breeder seed and foundation seed, which is the source of certified seed for rice, is produced only by NCRI and the International Institute of Tropical Agriculture. However, due to the deterioration of infrastructure for seed production and post-harvest processing equipment at NCRI, it is currently unable to supply sufficient quantities of breeder seed and foundation seed, and there is potential for improvement in quality. It is expected to improve the rice seed supply system through strengthening the seed production system of NCRI, which plays a key role in domestic seed production, thereby increasing the production capacity of rice breeder and foundation seed. The proposed project plan is based on a scale considered appropriate for public institutions in the field of seed multiplication, taking into account their jurisdiction and their performance. Based on the above background, the project aims to contribute to the strengthening of the production system of public institutions in the field of seed multiplication.

### 2.8.3 Project Site

The project sites are NCRI and its regional stations.

- NCRI: Niger State
- Regional station: Kebbi and Kwara states

### 2.8.4 Implementation/Responsible Agency

The project implementing agency is Federal Ministry of Agriculture and Rural Development (FMARD), and NCRI is planned as the agency in charge of operation and maintenance after the project implementation.

### 2.8.5 Components

#### (1) Facility and Equipment

**Table 2.19 Components of Proposed Project Plan in Nigeria**

Purpose and Function		
Install agricultural machinery at NCRI and the research stations and renovation of water intake facilities at NCRI to improve capacities of rice seed production (breeder seed, foundation seed, and certified seed) and seed supply, both.		
Component		
Place	Item	Specifications
<b>Facility</b>		
NCRI, ARC Mokwa, Nija state Bacita ARC, Kwara state, Birnin-Kebbi ARC, Kebi state	Shelter for machinery	W14xD20xH4mx1place
	Workshop for machinry and equipment	W14xD20xH4mx1place
	Shelter doe a seed dryer and a cleaning unit	W30xD10xH8mx1place
NCRI	Irrigation Facility Rehabilitation	Water intake weir: Repair of movable weir (sluice gate) and weir post Water intake works: Repair of intake gates Levee improvement: 100m (left and right) improvement ※Fundamental improvement of levees is not included
<b>Equipment</b>		
NCRI, ARC Mokwa, Nija state Bacita ARC, Kwara state, Birnin-Kebbi ARC, Kebi state	Machinery 1 set for each station	Two tractors with rotary tiller, chemical, sprayer, wheel, One transplanting machine, One combined harvester, One mechanical seed dryer, seed cleaning unit, One set of maintenance tools, One set of spare parts

#### (2) Soft Component

The soft component will plan the following items related to the agricultural machinery for installation.

- Preparation of a seed production plan: A new seed production plan will be prepared in conjunction with the expansion of seed cultivation and post-harvest processing facilities.

- Guidance on seed production: Provide practical guidance on how to properly operate the facilities and equipment to be introduced in order to efficiently produce high quality seeds. In addition, guidance on seed cultivation techniques will also be provided.

### (3) Project Cost Estimation

The total project cost is estimated to be 1,200 million yen.

**Table 2.20 Proposed Estimated Project Cost in Nigeria**

	Item	Amount (million JPY)
1)	Construction costs	330
2)	Cost for equipment	530
3)	Soft component	20
4)	Costs for detailed design and supervision	240
5)	Contingency	60
	Total	1,200

### (4) Expected Output

This project is expected to stabilize and increase the production of high-quality seeds. The quantitative output will be measured in terms of seed production and rice production as shown in the table below.

**Table 2.21 Proposed Quantitative Output of Project Plan in Nigeria**

Indicator	Reference value (Actual result in 20XX)	Target value (202X) (3 years after the project completion)	Remarks
Seed production (original seed, original seed, and certified seed) (tons)	To be confirmed		
Rice production (tons)			

### (5) Obligation of Recipient Country

- Assignment of a person in charge during project implementation
- Securing the site for the project
- Installation of commercial power supply to the facility
- Maintenance of facilities and equipment after the completion of the construction

### (6) Points to Note

- The effect of the rainy season needs to be taken into account when considering the schedule of civil works.



## **2.9 Proposed Project Plan in Senegal: Project for Development of Seed Production Field, Inspection, sorting and Training Facilities**

### **2.9.1 Project summary**

The project will strengthen infrastructure and facility for rice seed production, distribution and human resource development spread across the Senegal River Basin, which stretches from the north to the north-east of Senegal. It will also strengthen upstream seed production and supply capacity through increased production of breeder seed (BS) and foundation seed (FS) by ISRA, improved seed sorting machinery under the management of DRDR and strengthened training facilities owned by CIFA, thereby contributing to increased rice production in the country.

### **2.9.2 Background of Project Planning**

The PNAR, which corresponds to the NRDS, defined a target to produce competitive milled rice of 1 million tonnes (1.5 million tonnes in unhusked rice) and also set a target to achieve rice self-sufficiency by 2017, but the target was not achieved. On the other hand, some progress and successes have been observed in components in the value chain, and these have been attributed to the Government's high level of commitment to success. The actors involved in the value chain (industry, academia and government sectors in combination) are also active, particularly in the irrigated rice growing areas in the north of the country. Through the study on the reorganization of the production of rice in Senegal, JICA supported the preparation of a master plan for the promotion of rice cultivation in Senegal and proposed priority programmes. Based on this, Project on Improvement of Rice Productivity for Irrigation Schemes in the Valley of Senegal (PAPRIZ) and PAPRIZ2, Phase 2 of PAPRIZ, provided capacity building to actors in the Senegal River Basin, including the private sector, and supported the preparation of a new master plan for the Senegal Rive. A further successor project, PAPRIZ3, is currently being implemented. In addition, a preparatory survey on the Senegal River valley irrigated rice farming improvement project will expand the activities of PAPRIZ2 and implement priority projects in the master plan. From the above, the Government and other donors such as JICA are strengthening the capacity of necessary actors in line with government policy. On the other hand, while PAPRIZ2 also addresses the challenges of certified seed production outsourced to the private sector at the field level, there are also challenges for Early Generation Seed<sup>2</sup> regarding to seed multiplication. The challenge in early generation seed production is the deterioration and malfunctioning of the facilities under public institutions which is responsible for seed production systems, and the proposed project plan aims to contribute to strengthening the solution to these problems.

### **2.9.3 Project site**

- ISRA Ndiol station in Dagana Department, Saint-Louics Region
- ISRA Fanaye station in Podor Department, Saint-Louics Region

---

<sup>2</sup> Early generation seed includes Breeder seed and Foundation seed

- DISEM seed laboratory and DRDR Seed sorting centre (CTS: Centre de Traitement des Semences) in Dagana Department, Saint-Louics Region
- CIFA in Dagana Department, Saint-Louics Region

## 2.9.4 Implementation/Responsible Agency

Rice cultivation in the Senegal River Basin is mainly controlled by the Société d'Aménagement et d'Exploitation des Terres du Delta du fleuve Sénégal et des Vallées du fleuve Sénégal et de la Falémé (SAED), which is a public corporation for the development of irrigation in the Senegal River Delta and work in association with ISRA as the organization in charge of rice breeding and BS/FS production, CIFA as the agricultural training organization independent of SAED, and MAERSA as the organization responsible for seed quality inspection. The organization in charge of inspection of seed quality is DISEM, which is under MAERSA at the central level, and DRDR, which is MAERSA's regional agency at the regional level.

## 2.9.5 Components

### (1) Facility and Equipment

#### 1) Ndiol station

**Table 2.22 Purpose, Functions and Components (Seed production fields in Ndiol station)**

<b>Purpose and Functions</b>
Reinforce the seed production infrastructure to enable the production of BS and FS in sufficient quantities to supply good quality seed in the country.
<b>Components</b>
<b>[Facilities]</b> <ul style="list-style-type: none"> <li>• Rehabilitation of seed production fields (50 ha: improving irrigation and drainage canals and farm roads).</li> <li>• Rehabilitation of pumping stations</li> <li>• Rehabilitation of administrative offices and warehouses for fertilizers and seeds</li> <li>• Renovation of dry yards with bird nets</li> </ul> <b>[Equipment]</b> <ul style="list-style-type: none"> <li>• Refurbishment of farm machinery</li> </ul>
<b>Contents</b>
<ul style="list-style-type: none"> <li>• Rehabilitation of irrigation pumps, main and secondary canals and farm roads in the field to improve productivity, for Ndiol stations where seed production capacity is limited due to deterioration of the production infrastructure.</li> <li>• New drainage canals will be constructed to solve growth damage caused by the salinity.</li> <li>• Rehabilitate deteriorated offices, warehouses and dry yards for paddy drying to reduce the loss of produced rice seeds.</li> <li>• Refurbish old farm machinery to improve productivity and efficiency.</li> </ul>

#### 2) Fanaye station

**Table 2.23 Purpose, Functions and Components (Fanaye station)**

<b>Purpose and Functions</b>
Improve seed production infrastructure to enable the production of BS and FS in sufficient quantities to supply good quality seeds in the country.

Components
<b>[Facilities]</b> <ul style="list-style-type: none"> <li>Rehabilitation of seed production plots (24 ha: rehabilitation of irrigation canals).</li> <li>Rehabilitation of pumping stations</li> <li>Rehabilitation of garage, fence for seed conditioner and dry yard with bird nets</li> <li>Renovation of laboratory (with refrigerated storage for seeds)</li> <li>Expansion of accommodation building</li> <li>Construction of training and conference rooms</li> </ul> <b>[Equipment]</b> <ul style="list-style-type: none"> <li>Enhancement of field machinery, office furniture, repair and furnishing of existing accommodation building</li> </ul>
Contents
<ul style="list-style-type: none"> <li>Rehabilitate irrigation pumps, main secondary canals, drainage canals and farm roads in the field to improve productivity, targeting Fanaye stations where seed production capacity is limited due to deteriorating production infrastructure.</li> <li>Rehabilitate deteriorated offices, warehouses and dry yards for drying paddy rice to reduce loss of seed rice produced.</li> <li>Rehabilitate deteriorated field machines to improve productivity and efficiency.</li> <li>Rehabilitate the deteriorated accommodation facilities and training and meeting rooms for ISRA researchers and external visitors to improve the environment for human resource development for breeding and seed production.</li> <li>Rehabilitate the laboratory, including the cold storage for seeds, which is mostly unfunctioning and facing failures in the Senegal River Basin due to the fractuation of the electricity supply system, to prevent the quality degradation of BS and seeds for research use.</li> </ul>

### 3) CTS DISEM seed laboratory and CTS in Richard Toll

**Table 2.24 Purpose, Functions and Components for CTS**

Purpose and Functions
Strengthen the inspection capability of FS, aiming to improve the quality of FS supplied to the farmers, as well as strengthen the seed sorting capacity for FS that have passed inspection, and enhance the system for supplying FS to rice farmers in a suitable and timely manner.
Components
<b>[Facilities]</b> <ul style="list-style-type: none"> <li>Rehabilitation of Fence for boundary fencing</li> </ul> <b>[Equipment]</b> <ul style="list-style-type: none"> <li>Enhancement of equipment and materials for seed testing</li> <li>Renewal of two seed sorter</li> <li>Refurbishment of equipment for seed warehouse management (pallets, forklift trucks, weighing scales)</li> <li>Repair of generators</li> </ul>
Contents
<ul style="list-style-type: none"> <li>Replace two existing seed sorters that are deteriorated and not able to process during the peak periods, and improve the capacity to ensure the timely processing and distribution of collected BS and FS.</li> <li>Enhance the capacity of the seed testing laboratory with the necessary materials and equipment, as there is a shortage of testing equipment and consumables.</li> <li>Improve equipment and materials for managing collected and conditioned seed.</li> <li>Due to unstable power supply, which limits the time of operations, the generator will be upgraded to ensure a stable power supply so that activities are not affected during the peak period.</li> </ul>

### 4) CIFA

**Table 2.25 Purpose, Functions and Components at CIFA**

Purpose and Functions
Improve capacity to provide training to rice seed growers and rice farmers through rehabilitation and enhancement of deteriorated training facilities, which will contribute to improving the cultivation techniques of

the trainees, thereby increasing the production and quality of rice seed.
<b>Components</b>
<b>[Facilities]</b> <ul style="list-style-type: none"> <li>• Construction of new large lecture room, library/media room and janitor's office</li> <li>• Rehabilitation of administration building, small lecture rooms, canteen and boundary fence.</li> <li>• Reconstruction of old dormitory building</li> <li>• Installation of new transformer and deep well.</li> </ul> <b>[Equipment]</b> <ul style="list-style-type: none"> <li>• Enhancement of equipment for the main conference room</li> <li>• Buses for trainee transport</li> </ul>
<b>Contents</b>
<ul style="list-style-type: none"> <li>• Construct new large lecture rooms which are currently insufficient, a library/media room for archiving training materials and manuals, and a janitor's room, and provide the necessary equipment and appliances.</li> <li>• Rehabilitate the deteriorated small lecture rooms with partially damaged ceilings, the administration block, the canteen and the boundary fence.</li> <li>• Reconstruct the old dormitory building, which is dilapidated, to strengthen the capacity to receive long-term trainees.</li> <li>• In order to improve the unstable electricity and water infrastructure, install its own transformer instead of sharing it with the surrounding community, and build a new deep well as a water source.</li> <li>• Provide a large bus to transport trainees to the training sites, as there are no training plots available within the site.</li> </ul>

## (2) Soft Component

The soft components required are yet to be determined.

### 2.9.6 Project Cost Estimation

The total estimated project cost is 3,217 million yen.

**Table 2.26 Proposed Estimated Project Cost of CARD Grant Aid in Senegal**

	Item	Amount (million JPY)
1)	Construction costs	2,881
2)	Cost for equipment	321
3)	Soft component	20
4)	Costs for detailed design and supervision	260
5)	Contingency	490
	Total	3,972

### 2.9.7 Expected Outputs

Through this project, it will be possible to improve the quantity and quality of rice seeds (BS and FS) production and increase the quantity of distribution and timely supply in the Senegal River Basin, thereby contributing to the improvement in the quality and quantity of rice seed production throughout Senegal, in terms of both software and hardware aspects.

### 2.9.8 Obligation of Recipient Country

- Securing the site for the project

- Allocation of the necessary budget from the counterpart organisation to solve the shortage of consumables for the DISEM seed laboratory

### **2.9.9 Points to Note**

- As there are many organizations involved in the project, the role of each agency, especially which organization will be the main implementing agency, needs to be confirmed during the preparatory survey.
- According to interviews regarding the land ownership of each facilities to be targeted by the project, it was mentioned that the land was owned by each organization (GoS). However, documentation on land ownership was confirmed only for the Fanaye station, but the status of ownership of other sites were not confirmed by documents, therefore, it is necessary to confirm the ownership of these sites during the preparatory survey.
- Regarding the CIFA training facilities, the condition of the existing facilities should be confirmed during the preparatory survey, in order to determine the requirement of reconstruction or whether the current buildings can be renovated and utilized.
- The establishment of a new demonstration paddy field for training in the CIFA premises will be considered if a water source and sustainable O&M system for the field are identified during the preparatory survey.
- As some of the infrastructure facilities in Fanaye Station have been rehabilitated with support from KOICA, and the seed sorting machines at CTS was equipped with USAID support, a coordination with other relevant donors will be necessary.
- Coordination with relevant agencies is needed to ensure that there is no overlap with The Rice Value Chain Development Project (PDCVR) activities being implemented by IsDB during the preparatory survey.
- The effect of the rainy season needs to be taken into account when considering the schedule of civil works.

## **2.10 Proposed Project Plan in Sierra Leone: Project for Development of Seed Production Field and Rehabilitation of Research and Training Facilities**

### **2.10.1 Summary of Proposed Project Plan**

The project aims to strengthen the upstream production and supply capacity of seed by developing plots and irrigation facilities for increased Breeder Seed (BS) and Foundation Seed (FS) production in Rokupr Agricultural Research Centre (RARC) under Sierra Leone Agricultural Research Institute (SLARI), hence contributing to increase the production of rice in the country. The total estimated project cost is 3,079 million yen.

### **2.10.2 Background of Project Planning**

The Rice Seed Development Strategy of the NRDS clarifies the roles of relevant actors in seed

production and outsources production to the private sector after certified seeds. The Rokpur Agricultural Research Centre (RARC) is a research institute focused on rice and also a centre for BS and FS multiplication, but it does not appear to be able to satisfy the needs of the country due to deteriorating and malfunctioning facilities. RARC had a relationship of cooperation in the Sustainable Rice Development Project (SPDP), which was a precedence project of the Sustainable Rice Production Project (SRPP), for the development of an appropriate rice production package. Based on the above, the objective of the project targeted the strengthening of functions of the RARC that would be the core of increased production of early generation seed. On the other hand, the development of farmer plots for certified seed multiplication was also mentioned as a need at the interview stage, however, it was excluded since it was considered difficult to include it in the project due to the limited capacity of farmers to be responsible for the operation and maintenance of the fields.

### **2.10.3 Project Site**

The target site is the following site.

- RARC in Kambia District

### **2.10.4 Implementation/Responsible Agency**

SLARI and its affiliated RARCs are independent institutions and their budgets are not allocated by the Ministry of Agriculture (MoA), but directly by the Ministry of Finance. The SLARI Council is the supreme body within SLARI and reports to the Minister of Agriculture. Afterward, MoA reports to the Cabinet. Although SLARI is independent, in practice the MoA is the competent authority and the MoA is the implementing agency of the project.

SLARI and RARCs are responsible for the operation and maintenance of the facilities and equipment. Although it is expected that these institutions will be responsible for operation and maintenance practices, the level of technology and the amount of the budget are supposed to be limited.

### **2.10.5 Components**

#### **(1) Facility and Equipment**

##### **1) Magbolonthe FS Production Field for RARC**

**Table 2.27 Components of Proposed Project Plan for Magbolonthe FS Production Field in Sierra Leone**

<b>Purpose and Functions</b>
Development of production infrastructure for seed production to enable sufficient quantities of FS production to supply quality seed to the country.

Components
<b>[Facilities]</b> <ul style="list-style-type: none"> <li>• Construction of irrigation and drainage canals within the Magbolonthe FS production field (approx. 50 ha)</li> <li>• Construction of farm roads for transporting agricultural machinery</li> <li>• Development of water sources (*optional)</li> <li>• Construction of a warehouse for agricultural machinery and temporary storage of harvested products beside the Magbolonthe FS production field.</li> </ul> <b>[Equipment]</b> <ul style="list-style-type: none"> <li>• Tiller (12hp, work equipment: Trailers, cage wheel, levellers and ploughs)</li> <li>• Harvester (2-row, 2-wheel)</li> <li>• Threshing machines</li> <li>• winnowers (manual type)</li> <li>• One-pass type Rice milling machine (Capacity: 0.7 t/h for paddy, main unit, coarse selector, destoner, engine, lift)</li> </ul>
Contents
<ul style="list-style-type: none"> <li>• Development of irrigation and drainage facilities to increase FS production and productivity and construction of farm roads for agricultural machinery in RARC's Magbolonthe FS production plots where production infrastructure has not yet been developed.</li> <li>• Development of water source (small-scale reservoir): To secure a stable water source during the dry season, a feasibility study on construction of a small-scale embankment in part of the upstream side of the RARC property will be conducted, and facilities will be constructed if feasibility is confirmed.</li> </ul>

## 2) RARC Experimental Field

**Table 2.28 Components of Proposed Project Plan for RARC Experimental Field in Sierra Leone**

Purpose and Functions
Infrastructure development of IVS experimental field and mangrove rice experimental field that exist on the RARC site to strengthen capacity for BS production and rice research in Sierra Leone.
Components
<b>[Facilities]</b> <ul style="list-style-type: none"> <li>• Construction of irrigation infrastructure for IVS experimental field (approx. 7 ha)</li> <li>• Construction of tide embankments to prevent inundation of IVS experimental field</li> <li>• Development of water sources for IVS experimental field (*optional)</li> <li>• Development of mangrove rice experimental field (approx. 6 ha)</li> <li>• Construction of tide embankments on mangrove rice experimental field</li> </ul> <b>[Equipment]</b> <ul style="list-style-type: none"> <li>• Small power tillers for mangrove rice experimental field.</li> </ul>
Contents
<ul style="list-style-type: none"> <li>• Construction of a tide embankment (approx. 200 m long) to prevent the inflow of salt water flowing back upstream from the downstream of the IVS experimental field.</li> <li>• Improvement of existing IVS experimental field: Establish plots with a controlled cultivation environment by Creation of tillage beds, levelling and grading of plots, construction of irrigation and drainage canals and farm roads</li> <li>• To ensure a stable water source during the dry season, a feasibility study on the construction of a new small-scale reservoir upstream of the IVS experimental field will be conducted, and the facility will be constructed once its feasibility is confirmed.</li> <li>• Construction of a tide embankment to prevent erosion of the mangrove rice experimental field due to fluctuating tidal levels. Gates will also be installed to control the water level of the field side.</li> <li>• Improvement of existing mangrove rice experimental field: Establish plots with a controlled cultivation environment by Creation of tillage beds, levelling and grading of plots, construction of irrigation and drainage canals and farm roads</li> </ul>

### 3) Improve Equipment to strengthen Capacity for Rice research and Training Functions in RARC

**Table 2.29 Components of Proposed Project Plan for Improve Equipment to strengthen Capacity for Rice research and Training Functions in RARC in Sierra Leone**

<b>Purpose and Functions</b>
Strengthen the capacity of RARC as a rice research hub through rehabilitation and construction of deteriorated research facilities at the RARC. In addition, to improve the training environment and strengthen the capacity for technology dissemination through the construction of facilities as training centres for rice farmers and rice researchers.
<b>Components</b>
<b>[Facilities]</b> <ul style="list-style-type: none"> <li>• Construction of new training centres (training rooms, large conference rooms and administrative offices) and accommodation buildings</li> <li>• Rehabilitation of garages</li> <li>• Construction of fence for boundary of the facility</li> <li>• Construction of cold storage for BS preservation</li> <li>• Repair or construction of new screen house</li> <li>• Construction of new solar panels and batteries for energy storage</li> <li>• Repair or construction of new staff quarters</li> </ul> <b>[Equipment]</b> <ul style="list-style-type: none"> <li>• Equipment for chemical analysis (Chemical Fume hood and accessories, Soil/plant samples Digestion/extraction unit, Atomic Absorption Spectrophotometer, Spectrometers/ Colorimeters, Kjeldahl distillation unit, etc.)</li> <li>• Equipment for plant experiments (Plant sample grinders and accessories, etc.)</li> <li>• Equipment for soil analysis (Laboratory centrifuges, Soil filtration unit with vacuum pump, soil samplers, soil physics test kits, etc.)</li> <li>• Other laboratory equipment (water purification equipment, laboratory freezers (up to -80°C), electronic balances)</li> <li>• Internet infrastructure, Office Automation (OA) equipment for training and a PC set for research.</li> </ul>
<b>Contents</b>
<ul style="list-style-type: none"> <li>• Establish a new training centre, including lecture rooms (capacity of about 40 x 3 rooms) for farmer training and accommodation for farmer training participants and long-stay researchers(100 beds).</li> <li>• Renovate or construct new accommodation for RARC staff, which is in short supply.</li> <li>• Install equipment for chemical analysis, soil analysis and plant experiments, which are no longer available due to deterioration and breakdowns.</li> <li>• Rehabilitate garages for the maintenance of agricultural machinery.</li> <li>• Construction of a fence along the RARC premises boundary to prevent the invasion of outsiders and to define the land boundary.</li> <li>• Establish internet environment and PCs.</li> </ul>

## (2) Soft Component

The soft components required are yet to be determined.

### 2.10.6 Project Cost Estimation

The total project cost is estimated to be 2,782 million yen.



**Table 2.30 Proposed Estimated Project Cost in Sierra Leone**

	Item	Amount (million JPY)
1)	Construction costs	2,224
2)	Cost for equipment	205
3)	Soft component	20
4)	Costs for detailed design and supervision	260
5)	Contingency	370
	Total	3,079

### 2.10.7 Expected Outputs

It is expected to improve skills required for FS production and strengthen the capacity to utilise and maintain the constructed infrastructure resulting in further human resource development related to FS production and to stabilize and increase the FS production through strengthening the capacity of RARC personnel for upstream seed production. Consequently, the constructed facilities and provided equipment under this project will be fully utilized.

In addition, in collaboration with the successor to SRDP, it will be enabled to contribute to the improvement of quality and quantity related to rice seed production both in terms of software and hardware in Sierra Leone.

### 2.10.8 Obligation of Recipient Country

- Securing the site for the project (Note that there are country-specific circumstances regarding land ownership.)
- Assignment of a person in charge during project implementation
- Seed production and equipment O&M system and budget allocation after the project

### 2.10.9 Points to Note

- To confirm in advance that the budget for seed production-related activities and the operation and maintenance of the equipment which is provided by the project will be appropriately allocated by the host government.
- Consult with local communities regarding land tenure, and reach a consensus among the concerned parties and acquire the land for the project.
- Due to the lack of information on tidal cycles, water level changes and inundation areas, salinity, etc., it is required to take actual measurements or estimate them at the stage of planning and designing infrastructure development in the target fields.
- The impact to seed production on acid soils in some parts of the RARC site should be confirmed. Agricultural machinery support provided by SLARIs, which was financed by AfDB, to SLARI and RARC should be confirmed during the preparatory survey and coordinated to avoid duplication.
- Although many researchers belong to the RARC, the level of skills related to early generation seed production is unclear. To maximise the outputs of the project, it is expected that the results of SRPP, such as TR-P and human resources whose capacity has been strengthened through training, will be

utilised and that collaboration with successor of technical cooperation project will be encouraged.

- The effect of the rainy season needs to be taken into account when considering the schedule of civil works.

## **2.11 Proposed Project Plan in Zambia: Project for Development of Seed Production Field and Training Facilities**

### **2.11.1 Summary of Proposed Project Plan**

The project aims to strengthen the system for the dissemination of rice cultivation technology and the production capacity of quality seeds at the Zambia Agriculture Research Institute (ZARI) Mount Makulu Central Research Station and Mansa Research Station by developing facilities and equipment for the dissemination of rice cultivation technology, and plots and irrigation facilities for the production of quality seeds, thereby contributing to the increase in rice production in the country. The total estimated project cost is 1,570 million yen.

### **2.11.2 Background of Project Planning**

The NRDS targeted 25% increase in unit yield in five years, 20% increase under cultivation by 2020 and strengthening of the entire rice value chain. On the other hand, three main challenges faced by farmers in the NRDS2 were identified: inadequate water management due to lack of development including irrigation facilities; low farm mechanisation rates, which limit the expansion of cultivated area; and lack of access to quality seeds. Technical guidance and dissemination of JICA-supported small-scale irrigation development is effective in terms of irrigation development for small-scale irrigation with potential. To address the challenges of limitations in expanding the area under cultivation and the difficulty to obtain quality seeds, it is essential to strengthen the system for increasing agricultural mechanisation and the production of quality seeds. On the other hand, the ZARI Mount Makulu Central Research Station, located near the capital and involved in technical exchange and collaboration with private agricultural machinery manufacturers, has a lot of researchers for general agricultural mechanisation and seed production, but its facilities are deteriorating and its functions are limited. In addition, the ZARI Mansa Research Station, located in an area suitable for rice production, is appropriate as a base for research, technology development and extension methods including rice mechanisation and a quality seed production system, however, the functions of the facility are similarly limited, which is a cause of limiting its effectiveness. Considering the above, In order to promote the strengthening of rice mechanisation and seed production to solve problems in the rice value chain, the strengthening of rice mechanisation and seed production facilities is required, and a draft project plan is considered for the abovementioned research stations, which are a base of Market-Oriented Rice Development Project (MOREDeP) activities, and based on a scale taking into account their jurisdiction and their performance.

### 2.11.3 Project Site

The target sites are the following two (2) ZARI facilities.

- Lusaka Province: ZARI Mount Makulu Central Research Station
- Luapula Province: ZARI Mansa Research Station

### 2.11.4 Implementation/Responsible Agency

The implementing agency is the Ministry of Agriculture, which is responsible for the operation and maintenance of the facilities and equipment at the ZARI Mount Makulu Central Research Station and the ZARI Mansa Agricultural Research Station. The maintenance teams assigned to both institutions will be responsible for operation and maintenance, and are expected to be equipped with a certain level of technology and budget.

### 2.11.5 Components

#### (1) Facility and Equipment

##### 1) ZARI Mount Makulu Central Research Station

**Table 2.31 Components of Proposed Project Plan for ZARI Mount Makulu Central Research Station in RARC in Zambia**

<b>Purpose and Functions</b>
Expansion of the Agricultural Mechanization Centre, seed production fields for testing and research by agricultural research station technicians, training & exhibition of field machinery and post-harvest processing facilities for extension workers nationwide.
<b>Components</b>
<b>[Facilities]</b> <ul style="list-style-type: none"> <li>• Construction of agricultural mechanization centre (laboratory and office)</li> <li>• Construction of a workshop and garage for agricultural machinery</li> <li>• Construction of drying and milling facilities</li> <li>• Construction of seed production field (1 ha) and its water source</li> </ul> <b>[Equipment]</b> <ul style="list-style-type: none"> <li>(1) Laboratory equipment: <ul style="list-style-type: none"> <li>Agricultural machinery (1 tractor and implements, 1 harvester, 1 threshing machine)</li> <li>A set of equipment for laboratory</li> </ul> </li> <li>(2) Equipment for Agricultural Mechanization Centre <ul style="list-style-type: none"> <li>Agricultural machinery (5 units each of tractor, work equipment, harvester, threshing machine, combine harvester), 1 batch dryer, 1 set of equipment for laboratory, 1 set of dryer, 1 set of dryer, 1 set of dryer</li> <li>Batch dryer (1 unit)</li> <li>Maintenance equipment, rice milling plant</li> </ul> </li> </ul>
<b>Contents</b>
<ul style="list-style-type: none"> <li>• Install field machinery and rice milling facilities for testing and research of rice milling technology at Mount Makulu Central Research Station, initial training and training for extension workers, and demonstrations for private sectors.</li> <li>• Establish a new agricultural machinery training center.</li> <li>• Renovate aging workshops and warehouses for equipment maintenance.</li> <li>• Build a new drying/milling facility.</li> </ul>

- Improvement of existing research fields: Creation of tillage beds, levelling and grading of plots, and application of soil dressing to create an impermeable layer and improve soil water retention.
- Construction of water source (wells): To secure a stable water source, a feasibility study on drilling new wells and building new small-scale reservoirs will be conducted, and facilities will be constructed if feasibility is confirmed.

## 2) ZARI Mansa Research Station

**Table 2.32 Components of Proposed Project Plan for ZARI Mansa Research Station in RARC in Zambia**

<b>Purpose and Functions</b>
The project aims to enhance rice seed production in the northern region by developing training facilities for post-harvest processing mainly for farmers and private contractors, based on the Mansa Research Station in the northern region. In addition, water source facilities, irrigation canals, and research field will be developed to ensure a stable production base for seed production field, and to strengthen the supply system of quality seeds to the northern region.
<b>Components</b>
<b>[Facilities]</b> <ul style="list-style-type: none"> <li>• Construction of a new rice training center (training room, laboratory, and office) and accommodation building</li> <li>• Construction of a garage and workshop for agricultural machinery, a dry yard, and storage space</li> <li>• Construction of drying/milling facilities</li> <li>• Rehabilitation of water source facilities (reservoirs) and construction of irrigation canals</li> <li>• Construction of seed production plots (2 ha) and research plots (1 ha) and a field caretaker's office</li> <li>• New training plots (6 ha) and improved drainage</li> </ul> <b>[Equipment]</b> <p>(1) Laboratory equipment:</p> <ul style="list-style-type: none"> <li>Agricultural machinery (3 each of harvesters and threshers)</li> <li>1 batch dryer</li> <li>Maintenance equipment</li> <li>Rice milling plant</li> <li>Equipment and materials for inspection</li> </ul> <p>(2) Equipment for quality seed production</p> <ul style="list-style-type: none"> <li>Agricultural machinery (one each of tractor, work equipment, and small combine harvester), post-harvest processing equipment (one batch dryer, small seed sorting equipment)</li> <li>Post-harvest processing equipment (1 batch dryer, small seed sorting plant)</li> </ul>
<b>Contents</b>
<ul style="list-style-type: none"> <li>• Installation of agricultural machinery and rice milling facilities for farmer and private contractor training and demonstration.</li> <li>• Construction of a rice training centre for farmer training and experimentation</li> <li>• Construction of an accommodation building for researchers and technicians from the centre and other states.</li> <li>• Construction of workshops and other facilities for maintenance and inspection of introduced machinery</li> <li>• Construction of a dry yard and storage space for quality seeds produced.</li> <li>• Construction of facilities for drying and milling machinery for demonstration purposes.</li> <li>• Rehabilitation of water source facilities and irrigation canals and field maintenance to ensure a stable production foundation for seed production plots.</li> <li>• Improvement of existing seed production plots and research plots</li> <li>• Construction of new plots for training of agricultural machinery and improvement of drainage</li> </ul>

## (2) Soft Component

The soft component will plan the following items related to the agricultural machinery to be installed.

- Operation and maintenance training of agriculture machinery and post-harvest equipment
- Preparation of inspection and maintenance manuals of agriculture machinery and post-harvest equipment

### 2.11.6 Project Cost Estimation

The total project cost is estimated to be 1,570 million yen.

**Table 2.33 Proposed Estimated Project Cost in Zambia**

	Item	Amount (million JPY)
1)	Construction costs	880
2)	Cost for equipment	350
3)	Soft component	20
4)	Costs for detailed design and supervision	240
5)	Contingency	80
	Total	1,570

### 2.11.7 Expected Outputs

By linking with the technical cooperation project using the facilities constructed under the present project, it is expected to develop human resources related to agricultural mechanization, and to stabilize and increase the quality seed production. The number of training participants and the production of quality seeds shown in the table herein below will serve as quantitative indicators.

**Table 2.34 Indicators for Quantitative Outputs of Project Plan in Zambia**

Indicator	Baseline value (actual value in 2019)	Target value(202X) (3 years after project completion)	Remark
Total number of trainees (persons/year)	To be confirmed		
Yield of quality seed (pre-basic and basic seed) (ton/year)			

### 2.11.8 Obligation of Recipient Country

- Assignment of a person in charge during project implementation
- Securing the site for the project
- Installation of commercial power supply to the facility
- Maintenance of facilities and equipment after construction

### 2.11.9 Points to Note

- Capacity development for the operation and maintenance of field agricultural machinery and research equipment needs to be considered carefully in the short term for human resource development through soft components including the project, and in the longer term for possible collaboration with technical cooperation project.
- The effect of the rainy season needs to be taken into account when considering the schedule of civil works.

## **2.12 Proposed Project Plan in Cameroon: Project for Enhancement of Rice Value Chain**

### **2.12.1 Summary of Proposed Project Plan**

The project aims to provide necessary equipment and materials to improve production efficiency, distribution system, rice production environment, and post-harvesting facilities, which are necessary to increase local rice production in the areas under the jurisdiction of Upper Nun Valley Development Authority (UNVDA) and Center of studies and experimentation of agricultural machinery (CENEEMA). The total estimated project cost is approximately 1,160 million yen.

### **2.12.2 Background of Project Planning**

The NRDS aimed to increase rice production from 100,000 tonnes to about 970,000 tonnes, while a production increase target of about 700,000 tonnes was aimed to be achieved by expanding upland rice production by about 22 times or more. JICA implemented Upland Rice Development of the tropical Forest zone in Cameroon (PRODERiP) with Ministry of Agriculture and Rural Development (MINADER) as the implementing agency and carried out activities from May 2011 to May 2016 in relation to the introduction of improved upland rice varieties, preparation of technical manuals, training of extension officers, establishment of upland rice seed production systems and introduction of post-harvest processing technologies, which contributed to the achievement of these results. However, the number of farmers continuously engaged in upland rice cultivation did not increase as much as expected at first, and it appeared the need to develop and disseminate cultivation techniques adapted to the cultivation environment and farming pattern, as well as the production and distribution of quality seeds, in order to promote the establishment of upland rice cultivation. Therefore, the Project for the upland rice and irrigation rice development (PRODERIP) was launched as a successor project, and activities are ongoing to enhance irrigated rice cultivation for stable high yields in addition to upland rice cultivation, to improve rice quality to competitive levels with imported rice, and to improve the profitability of rice production, in order to increase rice self-sufficiency. A series of technical cooperation projects, based at the UNVDA, have implemented capacity building in technical aspects, such as extension officers, to increase the production of certified seeds and other quality seeds. However, it is essential for further strengthening to prioritise the improvement of production efficiency, distribution and production environment and post-harvest management, which can be the basis for producing and supplying domestic rice that is more competitive than imported rice, to the CENEEMA, which has a partnership with UNVDA and PRODERIP. Therefore, a proposed project plan was considered for public institutions in cooperation with PRODERIP, based on the scale envisaged, taking into account their jurisdiction and their performance.

### **2.12.3 Project Site**

The target project areas are the Northwestern province where UNVDA is located and the Central

province where CENEEMA is located.

#### 2.12.4 Implementation/Responsible Agency

The project implementing agency is Ministry of Agriculture and Rural Development (MINADER). UNVDA and CENEEMA come under the MINADER, and the MINADER will be responsible for the operation and maintenance of the facilities and equipment provided. In addition, the maintenance teams assigned to both organizations will be responsible for the practical operation and maintenance of the equipment and materials, details of which will be confirmed in the preparatory survey to be conducted in the future.

#### 2.12.5 Components

##### (1) Facility and Equipment

**Table 2.35 Components of Proposed Project Plan in Cameroon**

<b>Objectives</b>
Introduce equipment and materials that will contribute to improving production efficiency, distribution and production environment, and post-harvesting process in the rice value chain. This will strengthen the rice value chain, and improve the productivity of upland and paddy rice. It will contribute to achieving self-sufficiency in rice production in the country.
<b>Components</b>
<b>【Equipments】</b>
<u>UNVDA</u>
1) Production efficiency improvement package: Tiller, medium-sized truck (4 ton), heavy truck, aluminum bridge, maintenance equipment
2) Distribution and production environment improvement package: Mini-backhoe with earth removing plate, backhoe, vibratory roller (0.8t-1.1t), vibratory roller (3t), vibratory roller (10t-20t), motor grader, bulldozer, trailer truck, dump truck (20t), dump truck (4t), maintenance equipment
3) Post-harvest processing improvement package: Paddy dryer, engine forklift, maintenance equipment
<u>CENEEMA</u>
1) Production efficiency improvement package: Tiller, medium-sized truck (4 tons), aluminum bridge, maintenance equipment
2) Distribution and production environment improvement package: Mini-backhoe with earth removing plate, vibratory roller (0.8t-1.1t), dump truck (4t), maintenance equipment
<b>Contents</b>
<u>UNVDA</u>
1) Promote the provision of agricultural machinery services to local rice producer groups or the lending of agricultural machinery to local rice producer groups in order to improve rice production capacity.
2) Promote projects to improve and renovate irrigation facilities in order to shift from rain-fed rice cultivation system to irrigated rice cultivation system.
3) Promote the construction and rehabilitation of farm roads to improve the distribution environment of local rice produced in the target area.
4) Improve the capacity of harvest transportation and post-harvest processing equipment including paddy dryers and rice milling facilities in anticipation of future increases in local rice production.
<u>CENEEMA</u>
1) Promote the spread of agricultural mechanization using small agricultural machinery in upland rice production areas.

- 2) Promote the implementation of farm road maintenance and renovation projects that will stimulate agricultural mechanization in upland rice production areas.

**A. Production Efficiency Improvement Package**

- Plowing of traditional rain-fed paddy fields and irrigated paddy fields,
- Transportation of production materials such as fertilizer, and transportation of harvested agricultural products.

**B. Distribution and Production Environment Improvement Package**

- Improvement of rice production field and related facilities; leveling of rice production field / large plots of rice production fields / rehabilitation of brach fram roads / rehabilitation of branch irrigation canals and branch drainage channels
- Rehabilitation of main farm roads
- Rehabilitation of main irrigation canals and main drainage canals.

**C. Post-harvest processing improvement package**

- Improvement of the efficiency of paddy drying operations
- Improvement of the quality of milled white rice
- Improvement of work efficiency at existing rice milling plants

**(2) Soft Component**

The soft components required are yet to be determined.

**2.12.6 Project Cost Estimation**

The estimated total project cost is 1,160 million yen.

**Table 2.36 Estimated Project Cost in Cameroon**

	Items	Yen (Million )
1)	Equipment procurement costs (UNVDA)	1,100
2)	Equipment procurement costs (CENEEMA)	30
3)	Detail design and design supervision cost	30
	<b>Total</b>	<b>1,160</b>

**2.12.7 Expected Outputs**

The implementation of the project is expected to have the following outputs in the target areas.

**(1) UNVDA**

- Improvement of production efficiency in irrigated rice field
- Improvement of distribution and production environment in irrigated rice fields
- Improvement of post-harvesting process in irrigated rice fields



## **(2) CENEEMA**

- Promotion of the opportunities for agricultural machinery demonstrations to local rice farmer
- Promotion of agricultural mechanization among upland rice farmers through provision of agricultural machinery services

### **2.12.8 Obligation of Recipient Country**

- Assignment of a person in charge during project implementation
- Providing the facilities for storing procured equipment and materials
- Implementing management and maintenance of the equipment

### **2.12.9 Points to Note**

- Confirm that the budget of the government is appropriately allocated for the management and maintenance of equipment and materials procured.



## Chapter 3 Lessons Learned and Recommendations for Project Formulation from the Survey

### 3.1 General Support Packages across Sub-Saharan Africa

#### 3.1.1 Direction of Support Package for Promotion of Rice Sector in Sub-Saharan Africa

##### (1) Contents of Proposed Project Plan for 11 Countries

The proposed project plans were described in Table 2.1. The contents of the projects are summarized herein below.

**Table 3.1 List of Contents of Proposed Project Plan in 11 Countries**

No.	Country	Title of Proposed Project Plan	Contents
1	Ethiopia	Project for Support of Promotion of Rice Mechanization	Promotion of agricultural machinery
2	Madagascar	Project for Development of Seed Production Field and Facilities	Increasing production of quality seed
3	Rwanda	Project for Increasing Total Factor Productivity through Promotion of Mechanization	Promotion of agricultural machinery
4	Uganda	Project for the National Agricultural Innovations and Skills Enhancement Center	Establishing research hub
5	Cote d'Ivoire	Project for Strengthening of Rice Value Chain	Increasing production of quality seed, Promotion of agricultural machinery
6	Ghana	Project for Enhancement of Rice Seed Multiplication System	Increasing production of quality seed, Productivity improvement
7	Nigeria	Project for Enhancement of Rice Seed Multiplication System	Increasing production of quality seed
8	Senegal	Project for Development of Seed Production Field, Inspection, Sorting and Training Facilities	Increasing production of quality seed
9	Sierra Leone	Project for Development of Seed Production Field and Rehabilitation of Research and Training Facilities	Increasing production of quality seed
10	Zambia	Project for Development of Seed Production Field and Training Facilities	Establishing research hub, Increasing production of quality seed
11	Cameroon	Project for Enhancement of Rice Value Chain	Productivity improvement, Promotion of agricultural machinery

Although not expressed in the title of the proposed project plan, the content of Cote d'Ivoire includes increasing production of quality seed and promotion of agricultural machinery, while the content of Cameroon includes promotion of agricultural machinery. Considering the above, it can be said that, with the exception of Uganda, the support package is aimed at increasing the production of quality seeds and/or promotion of agricultural machinery.

##### (2) Approach for Addressing Irrigation Development Needs

During the interview stage in the target countries, there were requests for irrigation development from many countries. However, because of the need to link up with technical cooperation projects and to

formulate projects in a timely manner in the survey, the project did not arrive at a concrete project plan for a seed production fields for paddy of a certain scale, although irrigation development in seed production plots was taken up. In order to address the high need for irrigation development, it is important to take steps for conducting a basic study as individual project, confirm the technical, agricultural, marketing and economic feasibility of the project, and then proceed with project formulation based on linkages with technical cooperation projects.

### **(3) Support through Public Institutions**

In many countries, requests for irrigation development and agricultural mechanisation for rice farmers and rice farming groups as direct beneficiaries, especially request for agricultural machinery procurement on the line of the past 2KRs, were identified. As the support needs to be channel through public institutions rather than directly benefiting individuals to formulate projects under the current grant aid system, the project plan was not proposed. The form of support through public institutions is commonly applied to all proposed project plans, however, the characteristic examples of exceptions are proposed project plans in Côte d'Ivoire and Cameroon which do not target experimental stations and research centres.

The role of the proposed project plan in Côte d'Ivoire is proposed in line with the use of the private sector which is aligned with policy and it supplement the equipment aspects to the technical support provided by PRORIL2 through the public corporation which is the counterpart agency of PRORIL2 for PME, a private agricultural mechanisation service provider, and paddy producers will benefit from this support.

The role of the proposed project plan in Cameroon is to supplement the equipment aspect in line with the jurisdiction of the public institution regarding supervision and guidance throughout the entire value chain and promotion of agricultural mechanisation, and aims to improve the production infrastructure, improve access for distribution, improve post-harvest processing, and promote agricultural mechanisation through the Public Corporation. From a security aspect, it is currently unable for Japanese experts to visit the target sites of the proposed project plan in Cameroon for short-term surveys to determine the feasibility of grant aid. This matter needs to be resolved in order to proceed with the plan.

### **(4) Consideration for Beneficiaries**

The proposed project plans, which are not direct but close to direct, benefits to the beneficiaries of Cote d'Ivoire and Cameroon. In Cote d'Ivoire, support for agricultural mechanisation at the field level using the service of small and medium agricultural machinery service enterprises promoted in the national strategy. In Cameroon, proposed project is for procurement including construction machinery to directly improve specific issues in the value chain. And it focuses on improving production efficiency, distribution and production environment and post-harvesting by public institutions.

## (5) Others

In addition, when considering the menu, with a view to the preparation, implementation and post-evaluation of the project, it was decided to exclude as far as possible support to areas where Japanese experts could not work in the medium to long term due to security issues. However, in the process of consideration, the availability of transportable equipment and materials was also considered.

### 3.1.2 Linkage with Direction of Support Menu for Promotion of Rice Sector in Target Countries and JICA Technical Cooperation Projects

The Survey approach has been changed from the originally envisaged CARD Package Grant-Aid for aiming to formulate projects as ordinary grant-aid. However, the linkage of cooperation with CARD project<sup>3</sup> has continued to be considered. The table herein below shows the CARD cases on which the views has been exchanged, as indicated in table below.

**Table 3.2 List of CARD Project in Targeted 12 Countries**

No.	Country	CARD Project	Project Duration
1	Ethiopia	Project for Functional Enhancement of the National Rice Research and Training Centre (Ethio-rice)	From Nov. 2015 to Nov. 2020
2	Madagascar	Project for Rice Productivity Improvement and Management of Watershed and Irrigation Area (PAPRiz2)	From Dec. 2015 to Nov. 2020
3	Rwanda	Project for Water Management and Capacity Building (WAMCAB)	From Apr. 2019 to Mar 2024
4	Uganda	Promotion of Rice Development Project Phase 2 (PRiDe2)	From Apr. 2019 to Mar 2024
5	Uganda	Project for Sustainable Utilization, Operation and Management of Irrigation System in Atari Basin Area	From Jun. 2020 to Jun. 2024
6	Cote d'Ivoire	Local Rice Promotion Project Phase 2 (PRORIL2)	From Apr. 2020 to Apr. 2025
7	Ghana	Project for Enhancing Market-Based Agriculture by Smallholders and Private Sector Linkages in Kpong Irrigation Scheme (KIS)	From Jan. 2016 to Jan. 2021
8	Ghana	Sustainable development of Rain-fed Lowland Rice Production Project, PHASE TWO (TENSUI2)	From Apr. 2021 to Feb. 2021
9	Liberia	Improving Rice Production for Smallholders Project (LibRice)	From Oct. 2020 to Sep. 2023
10	Nigeria	No CARD Project	-
11	Senegal	Projet de renforcement de la chaîne de valeur rizicole dans la vallée du fleuve Sénégal (PAPRIZ3)	From Feb. 2022 to Apr. 2027
12	Sierra Leone	Sustainable Rice Production Project (SRPP)	From Jun. 2017 to Jun. 2022
13	Zambia	Market-Oriented Rice Development Project (MOREDeP)	From Oct. 2019 to Sep. 2025
14	Zambia	Support for Sustainable Community Based Irrigation Development Project (E-COBSI)	From Jan. 2019 to Jan. 2024
15	Cameroon	Project for the upland rice and irrigation rice development (RODERIP)	From Jun. 2016 to Jun. 2021

Source: As of the time of the interview.

In the case of envisaged linkages, the components should be aligned with the goals and activities of the CARD project and should expand and improve the outcomes. The draft project plan for Côte d'Ivoire,

<sup>3</sup> [https://www.jica.go.jp/activities/issues/agricul/approach/card\\_list.html](https://www.jica.go.jp/activities/issues/agricul/approach/card_list.html)

mentioned above, is a good model of the expected collaborative relationship, while the draft project plan for Zambia can also be characterised as a good model.

The role of the proposed project plan in Zambia is to strengthen the functionality from the equipment and facilities aspects for the Experiment Stations that already have a work experience with JICA and in line with increasing the production of quality seeds and adaption of agricultural mechanisation aligned with the policy, and MOREDeP will complement those efforts from the technical aspect.

On the other hand, the proposed project plans in Ethiopia and Rwanda are assumed cooperation with ongoing technical cooperation projects, although there are still challenges.

In Ethiopia, with a view to developing activities in the next phase of Ethio-Rice and Ethio-Rice 2, a proposed project plan on promotion of rice mechanisation for rice promotion with EIAR as the implementation agency, which is the counterpart agency of Ethio-Rice is envisaged and is expected to be the counterpart agency in the next phase. In addition to the rice research and training that has been carried out, Ethio-Rice2 will include the introduction of machinery with the involvement of Japanese experts, and the proposed project plan is linked to these. Meanwhile, there were no activities in Ethio-Rice in the past that would have promoted private sector initiative, although agricultural mechanisation in Ethiopia needed to be driven by the private sector in the medium to long term. Therefore, the inclusion of such activities in Ethio-Rice2 is a condition for the feasibility of the proposed project plan, which is recognised as a key challenge.

In Rwanda, a proposed project plan on increasing total factor productivity through promotion of mechanization was envisaged with RAB, the counterpart agency of WAMCAB, as the implementation body, with a view to improving results and developing activities within the WAMCAB under implementation. With a view to improving irrigation water management capacity, WAMCAB conducts activities in the policy and capacity-building aspects of the sectors such as organisation, water management, operation and maintenance, and farming. The proposed plan focus the improving efficiency in the farming in collaboration with WAMCAB. The RAB, as the responsible agency, has an experience of providing government-led mechanisation services for agricultural mechanisation in the past, but no experience to activate private sector services aligned with government policy, which is complemented by the draft project plan. On the other hand, similar to its situation in Ethiopia, there is a lack of know-how on the part of WAMCAB and RAB to promote private sector services, and therefore it is a short-term solution and condition to include this initiative as a new activity of the WAMCAB in order to enhance the feasibility of the draft project plan, which is recognised as a key challenge.

As for the timing for considering the project plan, it is one option to consider collaboration in the current project, as in Rwanda. On the other hand, if the project is placed at the start of activities, as in Zambia, or if a next phase is expected, as in Ethiopia and Ghana, it can be expected that a proposed project plan based on collaboration between the two be considered at the planning stage of activities as a way of

establishing a plan to realize results in an efficient and effective manner.

Obviously, technical cooperation projects have counterpart agencies. Counterpart agencies have their own jurisdiction and provide technical, as well as logistical, assistance to technical cooperation projects. Considering the collaboration between the draft project plan and the technical cooperation project, it should be considered that the feasibility depends on whether the counterpart organisations have sufficient technical knowledge and experience of their jurisdiction and whether they have secured staffing. In the case of a technical cooperation project that is implemented over several phases, it is also important whether sufficient and self-sustaining knowledge and experience has been accumulated in the areas related to the proposed project plan.

### **3.1.3 Assumptions and specific examples regarding the content and scale of the proposed menu**

From the above, it is suggested that collaboration with CARD projects is key, and since several conditions are supposed as a precondition, a proposed menu organised on this assumption is presented below. It is worth considering at first the possibility of the formation of projects that include the following menu with particular attention to the cooperation with CARD projects.

Condition 1: The organisations involved in the proposed project plan has a cooperative relationship with a past or present CARD project in the relevant field such as agricultural mechanisation promotion, good seed dissemination and there is some actual achievement in the field concerned.

Condition 2-1: The organisations involved in the proposed project plan has a cooperative relationship with a past or present CARD project in the relevant field such as agricultural mechanisation promotion, good seed dissemination but there is few actual achievement in the field concerned.

Condition 2-2: The organisations involved in the proposed project plan has enough experience and staffing in the relevant field such as agricultural mechanisation promotion, good seed dissemination but doesn't have a cooperative relationship with a past or present CARD project or has a weak cooperative relationship.

Condition 3: Other than the above.

**Table 3.3 Proposed Menu of Support Package for Promotion of Agricultural Machinery  
(Condition 1)**

<b>No.</b>	<b>Target</b>	<b>Item</b>	<b>Contents</b>
1	Small and Middle-Scale Rice Miller (Cote d'Ivoire)	Paddy dryer	-
		Destoner	-
		Color sorters	-

**Table 3.4 Proposed Menu of Support Package for Promotion of Agricultural Machinery  
(Condition 2)**

No.	Target	Item	Contents
1	National Research Center (Ethiopia)	Destoner	100 hp tractor, triple plow, rotary plow, harrow, seeder, broadcaster
		Tractor	40-50 hp tractor, rotary plow, harrow, seeder, broadcaster, trailer
		Transplanter	6-row transplanter, seeder for seedling tray, seedling tray
		Combined harvester	Reaper width 2m
		Batch type mobile dryer	Batch capacity 2 tons
		Machine tools	Lathe, milling machine, drilling machine, welding machine, bending machine, thread saw
		Pick-up truck	3 L Diesel engine
		Station wagon	3 L Diesel engine
		Forklift	1.5 tons
		Truck for equipment	4 tons truck with aluminium bridge for loading equipment
		Laboratory equipment (paddy)	
		Inspection equipment	White rice and seed inspection equipment
		Tools for maintenance	Tool set, maintenance tools
2	Regional Research Center (Ethiopia)	Tractor	Tractor (100 hp), disk plow, harrow
		Laboratory equipment (paddy)	
		Inspection equipment	White rice and seed inspection equipment
		Tools for maintenance	Tool set, maintenance tools
3	Regional Research Center 1 (Cameroon)	Tiller	-
		Medium-sized truck	4 tons
		Heavy truck,	-
		Aluminium bridge	-
		Mini-backhoe with earth removing plate	-
		Backhoe	-
		Vibratory roller	0.8 - 1.1 tons
		Vibratory roller	3 ton
		Vibratory roller	10 - 20 tons
		Motor grader	-
		Bulldozer	-
		Trailer truck	-
		Dump truck	20 tons
		Dump truck	4 tons
		Paddy dryer, engine forklift	-
		Rice milling facilities	-
		engine forklift	-
		Maintenance equipment	-
4	Regional Research Center 2 (Cameroon)	Tiller	-
		Medium sized truck	4 tons
		Aluminium bridge	-
		Mini backhoe with soil drainage plate	-
		Vibratory roller	0.8 - 1.1 tons
		Medium dump truck	4 tons
		Maintenance equipment	-



**Table 3.5 Proposed Menu of Support Package for Promotion of Agricultural Machinery  
(Condition 3)**

No.	Target	Item	Contents
1	Regional Research Center (Rwanda)	Tiller and various work machine	-
		Back-borne chemical sprayer	-
		Harvester	-
		Throwing-type threshing machine	-
		Winnower	-
		Small combined harvester	-

**Table 3.6 Proposed Menu of Support Package for Increasing Production of Quality Seed  
(Condition 1)**

No.	Target	Item	Contents
1	National Research Center (Zambia)	Construction of agricultural mechanization centre	Laboratory and office
		Construction of a workshop and garage for agricultural machinery	-
		Construction of drying and milling facilities	-
		Construction of seed production field	1 ha
		Construction of water source	-
		Tractor and work equipment	-
		Reaping machine	-
		Threshing machine	-
		Combine	-
		Laboratory machine	-
		Batch dryer	-
		Maintenance equipment	-
		Rice milling plant	-
2	Regional Research Center (Zambia)	Construction of rice cultivation training center and accommodation building	Training rooms, laboratories and offices
		Garage and workshop for field machinery	-
		Dry yard	-
		Construction of storage yard	-
		Construction of drying/milling facilities	-
		Rehabilitation of water source facilities (reservoirs)	-
		Maintenance of irrigation canals	-
		Maintenance of seed production plot	2 ha
		Maintenance of research plot	1 ha
		Maintenance of field caretaker's office	-
		Construction of new training plot and drainage improvement	6 ha
		Tractor and work machine	-
		Small combined harvester	-
		Harvester	-
		Threshing machine	-
		Batch dryer	-
		Maintenance equipment	-
		Small seed sorting plant	-
		Rice milling plant	-
		Inspection equipment	-
3	Private Service Provider through Public Institution (Cote d'Ivoire)	Medium sized tractor and various work equipment	40 - 50 hp, disc plow, rotary, paddy wheels, trailer
		Combined harvester	Cutting width of crop: 2m

No.	Target	Item	Contents
		Tiller and various work machines	12 hp, cage wheels, trailer

**Table 3.7 Proposed Menu of Support Package for Increasing Production of Quality Seed  
(Condition 2)**

No.	Target	Item	Contents
1	National Research Center (Madagascar)	Rehabilitation of existing facilities	Office and other equipment
2	National Research Center (Nigeria)	Shelter for machinery	W14xD20xH4m
		Tractor	With rotary, sprayer and paddy wheels
		Transplanter	-
		Combined harvester	-
		Dryer	-
		Seed sorting plant	-
		Replacement parts	-
		Maintenance equipment	-
3	Regional Research Center 1 (Madagascar)	Maintenance of seed production plots	2 ha
		Rehabilitation of existing irrigation facilities	Reservoirs and One permanent weir
		Rehabilitate existing facilities	Research building and Seed laboratory
		Equipment	Agricultural machinery (rice transplanters, tractors, etc.)
4	Regional Research Center 2 (Madagascar)	Improvement of seed production plots	2 ha
		Rehabilitation of existing irrigation facilities	One permanent weir
		Rehabilitation of existing facilities	Research building, Seed laboratory and Seed storage house, etc.
		Equipment	Agricultural machinery (rice transplanters, tractors, etc.)
5	Regional Research Center (Nigeria)	Workshop	W14xD20xH4m
		Tractor	With rotary, sprayer and paddy wheels
		Transplanter	-
		Combine	-
		Dryer	-
		Seed sorting plant	-
		Maintenance equipment	-
		Replacement parts	-
6	Regional Research Center 1 (Senegal)	Improvement of seed production plots	Improvement of 50 ha, drainage channels and farm roads
		Renovation of pumping stations	-
		Renovation of administrative offices and warehouses for fertilizer and seeds	-
		Renovation of dry yard with bird nets	-
		Renewal of field machinery	-
7	Regional Research Center 2 (Senegal)	Improvement of seed production plots	24 ha, canal rehabilitation
		Renovation of pumping stations	-
		Renovation of dry yard with garage, seed conditioner fence and bird net	-
		Renovation of laboratory (with cold storage for seeds)	-

No.	Target	Item	Contents
		Extension of accommodation building	-
		Construction of training and conference rooms	-
		Expansion of field machinery	-
		Expansion of office furniture	-
		Repair of existing lodging building	-
		Furniture enhancement	-
8	Regional Research Center (Sierra Leone)	Construction of irrigation and drainage channel	50 ha
		Construction of cultivation roads to allow loading and unloading of field machinery	-
		Maintenance of warehouse	For temporary storage of farm machinery and harvested products next to the production field
		Tillers	12 hp, full set: Trailer, basket wheels, leveler, plow
		Harvester	2-row 2-wheel
		Threshing machine	-
		Winnower	Manual
		One-pass type rice milling machine	0.7 tons/hour (paddy), main unit, coarse sorter, de-stoner, engine, elevator
		Water source maintenance	-
		Construction of seawalls to prevent flooding	-
		Maintenance of cultivation field	6 ha
		Construction of tide embankment	-
9	Regional Research Center (Sierra Leone)	Small tiller	-
		Field maintenance	7 ha
		Water source maintenance	-
		Construction of seawalls to prevent flooding	-
		Maintenance of cultivation field	6 ha
		Construction of tide embankment	-
10	Public Authority for Seed Procurement (Madagascar)	Small tiller	-
		Improvement of seed production plots	550 ha
		Rehabilitation of existing facility	Office, seed storage
		Seed sorting plant	2 tons
		Low-temperature humidity-controlled storage	For upstream seed storage
		inspection equipment of rice milling and seed	-
11	Inspection Authority (Madagascar)	Maintenance equipment, etc.	-
		Equipment	Inspection equipment for seed certification (dryers, chemical testing equipment, etc.), agricultural machinery (rice transplanters, tractors, etc.)
12	Inspection Authority (Senegal)	Repair of property boundary fence	-
		Expansion of seed inspection equipment and materials	-
		Repair of seed conditioner	-

No.	Target	Item	Contents
		Equipment for seed warehouse management (pallets, forklifts, weighing scales)	-
		Renovation of generator	-
13	Training Institute (Senegal)	New large classrooms	-
		New library and media room	-
		New janitor's office	-
		Renovation of administration building	-
		Renovation of small lecture rooms and cafeteria	-
		Repair of boundary fence	-
		Reconstruction of old accommodation building	-
		Installation of new transformer	-
		Installation of new deep well	-
		Expansion of fixtures for the main conference room	-
		Buses to transport trainees	-

**Table 3.8 Proposed Menu of Support Package for Increasing Production of Quality Seed (Condition 3)**

No.	Target	Item	Contents
1	Regional Research Center (Nigeria)	Drying and seed sorting plant	W30xD10xH8m
		Tractor	With rotary, sprayer and paddy wheelsreaper
		Transplanter	-
		Combine	-
		Dryer	-
		Seed sorting plant	-
		Maintenance equipment	-
		Replacement parts	-
2	Public Authority for Seed Procurement (Ghana)	Stationary dryer	With 3 tons coarse separator
		Seed sorting plant	2 tons
		Low-temperature humidity-controlled storage	For upstream seed storage
		inspection equipment of rice milling and seed	-
		Maintenance equipment, etc.	-

## 3.2 Efficient and Effective Survey Approach

### 3.2.1 Involvement of Focal Point Persons and Task Force Members on National Rice Development Strategy

The discussions with the FPs and TF members of the NRDS was effective for the consideration of the direction of the project plan and the effectiveness of the draft. In addition, follow-up after the meetings was important in the survey, where online meetings were used extensively, and in some countries FPs functioned efficiently as a key actor of this process. The table herein below shows the FPs and their original positions in the targeted 12 countries.

**Table 3.9 List of FPs in Targeted 12 Countries as September 2020**

No.	Country	Job Title of FP in Belonging Entity <sup>4</sup>
1	Ethiopia	• Director, Crop Development, Ministry of Agriculture ( <u>Chief Executive officer, Crop Development, Ministry of Agriculture</u> )
2	Madagascar	• Directeur General de l'Agriculture ( <u>Directeur de la Planification et du Suivi- Evaluation (DPSE) Secretariat General -</u> <u>Ministere de Agriculture et de l'Elevage</u> )
3	Rwanda	• Director General of Agriculture Development, Ministry of Agriculture (MINAGRI) ( <u>Director General, Agriculture Value Chain Management and Trade, Ministry of</u> <u>Agriculture and Animal Resources</u> )
4	Uganda	• Senior Agriculture Officer, Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)
5	Cote d'Ivoire	• Director General of ADERIZ, Focal Point of Rice Task Force, Ministry of Agriculture
6	Ghana	• Deputy Director, Directorate of Crop Services ( <u>Director, Directorate of Crop Services, Ministry of Food and Agriculture</u> )
7	Liberia	• Director of Marketing, Ministry of Agriculture
8	Nigeria	• Deputy Director/Rice Value Chain Desk Officer, Federal Ministry of Agriculture and Rural Development
9	Senegal	• Coordonnateur, Programme National d'Autosuffisance en Riz, Ministère de "Agriculture et de l'Equipeement Rural
10	Sierra Leone	• Director of Crops Division, Ministry of Agriculture and Forestry ( <u>Acting Director of Crops, Ministry of Agriculture and Forestry</u> )
11	Zambia	• Deputy Director, Crops Production Branch, Department of Agriculture, Ministry of Agriculture
12	Cameroon	• Chef de Cellule des Projets et Programmes, Ministère de l'Agriculture et du Développement Rural ( <u>Inspecteur General du Developpement de l'Agriculture, Ministère de l'Agriculture et du</u> <u>Developpement Rural</u> )

There are many staff members of the Ministry of Agriculture whose responsibilities include the promotion of rice production, but their positions are not uniform. If they are high-ranking officials of their belonging entity, in particular the Director General, who is the head of the organization, the organizational response based on the discussions tends to be implemented promptly. On the other hand, if this was not the case, the response was carried out in line with the system of communication and instructions of their organisation, which sometimes required more time.

In addition, although the survey was conducted in four main areas such as rice value chains, agricultural and rural infrastructure, agricultural machinery and agricultural inputs. FPs were often in charge of rice value chains only, and in such cases, it was possible to collect information smoothly by asking TF members to nominate a person in charge for the other three areas, respectively. In some cases, TF members included private actors in the rice sector in many countries, but the level of activeness varied from country to country, and this needs to be taken into account when collecting information from private actors through FPs and TF members.

<sup>4</sup> Information in brackets was shown where there were differences from the information available on the CARD Secretariat's website as of January 2023.

### **3.2.2 Points for Environmental and Social Considerations**

Information was collected with a view to prompt project formulation, and project plans were proposed for 11 countries. In the process, the possibility of rehabilitation of existing facilities, which was assumed to reduce the level of environmental and social considerations, was also taken into account as part of the selection criteria, in order to shorten the preparation period to contribute to the early start and effects of the project. However, it is recognised that even the rehabilitation of existing facilities needs to be considered in the following preparatory survey as the next stage.

### **3.3 Lessons Learned from Previous Similar Projects and Application to Project Plan**

Although Past grant aid projects for the promotion of agricultural mechanisation were already confirmed for “The Project for Improvement of Farm Machinery for Hiring Services of Tillage” and “The Project for Improvement of Farm Machinery for Hiring Services of Tillage (Phase 2)” in Bhutan and “Project for improvement of agricultural machinery advances in rice seeds production techniques” in Cuba, similar projects from previous grant aid project for increasing of quality seed production and promotion of agricultural machinery could not be identified. However in terms of the development of research centres, which are the hubs of technical cooperation projects, such as NRRTC in Ethiopia, RARC in Sierra Leone and Mansa Agricultural Experiment Station in Zambia, the rice research and training centre construction programme in Uganda is similar to those proposed project plans. .

Currently, the research and training centre in Uganda is the base of PRiDe2 and also the base of CARD wide training for rain-fed and upland rice in the English-speaking African countries in the framework of CARD Phase 2. It is also an idea to develop the centre in such a way that it can be linked not only to individual technical cooperation projects, but also to CARD Phase 2. A proposed project plan in Uganda aims to strengthen the functions of NaCRRI and relevant institutes for improving the quality of training and human resource development, while another idea for development is to strengthen training functions including remote systems connecting to the technical cooperation projects in other countries in the framework of CARD 2, with a view to collaboration in regional training.

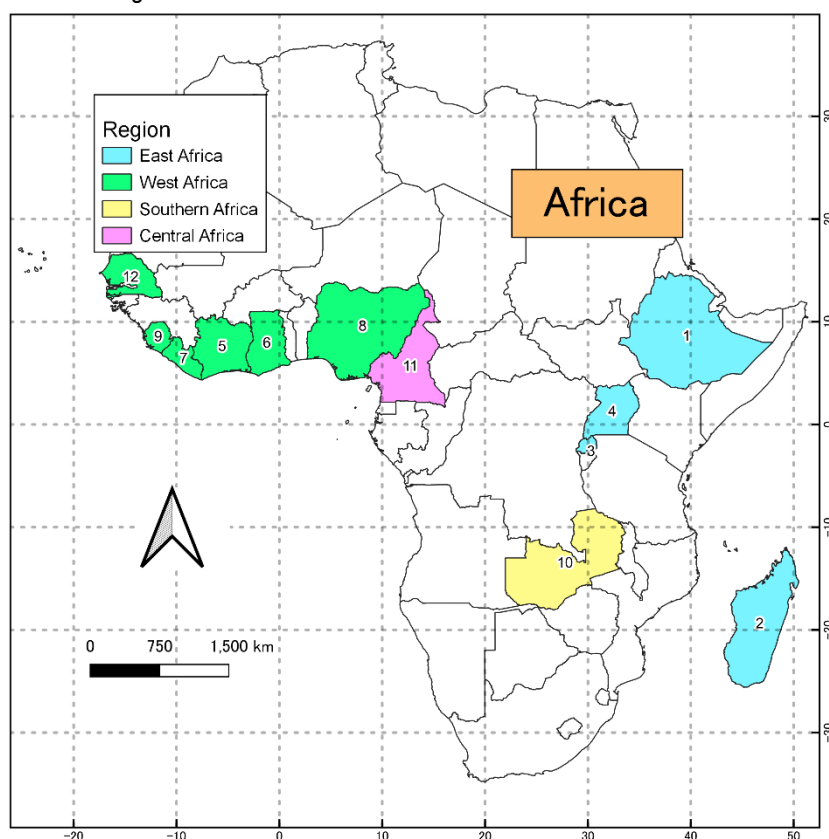
## **Appendix 1 : Country Profiles**





## What are Country Profiles? :

A summary of the position of CARD, issues of NRDS, and direction of support based on existing data on the countries surveyed in the information collection and confirmation survey for the development of infrastructure and equipment to promote CARD in the African region.



No.	Country	Region
1	Ethiopia	East Africa
2	Madagascar	East Africa
3	Rwanda	East Africa
4	Uganda	East Africa
5	Cote d'Ivoire	West Africa
6	Ghana	West Africa
7	Liberia	West Africa
8	Nigeria	West Africa
9	Sierra Leone	West Africa
10	Zambia	Southern Africa
11	Cameroon	Central Africa

11 countries covered in this survey

## Composition :

1. Basic information (population, annual precipitation, Farmland area, Irrigation potential , etc.)
2. Rice-related indexes (production, unit yield, cultivated area, consumption, self-sufficiency ratio, etc.)
3. Current issues (status of NRDS response, status of rice-related support, etc.)
4. Hypothetical cooperation concept (Japan's efforts, partner country's efforts and systems, development potential, future direction of support, anticipated grant aid components, etc.)

## Referenced existing materials :

1. Basic information  
Population, GDP, GNI per capita: Figures from the Ministry of Foreign Affairs website (accessed April 2020)

Other figures such as arable Land area, Irrigated area, etc.: Based on the latest version of the FAO AQUASTAT Country Report (as of April 10, 2020). Data missing for some countries (e.g., Farmland area) are supplemented with data from FAO STAT for the relevant year.

2. Rice-related indexes

NRDS target values: NRDS values for each country

FAO result: Figures from FAO STAT (accessed April 2020))

3. Current issues

Compiled based on "Review Study at the End of the Community for the Advancement of Rice Cultivation in Africa (CARD) Final Report (2018/3)"

4. Development issues and Japan's response policy :

Compiled based on the latest version of "Country Assistance Policy" and "Business Development Plan" of the Ministry of Foreign Affairs (accessed April 10, 2020)

5. Status of government initiatives and government organizational structure for NRDS implementation :

Compiled based on "Review Study at the End of the Community for the Advancement of Rice Cultivation in Africa (CARD) Final Report (2018/3)"

The direction of future support in the hypothetical cooperation concept and the anticipated grant aid components summarize the possibilities for support based on the following key words.


1. Human resource development
2. Technology dissemination
3. Rehabilitation of irrigation facilities
4. Development of new irrigation facilities
5. Mechanization of agricultural work
6. Improving market access
7. Harvesting technology processing
8. Agricultural equipment and materials
9. Facility maintenance
10. Seed supply
11. Maintenance of farm roads

## **Classification of CARD phase 2**




- First Group Countries : 12 countries
- Second Group Countries : 11 countries
- Third Group Countries : 9 countries

Reference: Grouping by CARD classification for the 32 countries in the CARD phase 2

Federal Democratic Republic of Ethiopia:				
Positioning of CARD		JICA Category: Priority Country CARD Category: Group 2		<div></div> <div>Source: FAO, Country profile, 2016</div>
Basic information				
Population (WB, 2018)	109,220,000	Land area (2013)	110,430,000 ha	
Population (WB, 2015)	99,391,000	Agricultural Land area (2013)	36,259,000 ha	
Population growth ratio	3.3%	Farmland area ratio (2013)	33%	
GDP (WB, 2018)	US\$84,300,000,000	Arable Land area (2013)	16,259,000 ha	
GNI per capita (WB, 2018)	US\$790	Irrigation potential (2015)	2,700,000 ha	
Annual precipitation	848 mm/year	Irrigated area (2015)	858,340 ha	
Annual water consumption per capita (2015)	1,227 m³/year	Irrigated area ratio (2015)	5%	
Rice-related indexes				
Item		2008 (Basis)	2019	Remarks
Rice Production	NRDS Target (2018)	498 Thousand tons	3,959 Thousand tons	
	FAO result (2017)		140 Thousand tons	Target achievement ratio 3.5%
Rice unit yield	NRDS Target (2018)	3.2 t/ha	5.0 t/ha	
	FAO result (2017)		2.89 t/ha	Target achievement ratio 57.8%
Rice cultivated area	NRDS Target (2018)	155,886 ha	773,504 ha	
	FAO result (2017)		48,484 ha	Target achievement ratio 6.3%
Rice consumption (FAO, 2017)		520 Thousand tons		
Rice consumption per capita		N/A kg		
Self-sufficiency ratio		26.9% (FAO, 2017)		
Current issues (Progress in CARD Phase 1)		NRDS support status	Status of CARD-related support	
			JICA	Donor
1. Seeds	Progress made.	NRDS Priority area Seed Strategy formulated	Technical cooperation	
2. Fertilizer		NRDS Priority area		
3. Irrigation and water management		NRDS Priority area		
4. Technology dissemination		NRDS Priority area	Technical cooperation	
5. Mechanization	No progress has been	NRDS Priority area		

	made.			
6. Post-Harvest Processing and Marketing	No progress has been made.	NRDS Priority area		
<b>Hypothetical cooperation concept</b>				
<b>1) Development Issues and Japan's Response Policy (Business Development Plan, April 2019)</b>				
Most of the farmers are self-sufficient small-scale farmers with an average cultivated area of less than 1ha, and most of them rely on rain-fed agriculture. The country is vulnerable to frequent droughts and other natural disasters, making it prone to food crises, and stable food production remains an issue. Japan has identified agriculture and rural development as a Priority area, and intends to support efforts that take the entire agricultural value chain into account, including not only improving agricultural production and productivity but also improving market access and increasing small farmers' income through marketing support.				
<b>2) Status of government efforts</b>				
The National Rice Research and Development Strategy (NRRDSE) was developed in 2009, approved by the government, and has become an official document. Rice is considered a high priority grain as an alternative to Teff and as a commercial investment, and was named the "millennium crop" in the NRRDSE. Regarding the governmental organizational structure, the National Rice Research and Training Center was opened in the Fogara district in October 2017, and the government is working on the construction of research capacity which is emphasized in the strategy as a priority issue.				
<b>3) Government organization structure for NRDS implementation</b>				
The Ministry of Agriculture and Natural Resources and the regional bureaus at the federal level are responsible for the formulation of the NRDS and its implementation. Currently, Focal Point Person (FP) is a senior researcher (plant pathology) at the Ethiopian Institute of Agricultural Research (EIARA) and the head of the Grain Research Institute (2018). As the strategic name of the National Rice Research and Development Strategy suggests, the Ethiopian government is focused on research, and the task force members consist of government and laboratory personnel. There is an NRRDSE technical committee, which is supposed to meet quarterly, but actually meets once or twice a year.				
<b>4) Achievement status of CARD Phase 1 (Target values and results)</b>				
Rice has been looked at as an alternative to the Teff. After the NRRDSE was developed, a number of projects that could be funded were developed, and several projects have been funded and are currently being implemented. The goals of NRRDSE (2009) were to increase unit yield from 3.2 t/ha to 5.0 t/ha and cultivated area from 155,886 ha to 773,504 ha by 2019. The actual results were 2.89 t/ha (FAO 2017, 57.8% of target achieved) for the unit yield and 48,484 ha (FAO 2017, 6.3% of target achieved) for the cultivated area, with low unit yield and reduced cultivated area hindering the achievement of the Phase 1 target. In addition, no progress was made in rice mechanization and value added to rice cultivation. The strategy of focusing on research did not hinder the development of the value chain in the rice sector, but the lack of human resources and the lack of interest from the private sector are challenges.				
<b>5) Development Potential</b>				
Irrigated area ratio to Farmland area was 5%, and Irrigated area ratio to Irrigation potential area was 32% (FAO 2016), there is significant room to increase rice production through expanding the Irrigated area. Irrigated Farmland is spread over the central and northern regions, and paddy rice is also developed in the same areas. The Fogara area (about 30,000 ha of the arable land) is one of the country's most rice-growing areas with the highest potential for rice cultivation.				
<b>6) Direction of future support and anticipated grant aid components</b>				
<b>【Human resource development】【Technology dissemination】</b> With regard to rice cultivation research, JICA's technical cooperation project which is the "Strengthening the National Rice Research and Training Center Project" (2015-2020) aims to improve human resource capacity and disseminate appropriate technologies for the promotion of the rice industry. The project was scheduled for Phase 2 in FY2021. Given the current situation in the country, where human resource capacity is inadequate, it is effective to disseminate the technology throughout the entire value chain (VC) of agricultural products through a grant aid project in collaboration with a technical project.				
<b>【Rehabilitation of irrigation facilities】【Development of new irrigation facilities】</b> In order to increase agricultural productivity by improving the fragile production base, the implementation status of the rehabilitation of existing irrigation facilities planned in the CARD Phase 1 will be checked. The possibility of expanding the cultivated area by rehabilitation or new construction in Irrigation potential areas will be examined.				
<b>【Improving market access】</b> It is effective to provide support that takes a bird's eye view of agricultural VC, such as improving market access by maintenance of farm roads and marketing support.				

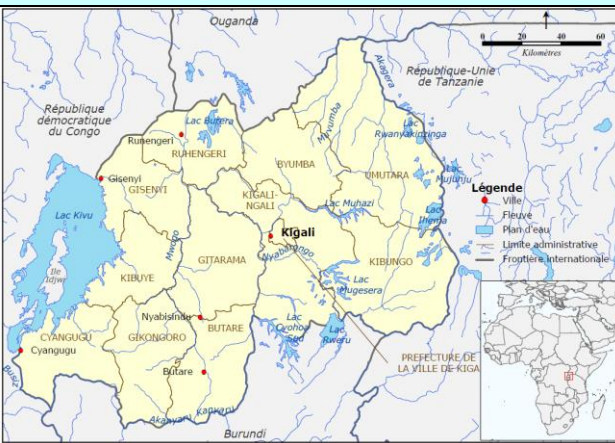
Republic of Madagascar				
Positioning of CARD		JICA Category : Regional base country CARD Category : Group 1	<div></div> <div>Source: FAO, Country profile, 2016</div>	
Basic information				
Population (WB, 2018)	26,260,000	Land area (2013)	58,730,000 ha	
Population (WB, 2015)	24,235,000	Agricultural Land area (2013)	41,415,000 ha	
Population growth ratio	2.8%	Farmland area ratio (2013)	71%	
GDP (WB, 2018)	US\$12,100,000,000	Arable Land area (2013)	4,120,000 ha	
GNI per capita (WB, 2018)	US\$440	Irrigation potential (2015)	1,517,000 ha	
Annual precipitation	1,518 mm/year	Irrigated area (2015)	904,785 ha	
Annual water consumption per capita (2015)	889 m³/year	Irrigated area ratio (2015)	22%	
Rice-related indexes				
Item		2008 (Basis)	2019	Remarks
Rice production	NRDS Target (2018)	4,914 Thousand tons	12,100 Thousand tons	
	FAO result (2017)		3,100 Thousand tons	Target achievement ratio 25.6%
Rice unit yield	NRDS Target (2018)	3.03 t/ha	4.65 t/ha	
	FAO result (2017)		4.25 t/ha	Target achievement ratio 91.3%
Rice cultivated area	NRDS Target (2018)	1,620,615 ha	2,600,000 ha	
	FAO result (2017)		730,000 ha	Target achievement ratio 28.1%
Rice consumption (FAO, 2017)		3,695 Thousand tons		
Rice consumption per capita		97 kg ※Decreased from 165 kg in the early 1970s		
Self-sufficiency ratio		83.9% (FAO, 2017)		
Current issues (Progress in CARD Phase 1)		NRDS support status	Status of CARD-related support	
			JICA	Donor
1. Seeds	Progress made	NRDS Priority area Seed Strategy formulated	Technical cooperation	Loan
2. Fertilizer		NRDS Priority area		
3. Irrigation and water management		NRDS Priority area	Grant	Grant Loan
4. Technology dissemination	Progress made	NRDS Priority area	Technical cooperation	Loan
5. Mechanization	Progress made	NRDS Priority area		Loan



		Mechanization strategy has been developed		
6. Post-Harvest Processing and Marketing	Few progress has been made	NRDS Priority area		Loan
Hypothetical cooperation concept				
1) Development Issues and Japan's Response Policy (Business Development Plan, April 2017)				
Rice cultivation in which about 90% of poor farmers are engaged is a key crop that accounts for about half of their income. However, due to the lack of related infrastructure and insufficient funds and technology, productivity remains low, and improving rice productivity is an urgent issue. Focusing on the rice cultivation sector in which it has a comparative advantage, the government of Japan aims to improve rice production in a sustainable manner by providing comprehensive support for policy formulation, cultivation technology development and dissemination, research, surveys, irrigation development, distribution and so on. With a focus on rice, the policy is also to strengthen the sustainability and self-reliant development of agriculture as a whole and related peripheral industries (distribution, processing, etc.) through market-oriented agricultural development.				
2) Status of government efforts				
Both the initial and revised versions of the NRDS for Madagascar had been approved by the Ministry of Agriculture and Livestock (MPAE) and endorsed by stakeholders. The revised NRDS is currently in the process of being approved by the Cabinet of Ministers; the NRDS and sub-sector strategies now serve as the basis for evaluation and other criteria for the MPAE and for donors involved in the development of rice-related projects. The NRDS proposes to increase production, thereby Madagascar aims to achieve self-sufficiency and becomes a net exporting country of rice, primarily to African countries.				
3) Government organization structure for NRDS implementation				
The Department for the Promotion of Rice Development (DPDR), which reports directly to the Director General of Agriculture of the MPAE, is responsible for the promotion and coordination of rice development in Madagascar at the central and local levels and is tasked with implementing the NRDS. Eleven staff members are assigned to the DPDR, and the Director of the DPDR serves as the Focal Point Person (FP). In 2005, the Platform for Consultation on Rice Sector Management (PCP-Riz) was established under the Prime Minister's Office, which oversees the ministries. It is a multi-stakeholder platform that aims to strengthen cooperation between the public and private sectors. Since the PCP-Riz is not active, the revised NRDS advocates its reactivation. The DPDR provides secretariat support to the PCP-Riz. At the regional level, individual regional directors (DRAEs) are expected to provide leadership in the implementation of the NRDS. A regional version of the PCP-Riz exists and serves as a coordination and cooperation platform between relevant ministries and other stakeholders at the regional level.				
4) Achievement status of CARD Phase 1 (Target values and results)				
According to the NRDS (2009), the goal was to increase unit yield from 3.03 t/ha to 4.65 t/ha and cultivated area from 1,620,615 ha to 2,600,000 ha by 2018. However, as a result, the yield per hectare was 4.25 t/ha (FAO 2017, 91.3% of the target achieved) and the cultivated area was 730,000 ha (FAO 2017, 28.1% of the target achieved). Increased unit income is yielding results, but the amount of arable land was decreasing dramatically. Achievement of rice production relative to the NRDS 2018 target was 25.6% as of 2017, and the self-sufficiency ratio was 83.9%.				
5) Development Potential				
With abundant rainfall (average annual precipitation 1,518 mm/year), relatively fertile soils, and a rice culture, the Irrigated area ratio to arable land was 22% (FAO 2015), the highest irrigation ratio among the CARD countries. The Irrigated area is about 900,000 ha compared to the Irrigation potential area of 1.51 million ha, and the maintenance ratio was about 60%. The widespread use of paddy rice cultivation techniques has resulted in high mono yields, and there is significant room to improve productivity by developing areas where irrigation facilities have not yet been developed.				
6) Direction of future support and anticipated grant aid components				
【Facility maintenance】				
Lack of seed storage, research facilities, and testing and control centers for mechanized equipment. It is in poor condition at many stages of the value chain. These have shown little progress and there is room for support. In addition, as a market-oriented agricultural development, it is necessary to consider strengthening related peripheral industries (distribution, processing, etc.).				
【Rehabilitation of irrigation facilities】【Development of new irrigation facilities】				
There is a possibility to support the rehabilitation of existing irrigation facilities proposed in the CARD Phase 1, as well as to increase productivity through development in areas where irrigation facilities are not yet in place.				
【Mechanization of agricultural work】				
There is room for support for mechanization, as it is inadequate.				

**【Technology dissemination】**


CARD-related assistance is being provided in general, but there is potential for assistance in proper fertilizer management.

Republic of Rwanda				
Positioning of CARD		JICA Category : Priority Country CARD Category : Group 2		
Source: FAO, Country profile, 2005				
Basic information				
Population (WB, 2018)		12,300,000	Land area (2002)	2,634,000 ha
Population (WB, 2004)		8,481,000	Agricultural Land area (2002)	1,385,000 ha
Population growth ratio		3.2%	Farmland area ratio (2002)	53%
GDP (WB, 2018)		US\$9,509,000,000	Arable Land area (2002)	1,385,000 ha
GNI per capita (WB, 2018)		US\$780	Irrigation potential (2002)	165,000 ha
Annual precipitation		1,212 mm/year	Irrigated area (2002)	8,500 ha
Annual water consumption per capita (2004)		32 m³/year	Irrigated area ratio (2002)	0.6%
Rice-related indexes				
Item		2008 (Basis)	2019	Remaarks
Rice production	NRDS Target (2018)	66 Thousand tons	374 Thousand tons	
	FAO result (2017)		109 Thousand tons	Target achievement ratio 29.1% Growth Ratio 165%
Rice unit yield	NRDS Target (2018)	5.8 t/ha	7.0 t/ha	
	FAO result (2017)		3.45 t/ha	Target achievement ratio 49.3%
Rice cultivated area	NRDS Target (2018)	6,838 ha	28,500 ha	
	FAO result (2017)		31,583 ha	Target achievement ratio 110.8%
Rice consumption (FAO, 2017)		139 Thousand tons		
Rice consumption per capita		15.6 kg (2018 projected value)		
Self-sufficiency ratio		78.0% (2017, FAO)		
Current issues (Progress in CARD Phase 1)		NRDS support status	Status of CARD-related support	
			JICA	Donor
1. Seeds	Difficult to obtain excellent seeds	NRDS Priority area Seed strategy development in progress		
2. Fertilizer		NRDS Priority area		
3. Irrigation and water management		NRDS Priority area	Grant	Grant
4. Technology dissemination		NRDS Priority area	Technical cooperation	
5. Mechanization	Slow progress	NRDS Priority area		



		Mechanization strategy development in progress		
6. Post-Harvest Processing and Marketing		NRDS Priority area		
<b>Hypothetical cooperation concept</b>				
<b>1) Development Issues and Japan's Response Policy (Business Development Plan, July 2015)</b>				
Japan has made the basic policy (major goal) of its ODA for agricultural development (high value-added and business-oriented). Approximately 70% of Rwanda's working population is engaged in agriculture, which is densely populated and small-scale type of farming. To improve productivity and profitability of agriculture, which leads to poverty reduction, we will work on support covering from the field (production technology) to policy aspects. Specifically, we will support the improvement of agricultural productivity through the promotion of irrigation and other measures, the commercialization of agriculture, including the SHEP approach, which encompasses production, post-harvest processing, distribution, and marketing, as well as the comprehensive improvement of food value chains.				
<b>2) Status of government efforts</b>				
The rice strategy was mentioned in the third phase (2012-2017) of the Strategic Plan for Agrarian Reform in Rwanda (PSTA III), where strengthening the value chain covering all areas of production, including the organization and technology of seed farmers, was identified as the third pillar of the strategic plan. Rice has a priority and is required special focus. The strategic plan is understood as the implementation framework of the Comprehensive African Agricultural Development Program (CAADP) agenda. The NRDS is explicitly mentioned in the PSTA III and officially endorsed by the Ministry of Agriculture and Animal Resources (MINAGRI).				
<b>3) Government organization structure for NRDS implementation</b>				
Focal Point Person (FP) is the Director of Agricultural Development in the MINAGRI. The NRDS task force members consisted of the Director of Agricultural Development of the MINAGRI, one senior official from the agency, and three senior officials from the Rice Crop Program of the Rwanda Agricultural Bureau (RAB). The CARD Secretariat proposed, and the government agreed, to establish a Rice Crop Steering Committee at the end of 2014. In addition to the forum established for the CARD/NRDS, there are sectoral meetings (once a year in the Agricultural Working Group, attended by all donors) and seasonal meetings (twice a year, where stakeholders discuss planning and post-harvest evaluation) to coordinate the entire agricultural sector.				
<b>4) Achievement status of CARD Phase 1 (Target values and results)</b>				
The goal was to increase unit yield from 5.8 t/ha to 7.0 t/ha and rice cultivation area from 6,838 ha to 28,500 ha by 2018. The actual results were 3.45 t/ha of unit yield (FAO 2017, 49.3% of target achieved) and 31,583 ha of rice cultivation (FAO 2017, 110.8% of target achieved), indicating that rice cultivation area had met the target, but unit yield had not improved. The achievement ratio of rice production against the target (NRDS 2018) was 29.1% as of 2017, with a growth ratio of 165%. The challenge is to improve production by increasing rice unit yields.				
<b>5) Development potential</b>				
The Land area is small and most of the country is steep topography. In the 13,850 km <sup>2</sup> of arable land, the Irrigation potential was 165,000 ha (FAO 2002) and the Irrigated area had increased to 9,600 ha (FAO 2017). Rice cultivation area increased by 6,440 ha due to the development of wetlands implemented with donor assistance. Areas with high potential in the CARD Phase 1 were developed preferentially. There is still a possibility to expand the area of cultivated land with drainage improvement in low-lying areas, and to expand the area planted through double cropping by improving irrigation facilities and the intensification of agriculture. However, it is thought that there is little room for an increase in production by expanding the area of cultivated land.				
<b>6) Direction of future support and anticipated grant aid components</b>				
<b>【Seed supply】【Technology dissemination】【Post-harvest processing】</b>				
With its high population density and limited Land area in this country, there is a limit to the increase in production volume through expansion of arable land and mechanization. Therefore, with the goal of achieving the 7.0 t/ha rice unit yield set in the phase 1, the direction of the project is to increase the unit yield and add the high value through improvements in seed production, cultivation technology, and post-harvest processing.				
<b>【Improvement of facilities】</b>				
While providing soft support for human resource development, research, and dissemination of cultivation techniques to increase the unit yields and add the high value through the production of excellent seeds and research into new local brands, it considers providing hard support for base facilities such as excellent seed production bases, post-harvest processing facilities, and model plots, depending on needs and developments.				
<b>【Rehabilitation of irrigation and drainage facilities】【Development of new irrigation and drainage facilities】</b>				
It will be carried out the expansion of cultivated Land area with drainage improvement in low-lying areas, etc., and				

expansion of cropping area through double cropping by improving irrigation facilities and intensification of agriculture.

Republic of Uganda				
Positioning of CARD		JICA Category : Regional base country CARD Category : Group 1	<div></div> <div>Source: FAO, Country profile, 2015</div>	
Basic Information				
Population (WB, 2017)	42,860,000	Land area (2012)	24,155,000 ha	
Population (WB, 2013)	37,579,000	Agricultural Land area (2012)	14,262,000 ha	
Population growth ratio	3.5%	Farmland area ratio (2012)	59%	
GDP (WB, 2017)	US\$25,900,000,000	Arable Land area (2012)	9,150,000 ha	
GNI per capita (WB, 2017)	US\$600	Irrigation potential (2013)	90,000 ha	
Annual precipitation	1,180 mm/year	Irrigated area (2013)	11,137 ha	
Annual water consumption per capita (2013)	285 m³/year	Irrigated area ratio (2013)	0.12%	
Rice-related indexes				
Item		2008 (Basis)	2019	Remarks
Rice production	NRDS Target (2018)	178 Thousand tons	689 Thousand tons	
	FAO result (2017)		262 Thousand tons	Target achievement ratio 38.0% Growth Ratio 47%
Rice unit yield	NRDS Target (2018)	2.4 t/ha	3.1 t/ha	
	FAO result (2017)		2.68 t/ha	Target achievement ratio 86.5%
Rice cultivated area	NRDS Target (2018)	75,088 ha	220,263 ha	
	FAO result (2017)		97,659 ha	Target achievement ratio 44.3%
Rice consumption (FAO, 2017)		399 Thousand tons		
Rice consumption per capita		N/A kg		
Self-sufficiency ratio		65.7% (FAO, 2017)		
Current issues (Progress in CARD Phase 1)		NRDS support status	Status of CARD-related support	
			JICA	Donor
1. Seeds	Progress made for policy making	NRDS Priority area Seed strategy development in progress	Technical cooperation Grant	
2. Fertilizer		NRDS Priority area		
3. Irrigation and water	With donor intervention	NRDS Priority area	Technical	

management			cooperation	
4. Technology dissemination		NRDS Priority area		Technical cooperation
5. Mechanization				
6. Post-Harvest Processing and Marketing	Progress made for policy making	NRDS Priority area		Grant
<b>Hypothetical cooperation concept</b>				
<b>1) Development Issues and Japan's Response Policy</b>				
Rice production is rapidly expanding as a cash crop, but there are many challenges to the popularization of rice cultivation, such as low yield per unit of rice due to coarse rice cultivation and insufficient knowledge of rice cultivation among staff and researchers. Effective use of water resources through the development of irrigation facilities has been attracting attention, but the skills of agricultural professionals for irrigation development and its maintenance are inadequate. Japan has identified "Income enhancement through rural development" as a Priority area and intends to support the promotion of rice cultivation, including the dissemination of Nerica rice, the support for rice-related research institutions, and the improvement of rice productivity and profitability through the development of irrigation-related human resources, the establishment of maintenance and management systems.				
<b>2) Status of government efforts</b>				
Rice is one of the main products and is placed in line with the government's new Agricultural Sector Development Strategy and Investment Plan (2015/16 - 2019/20). The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) has selected rice as a priority product and considers it a target area for investment, and a content of the NRDS was reflected in the plan for rice sector. The NRDS, which was signed by the Minister of Agriculture in 2012, is a government document and is considered the cornerstone of the government's plan to promote rice cultivation in the country.				
<b>3) Government organization structure for NRDS implementation</b>				
Focal Point Person (FP) is a planning officer of the Grain Production Bureau of the MAAIF. Rice Production Secretariat was established, is headed by the Director of the Grain Production Bureau, and the Secretariat's members consist of Rice Desk Officers and Assistant Program Officers. The duties of this office are 1) to organize Rice Crop Management Committee (held twice a year) and 2) to organize Rice Crop Technology Committee (held quarterly). The Rice Steering Committee is an inclusive stakeholder committee whose members include officials of the MAAIF, the Ministry of Water and Environment, the Ministry of Trade, donor agencies, agricultural organizations, the National Crop Resources Research Institute (NaCRRI), and private sector.				
<b>4) Achievement status of CARD Phase 1 (Target values and results)</b>				
According to the NRDS (2012), the goal was to increase unit yield from 2.4 t/ha to 3.1 t/ha and rice cultivation area from 75,088 ha to 220,263 ha by 2018. However, as a result, the unit yield was 2.68 t/ha (FAO 2017, 86.5% of the target achieved) and the rice cultivated area was 97,659 ha (FAO 2017, 44.3% of the target achieved). There is room for improvement regarding unit yield. The achievement ratio of rice production against the 2018 target was 38.0% as of 2017, and the self-sufficiency ratio was only 65.7% against the 2018 target of 109%.				
<b>5) Development potential</b>				
Irrigation area was 11,137 ha (FAO 2013-2017) against Irrigation potential of 90,000 ha (FAO 2002), which was a slight increase from 10,000 ha in 2002 (FAO). This indicates the increase in Irrigated area with the development of irrigation facilities, and does not seem to reflect the current situation of a rapid increase in rain-fed rice in lowland wetlands. The central, eastern, and western regions of the country have high potential for agriculture and paddy rice cultivation with abundant water and relatively fertile soils, and high development potential through irrigation development that combines the wise use of wetlands with flood control and water utilization.				
<b>6) Direction of future support and anticipated grant aid components</b>				
The government supports the areal expansion of irrigated rice cultivation through irrigation and drainage development by taking advantage of its high potential, qualitative improvement of rice cultivation technology in wetland development, and the development of rice industry as a hub country in the eastern Africa region. <b>【Rehabilitation of irrigation and drainage facilities】</b> <b>【Development of new irrigation and drainage facilities】</b> <b>【Facility maintenance】</b> A project will be implemented that to expand the area of rice cultivation through irrigation and drainage projects involving drainage improvement and water source development, such as irrigation and drainage improvement in rain-fed rice cultivation areas around low marsh areas, agricultural use of livestock storage reservoirs, and construction of water storage dams. Large-scale water source development and field improvements will be considered in conjunction with loan projects. In the grant aid portion of Loan, mechanization centers and model plots are maintained, and research and dissemination, water management, maintenance and management, etc. will be carried out in technical cooperation				

projects.

**【Mechanization of agricultural work】**


Regarding the mechanization of agriculture, it is necessary to expand the plots and improve the fields in consideration of the drivability and workability of the machines. With regard to rain-fed rice areas where the floodplains on periphery of low wetlands had been reclaimed by human power, the implementation of the necessary infrastructure for mechanization can be effective as the first step by improving drainage and supplying irrigation water.

**【Seed supply】【Agricultural materials and equipment】【Post-harvest processing】**

Improvements to excellent seed development facilities, fertilizer certification agency facilities, proper fertilizer management, and post-harvest handling proposed in the CARD Phase 1 may also be eligible for support.

**【Human resource development】【Technology dissemination】**

Consideration should also be given to supporting the improvement of rice productivity and profitability through support for rice-related research institutes, irrigation-related human resource development, and the dissemination of technologies related to maintenance pipe rice cultivation.

Republic of Cote d'Ivoire				
Positioning of CARD		JICA Category : Priority Country CARD Category : Group 2		
Source: FAO, Country profile, 2005				
Basic information				
Population (WB,2018)	25,070,000	Land area (2002)	32,246,000 ha	
Population (WB,2004)	16,897,000	Agricultural Land area (2002)	19,600,000 ha	
Population growth ratio	3.5%	Farmland area ratio (2002)	61%	
GDP (WB,2018)	US\$43,000,000,000	Arable Land area (2002)	6,900,000 ha	
GNI percapita (WB,2018)	US\$1,610	Irrigation potential (2002)	475,000 ha	
Annual precipitation	1,348 mm/year	Irrigated area (2002)	72,750 ha	
Annual water consumption per capita (2004)	435 m³/year	Irrigated area ratio (2002)	1.1%	
Rice-related indexes				
Item		2008 (Basis)	2019	Remarks
Rice production	NRDS Target (2020)	661 Thousand tons	3,250 Thousand tons	
	FAO result (2017)		2,120 Thousand tons	Target achievement ratio 65.2%
Rice unit yield	NRDS Target (2020)	1.03 t/ha	2.3 t/ha	
	FAO result (2017)		2.56 t/ha	Target achievement ratio 111.3%
Rice cultivated area	NRDS Target (2020)	641,500 ha	1,430,000 ha	
	FAO result (2017)		829,142 ha	Target achievement ratio 58.0%
Rice consumption (FAO, 2017)		3,437 Thousand tons		
Rice consumption per capita		N/A kg		
Self-sufficiency ratio		61.7% (2017, FAO)		
Current issues (Progress in CARD Phase 1)		NRDS support status	Status of CARD-related support	
			JICA	Donor
1. Seeds	Progress made. Increased diffusion of certified seeds	NRDS Priority area Seed strategy development in progress		
2. Fertilizer		NRDS Priority area		
3. Irrigation and water management		NRDS Priority area		Grant
4. Technology dissemination		NRDS Priority area		



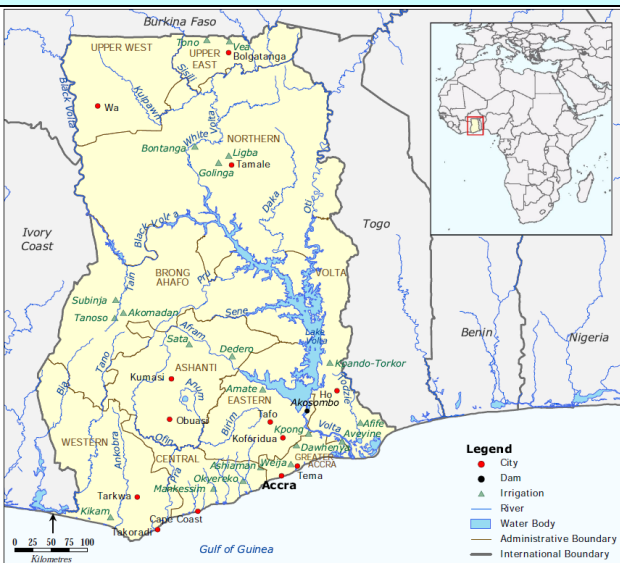
5. Mechanization		NRDS Priority area Mechanization strategy has been developed		Grant
6. Post-Harvest Processing and Marketing	Improving post-harvest processing capacity and quality	NRDS Priority area	Grant Technical cooperation	Grant (3) Private(5)
Hypothetical cooperation concept				
1) Development Issues and Japan's Response Policy (March 2018)				
<p>The consumption of rice and fish which is one of the main sources of protein, has been growing due to the diversification of consumer preferences. The challenge is to increase self-sufficiency ratio, and modernization of production and processing as well as improvement of distribution is require. Japan has identified "Industrial promotion" as a development issue and intends to support the promotion of primary industries such as agriculture and fisheries, which are the foundation of Cote d'Ivoire's economy, and to support the development of growth industries and entrepreneurs, including those in the fields of agro-processing, information and communication technology, environment and new energy, which contribute to the diversification and industrialization of the country's economy.</p>				
2) Status of government efforts				
<p>Various rice policies and programs have been implemented since the 1960s as the government attaches great importance to the promotion of rice cultivation. The government's basic strategy for rice is to achieve food security and food self-sufficiency ratio. The revised NRDS was approved by the Ministry of Agriculture and Rural Development (MINADER) in 2012. The Seed Strategy and Concept Note were developed in 2014 and are pending approval by MINADER. The Agricultural Mechanization Strategy was compiled by MINADER in 2015 and is currently awaiting approval.</p>				
3) Government organization structure for NRDS implementation				
<p>The Rice Sector Development Authority (ADERIZ) is a statutory administrative body with overarching authority for rice sector development, established in January 2018 through the reorganization of the National Rice Development Secretariat, and is responsible for implementing the NRDS through a three-year contract with MINADER. The contract between ADERIZ and MINADER stipulates in detail the objectives and performance indicators and methods of the NRDS implementation evaluation. Focal Point Person (FP) is the President of ADERIZ and the Director of the Production Support Department is in charge of practical affairs. The Board of Directors of ADETIZ also functions as the NRDS Task Force. Technical guidance is provided by MINADER and financial guidance by the Ministry of Economy and Finance. A new Ministry of Rice Promotion (MPR) was established in September 2019 with jurisdiction over rice policy, but its relationship to MINADER is not clear, and the functions and authority of MPR need to be confirmed.</p>				
4) Achievement status of CARD Phase 1 (Target values and results)				
<p>According to the NRDS (2012), the target was to increase unit yield from 1.03 t/ha to 2.3 t/ha and rice cultivated area from 641,500 ha to 1,430,000 ha by 2020, but as actual results, unit yield was 2.56 t/ha (FAO 2017, Target achievement ratio 111.3%) and the rice cultivated area was 829,142 ha (FAO 2017, Target achievement ratio of 58.0%), with the unit yield reaching the target and the cultivated area falling short of the target. The achievement ratio of rice production against the target (NRDS, 2020) was 65.23% and the self-sufficiency ratio was 61.7% as of 2017.</p>				
5) Development potential				
<p>The country of Cote d'Ivoire has high potential for agricultural production due to its favorable natural environment. Agriculture accounts for 27% of the country's gross domestic product, and two-thirds of the working population is engaged in agriculture. The demand for rice has increased tenfold since 1960, but the domestic production in 2011 was stagnant at 456,000 tons. In addition to the effects of political turmoil, the causes of this were (1) inadequate supply arrangements for excellent seeds, fertilizers and pesticides, (2) underdeveloped extension services, (3) low utilization of arable land due to lack of crop reserves, (4) lack of access to credit, and (5) lack of an environment for efficient functioning rice mills and distributors. Therefore, the development potential of these sectors is huge.</p>				
6) Direction of future support and anticipated grant aid components				
<p><b>【Rehabilitation of irrigation and drainage facilities】</b><b>【Development of new irrigation and drainage facilities】</b> Possible support may be provided depending on the status of rehabilitation of existing 35,000 ha irrigation facilities, new development, improvements, etc. proposed in the CARD Phase 1. It should be considered along with drainage improvements in low marsh areas.</p>				
<p><b>【Seed supply】</b><b>【Facility maintenance】</b> The supply system for excellent seeds and post-harvest processing, which are the basis for rice production, is not yet in place, and there are high needs for the dissemination of seed production technology, the development of seed storage facilities, the development of appropriate-sized rice milling facilities and storage facilities for post-harvest processing.</p>				
<p><b>【Mechanization of agricultural work】</b></p>				

Improvement of supply systems of rice milling machines, stone cutters, etc. for rice milling is lagging behind. Furthermore, preparation and improvement of supply of agricultural machinery such as tractors, tillers, threshing machines, etc. and the development of management and operation systems are lagging behind at the production stage as well.

**【Plot development】**

The plot configuration, which is a prerequisite for the introduction of agricultural machinery, is narrow and irregular, the soil is highly cohesive, and access roads to plots are not well maintained. Therefore, it should be consider that the possibility of modeling the development of plots with improved irrigation and drainage facilities in conjunction with the introduction of agricultural machinery.



Republic of Ghana				
Positioning of CARD		JICA Category : Priority Country CARD Category : Group 1		
Source: FAO, Country profile, 2005				
Basic information				
Population (WB,2018)		29,770,000	Land area (2002)	23,854,000 ha
Population (WB,2004)		21,377,000	Agricultural Land area (2002)	14,631,000 ha
Population growth ratio		2.8%	Farmland area ratio (2002)	61%
GDP (WB,2018)		US\$65,600,000,000	Arable Land area (2002)	6,331,000 ha
GNI per capita (WB,2018)		US\$2,130	Irrigation potential (2002)	1,900,000 ha
Annual precipitation		1,187 mm/year	Irrigated area (2002)	30,900 ha
Annual water consumption per capita (2004)		283 m³/year	Irrigated area ratio (2002)	0.5%
Rice-related indexes				
Item		2008 (Basis)	2019	Remarks
Rice production	NRDS Target (2018)	317 Thousand tons	1,343 Thousand tons	
	FAO result (2017)		721 Thousand tons	Target achievement ratio 53.7% Growth ratio 227%
Rice unit yield	NRDS Target (2018)	2.7 t/ha	3.6 t/ha	
	FAO result (2017)		2.79 t/ha	Target achievement ratio 77.5%
Rice cultivated area	NRDS Target (2018)	118,000 ha	375,000 ha	
	FAO result (2017)		258,587 ha	Target achievement ratio 69.0%
Rice consumption (FAO, 2017)		1,541 Thousand tons		
Rice consumption per capita		63.0 kg (2018 Predicted value)		
Self-sufficiency ratio		46.8% (2017 FAO)		
Current issues (Progress in CARD Phase 1)		NRDS support status	Status of CARD-related support	
			JICA	Donor
1. Seeds	Progress made	NRDS Priority area Seed strategy development in progress		Loan
2. Fertilizer		NRDS Priority area		
3. Irrigation and water management		NRDS Priority area		Technical cooperation

4. Technology dissemination		NRDS Priority area	開調 Technical cooperation	Technical cooperation
5. Mechanization	Some progress made			
6. Post-Harvest Processing and Marketing		NRDS Priority area	Technical cooperation	Loan and Grant Technical cooperation
<b>Hypothetical cooperation concept</b>				
<b>1) Development Issues and Japan's Response Policy</b>				
<p>The Government of Ghana has identified agricultural modernization as a development challenge. However, the government faces challenges such as low irrigation development and utilization area, inefficient use of existing facilities, inadequate fertilizer, pesticide, poor access to agricultural machinery for small-scale farmers who are the majority of farmers. Japan has identified "Agriculture (rice cultivation)" as a priority area, and its policy is to support small-scale farmers to improve their productivity and profitability and strengthen their extension systems, and to contribute to the promotion of agricultural intensification and commercialization through the introduction of production infrastructure and value chain approaches, including the promotion of agricultural mechanization, and the development of distribution systems.</p>				
<b>2) Status of government efforts</b>				
<p>Rice has become the second staple food in Ghana and is grown both as a food crop and as a cash crop, but is heavily dependent on imported rice and is one of the most important crops for national food security. The main policy for the agricultural sector in Ghana is the Food and Agriculture Sector Development Policy (FASDEP), and the action plan to implement this policy is the Medium Term Agricultural Sector Investment Plan (METASIP). Agricultural proposals will be implemented based on these key documents of FASDEP and METASIP along with other specific policies (NRDS, seed strategy, mechanization strategy). MATASIP is categorized by grain type.</p> <p>The revised NRDS is in the process of being approved by the Ministry of Food and Agriculture (MOFA) and is expected to become a Ministry document. (March 2018)</p>				
<b>3) Government organization structure for NRDS implementation</b>				
<p>Focal Point Person (FP) is the Deputy Director of Food Service Bureau of the MOFA who is responsible for developing commodity crop policy. National Rice Crop Coordinating Committee has been mentioned by the NRDS but has not yet been established. However, National Rice Task Force was established to handle the technical aspects of implementing the strategy. Rice Desk serves as the secretariat of the committee and as the MOFA point of contact in communicating with government bureaucrats in other departments.</p>				
<b>4) Achievement status of CARD Phase 1 (Target values and results)</b>				
<p>According to the NRDS (2009), the target was to increase unit yield from 2.7 t/ha to 3.6 t/ha and rice cultivation area from 118,000 ha to 375,000 ha by 2018, but the actual yield was 2.79 t/ha (FAO 2017, target achievement ratio 77.5%), and the area under rice cultivation was 258,587 ha (FAO 2017, 69.0% of target achieved). There is room for improvement in both unit yield and area under cultivation. As of 2017, the achievement ratio against the 2020 target (NRDS) remained at 53.7% for rice production and 46.8% for self-sufficiency ratio.</p> <p>Improved seeds subject to the seed strategy were produced in increased quantities and supplied to farmers throughout the country. In addition, the establishment of rice standards contributed to the improvement of rice quality. As regards mechanization, 89 Agricultural Mechanization Service Centers (AMSEC) were established under the MOFA initiative.</p>				
<b>5) Development potential</b>				
<p>Irrigation potential was expected to be 1,900,000 ha which was about 30% of the 6,331,000 ha of arable land. (FAO 2002). Development had not progressed because the irrigated area had remained unchanged from 30,900 ha (FAO 2002) to 36,000 ha (FAO 2017) at about 2% of the Irrigation potential. Lack of investment is cited as a cause, but the abundant water resources (average annual rainfall of 1,187 mm/year) and vast arable land area have high potential for improving production through irrigation development.</p>				
<b>6) Direction of future support and anticipated grant aid components</b>				
<p><b>【Development of new irrigation and drainage facilities】</b></p> <p>Four million hectares of undeveloped land has been identified in Rain fed Lowland, and feasibility studies such as expansion of arable land area through drainage improvement may be considered. Projects with a limited scope and relatively small scale, such as renovation and expansion of existing irrigation facilities, may be considered for rehabilitation through grant aid projects.</p> <p><b>【Agricultural equipment and materials】【Agricultural mechanization】【Post-harvest processing】【Facility maintenance】【Seed supply】</b></p> <p>Small-scale farmers face challenges such as lack of fertilizers, pesticides, and access to agricultural machinery.</p>				


To contribute to the promotion of agricultural intensification and commercialization through the adoption of a value chain approach and the development of a distribution system, projects that combine agricultural mechanization centers as regional centers, post-harvest processing facilities and facility maintenance and technical cooperation projects are envisaged from the perspective of promoting agricultural modernization and private investment. Rehabilitation of existing cold storage facilities for seed storage proposed in the CARD Phase 1 and development of post-harvest storage facilities may also be eligible for support.

**【Plot development】**


Taking advantage of the high irrigation development potential, the support through renovation of existing irrigation facilities, etc. is envisaged. In addition to this, another support that contributes to the development of production infrastructure, including the promotion of agricultural mechanization, such as the expansion of the area of cultivated land in use, is also envisaged.

**【Master plan development】**

In cases where the scope of irrigation development, etc. covers a wide area and regional characteristics vary greatly, it is proposed that the formulation of an irrigation development master plan, etc. Long-term development plans combining loans, technical cooperation projects, and grant aid projects are also envisaged and should be considered together with mechanization.

Republic of Liberia				
Positioning of CARD		JICA category : Supported country CARD category : Group 2	<div></div> <div>Source: FAO, Country profile, 2005</div>	
Basic information				
Population (WB,2018)	4,820,000	Land area (2002)	11,137,000 ha	
Population (WB,2004)	3,487,000	Agricultural Land area (2002)	2,610,000 ha	
Population growth ratio	2.7%	Farmland area ratio (2002)	23.4 %	
GDP (WB,2018)	US\$3,250,000,000	Arable Land area (2002)	600,000 ha	
GNI per capita (WB,2018)	US\$610	Irrigation potential (1987)	600,000 ha	
Annual precipitation	2,391mm/year	Irrigated area (1987)	2,100 ha	
Annual water consumption per capita (2002)	266 m³/year	Irrigated area ratio (1987)	0.4 %	
Rice-related indexes				
Item		2008 (Basis)	2019	Remarks
Rice production	NRDS Target (2018)	199 Thousand tons	879 Thousand tons	
	FAO result (2017)		247 Thousand tons	
Rice unit yield	NRDS Target (2018)	1.18 t/ha		
	FAO result (2017)		1.06 t/ha	
Rice cultivated area	NRDS Target (2018)	251,230 ha		
	FAO result (2017)		234,000 ha	
Rice consumption (FAO, 2017)		465 Thousand tons		
Rice consumption per capita		133 kg/year/personnel		
Self-sufficiency ratio		45.4% (FAO, 2017)		
Current issues (Progress in CARD Phase 1)		NRDS support status	Status of CARD-related support	
			JICA	Donor
1. Seeds	Progress made			
2. Fertilizer	No progress			
3. Irrigation and water management				
4. Technology dissemination				
5. Mechanization	No progress Policy unsettled			

6. Post-Harvest Processing and Marketing				
Direction of Support				
1) Development Issues and Japan's Response Policy (Business Development Plan, April 2019)				
Rice is the staple food in Liberia, but the country relies on imports for most of its demand. The spread of Ebola has had a tremendous impact on Liberia's agricultural sector where 70% of the population is engaged in agriculture, so the challenges are improving access to markets and increasing production of key agricultural products. Japan has identified "Promotion of agriculture and food security initiatives" as a development issue, and its basic policy is to further improve the effectiveness of its assistance in cooperation with other countries and international organizations while taking advantage of Japan's comparative advantage.				
2) Status of government efforts				
Liberia's NRDS was developed in 2012 and approved by the Cabinet. Although the NRDS is the foundational document for rice development in Liberia, little has been done to implement the strategy, disappointingly.				
3) Government organization structure for NRDS implementation				
Focal Point Person (FP) is the Executive Director of the Ministry of Agriculture and is responsible for the formulation and implementation of NRDS in Liberia. The task force consists of bureaucrats working for the Ministry of Agriculture, several members from research institutions, and one member from an NGO. There is no implementation mechanism established by the government, and the costs of CARD-related meetings are essentially borne by CARD Secretariat of Liberia. Various task forces lack the capacity to function adequately due to a lack of human resources and other reasons.				
4) Achievement status of CARD Phase 1 (Target values and results)				
There are no CARD-related projects already implemented or underway in Liberia. As of 2017, the ratio of achievement of the target was about the same as in 2008, the year of the plan, or showed a decreasing trend, suggesting that it would be difficult to achieve the target within the timeframe of the Phase 1.				
5) Development potential				
The vast undeveloped arable lands and lowlands have high irrigation potential, backed by abundant and underutilized water resources, it has been slow to develop due to the civil war and the Ebola hemorrhagic fever. On the other hand, considering the public's pervasive preference for the taste of imported rice, backed by the subsidy system, it would not be cost-effective to implement medium- to large-scale infrastructure improvements. If the strengths of Japan are to be utilized, it is assumed that there is significant room for possible cooperation in the areas of seed improvement and human resource development.				
6) Direction of future support and anticipated grant aid components				
【Human resource development】【Technology dissemination】 With regard to the slow progress of the seed strategy, it is envisioned that Japan will provide cooperative support in the areas of human resource development and technology dissemination, starting with technical cooperation projects or dispatch of experts that take advantage of Japan's strengths.				
【Rehabilitation of irrigation facilities】【Development of new irrigation facilities】 Although the development potential is high, it is not cost-effective in terms of enhancing the presence of Japan.				
【Improving market access】 Improving market access and developing base facilities would be worth considering as options for cooperation support that leverages the strengths of Japan.				

Federal Republic of Nigeria				
Positioning of CARD		JICA Category: Priority Country CARD Category: Group 1	<div></div> <div>Source: FAO, Country profile, 2016</div>	
Basic information				
Population (WB, 2018)	195,870,000	Land area (2013)	92,377,000 ha	
Population (WB, 2015)	182,202,000	Agricultural Land area 2013)	70,800,000 ha	
Population growth ratio	2.5%	Farmland area ratio (2013)	77%	
GDP (WB, 2018)	US\$397,300,000,000	Arable Land area (2013)	40,500,000 ha	
GNI per capita (WB, 2018)	US\$1,960	Irrigation potential (2010)	2,330,000 ha	
Annual precipitation	1,150 mm/year	Irrigated area (2010)	325,106 ha	
Annual water consumption per capita (2015)	1,062 m³/year	Irrigated area ratio (2010)	0.8%	
Rice-related indexes				
Item		2008 (Basis)	2019	Remarks
Rice Production	NRDS Target (2018)	3,465 Thousand tons	13,251 Thousand tons	
	FAO result (2017)		9,864 Thousand tons	Target achievement ratio 74.4% Growth ratio 284.7%
Rice unit yield	NRDS Target (2018)	1.92 t/ha	3.79 t/ha	
	FAO result (2017)		2.01 t/ha	Target achievement ratio 53.0%
Rice cultivated area	NRDS Target (2018)	1,801,000 ha	3,500,000 ha	
	FAO result (2017)		4,912,650 ha	Target achievement ratio 140.4%
Rice consumption (FAO, 2017)		9,926 Thousand tons		
Rice consumption per capita		40 kg (2015 Value)		
Self-sufficiency ratio		99.4% (2017 FAO)		
Current issues (Progress in CARD Phase 1)		NRDS support status	Status of CARD-related support	
			JICA	Donor
1. Seeds	Progressing well	NRDS Priority area Seed strategy formulated		Technical cooperation Government (5) Grant
2. Fertilizer		NRDS Priority area		
3. Irrigation and water management	Progressing well	NRDS Priority area		Loan Government
4. Technology dissemination		NRDS Priority area	Technical	



			cooperation	
5. Mechanization	No major improvement.	NRDS Priority area Mechanization strategy under development		
6. Post-Harvest Processing and Marketing	Progressing well	NRDS Priority area	Technical cooperation	Loan Grant (3) Fund (2) Government (2)
<b>Hypothetical cooperation concept</b>				
<b>1) Development Issues and Japan's Response Policy</b>				
In order to diversify industries by fostering alternatives to the oil and natural gas industry in Nigeria, the challenge is to develop and implement policies to promote the private sector in the field of such as agriculture, fisheries, food industry and manufacturing, over the medium to long term. Japan has identified "Economic diversification and industrial promotion" as its development agenda, and intends to provide support for the promotion of agriculture and fisheries, which have great potential, and for the construction of value chains from processing to distribution of agricultural products, including the promotion of the food industry.				
<b>2) Status of government efforts</b>				
Rice is the staple grain in Nigeria and is strategically important for food and security, and was identified as an important crop in the Agricultural Reform Plan (ATA, 2011-2016) and the Green Initiative (2016-2020) launched as an agricultural promotion policy. In 2015, Nigeria imported 1.6 million tons of rice compared to total rice demand of approximately 7.5 million tons. Such demand is expected to reach 36 million tons by 2050, and the country had aimed to become a rice exporter by 2020 in its Economic Recovery and Growth Plan (2017-2020). The Federal Ministry of Agriculture and Rural Development (FMARD) approved NRDS and the concept note in 2010. The President and Executive Council (Executive Council) officially launched Rice Reform Action Plan (RTA-AP), an upgraded version of the NRDS, in 2011. The seed strategy was developed and approved by the FMARD in 2014.				
<b>3) Government organization structure for NRDS implementation</b>				
The RTA-AP implementation regime can be understood in the broader ATA context. The Agrarian Reform Implementation Council (ATIC) was established as the highest decision-making body of the ATA and was chaired by the President. At the core of the ATIC, Agricultural Value Chain Reform Implementation Group (Value Chain ATIG) was set up, and several working groups had been established to support it, addressing common issues to all value chains, such as infrastructure and financing. Interdisciplinary policies are handled by a committee organized across ministries, which is the meeting place for all ministers. Federal Farm Service Agency (FDA) of the FMARD is an agency in charge of ATA implementation. To facilitate the implementation, Growth Enhancement Support Working Group (GESWG) was established and serves as a working unit that reviews all ATA programs weekly with the minister responsible. Value chain desk officers as well as rice desk included in the ATA attend the meetings. The rice desk is primarily responsible for the RTA-AP implementation.				
<b>4) Achievement status of CARD Phase 1 (Target values and results)</b>				
According to the NRDS (2009), the target was to increase the monoculture from 1.92 t/ha to 3.79 t/ha and the area under rice cultivation from 1,801,000 ha to 3,500,000 ha by 2018. As a result, the unit yield was 2.01 t/ha (FAO 2017) and the area under rice cultivation was 4,912,650 ha (FAO 2017, 140.4% of the target achieved). The achievement ratio against the 2018 target was 74.4% for the rice production and 99.4% for self-sufficiency ratio as of 2017. Steady progress is being made in the areas of seed, irrigation, water management, and post-harvest processing. The private sector's entry into the seed and post-harvest processing sector has improved access to high quality-excellent seeds and domestic milling capacity. On the other hand, with regard to mechanization, the lack of domestically produced agricultural machinery and the import-related problems are hampering introduction of the machinery.				
<b>5) Development potential</b>				
The irrigation potential was expected to be 2,330,000 ha, about 6% of the 40,500,000 ha of the arable land (FAO 2002). The irrigated area of 325,106 ha (FAO 2010) remained at the flat level of about 14% of irrigation potential, while the rice area of about 4.9 million ha (2015) was above the target. The annual water consumption per capita is 1,062 m <sup>3</sup> /year, which is high in Sub-Saharan Africa. In the CARD Phase 2, the vast area of arable land and its high irrigation development potential are expected to increase production through the area expansion.				
<b>6) Direction of future support and anticipated grant aid components</b>				
<b>【Improvement of facilities】【Improving market access】</b> The lack of various facilities (markets, storage facilities, transportation infrastructure) to facilitate distribution has been identified as challenges, and support will be provided to help build a value chain from processing to distribution of agricultural products.				


**【Seed supply】【Post-harvest processing】**

It aims to provide support in order to facilitate the entry of the private sector which has made significant progress in the seed and post-harvest processing sector.


**【Agricultural equipment and materials】【Repair and maintenance of irrigation facilities】【Mechanization of agricultural work】**

The support measures will also be considered for introduction of materials and equipment, renovation and maintenance of irrigation facilities through grant aid projects, and issues related to the importation of agricultural machinery.

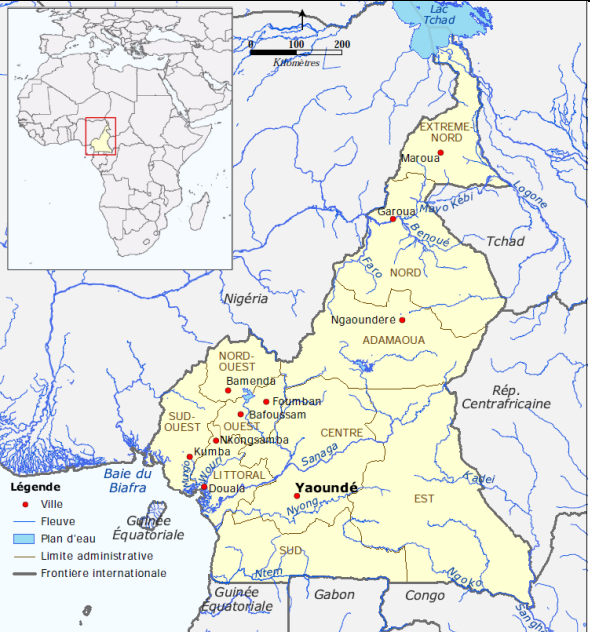


Republic of Sierra Leone				
Positioning of CARD		JICA Category : Priority Country CARD Category : Group 1		 <p>Source: FAO, Country profile, 2005</p>
Basic information				
Population (WB, 2018)	7,650,000	Land area (2002)	7,230,000 ha	
Population (WB, 2004)	5,168,000	Agricultural Land area (2002)	3,230,000 ha	
Population growth ratio	3.4%	Farmland area ratio (2002)	45%	
GDP (WB, 2018)	US\$4,000,000,000	Arable Land area (1992)	600,000 ha	
GNI per capita (WB, 2018)	US\$490	Irrigation potential (1981)	807,000 ha	
Annual precipitation	2,526 mm/year	Irrigated area (1992)	29,360 ha	
Annual water consumption per capita (2004)	183 m³/year	Irrigated area ratio (1992)	5%	
Rice-related indexes				
Item		2008 (Basis)	2019	Remarks
Rice production	NRDS Target (2018)	674 Thousand tons	3,101 Thousand tons	
	FAO result (2017)		1,400 Thousand tons	Target achievement ratio 45.1% Growth ratio 207.7%
Rice unit yield	NRDS Target (2018)	0.97 t/ha	4.0 t/ha	
	FAO result (2017)		2.16 t/ha	Target achievement ratio 54%
Rice cultivated area	NRDS Target (2018)	659,487 ha	1,100,000 ha	
	FAO result (2017)		647,295 ha	Target achievement ratio 58.8%
Rice consumption (FAO, 2017)		1,747 Thousand tons		
Rice consumption per capita		104 kg		
Self-sufficiency ratio		80.1% (FAO, 2017)		
Current issues (Progress in CARD Phase 1)		NRDS support status	Status of CARD-related support	
			JICA	Donor
1. Seeds	Progress made	NRDS Priority area Seed strategy development in progress		
2. Fertilizer		NRDS Priority area		
3. Irrigation and water management	Progress made in water resources management	NRDS Priority area	Technical cooperation	
4. Technology dissemination		NRDS Priority area	Technical cooperation	
5. Mechanization		NRDS Priority area		

6. Post-Harvest Processing and Marketing	Promoting	NRDS Priority area		Loan
Hypothetical cooperation concept				
1) Development Issues and Japan's Response Policy				
Japan's basic ODA policy (the main goal) is "To strengthen social infrastructure and improve economic foundation". Sierra Leone is one of the largest rice consuming countries in Africa, and the rice is the staple food in the country. The government has placed rice as a priority crop and is working to improve self-sufficiency ratio and productivity, and intends to utilize Japan's knowledge and technological capabilities to provide assistance in order to improve the productivity and profitability, especially for small-scale farmers in the country.				
2) Status of government efforts				
The annual rice consumption per capita in Sierra Leone is 104 kg. Rice as a staple food is strategically very important for improving food security and rural incomes. The NRDS was formulated in 2009 and approved by the Minister of Agriculture, Forestry and Food Security, and became the official document for the promotion of rice cultivation. The government had attempted to revise the NRDS in 2014 to ensure its alignment with the CAADP investment plan (Phase 2), but was interrupted by the Ebola outbreak. The seed strategy was developed in 2016 and the concept note was prepared in 2017, but the mechanization strategy has not yet been initiated.				
3) Government organization structure for NRDS implementation				
Focal Point Person (FP) is the Director of the Food Crops Bureau of the Ministry of Agriculture, Forestry and Food Security (MAFFS). The above-mentioned bureau of MAFFS tasked with implementing rice sector projects is working with a task force of key stakeholders in other MAFFS bureaus including Sierra Leone Agricultural Research Institute (SLARI), Sierra Leone Seed Certification Agency (SLeSCA) and Seed Multiplication Project (SMP) to promote and coordinate the implementation of the NRDS.				
The Task Force was appointed through a national consultation on rice promotion in Sierra Leone. It is responsible for drafting the NRDS and also serves as an advisory body for the coordination of the NRDS, contributing to building relationships with other stakeholders.				
4) Achievement status of CARD Phase 1 (Target values and results)				
According to the NRDS (2009), the target was to increase rice unit yield from 0.97 t/ha to 4.0 t/ha and rice cultivation area from 659,487 ha to 1,100,000 ha by 2018. However, the actual results were 2.16 t/ha (FAO 2017, target achievement ratio: 54%) for the rice unit yield and 647,295 ha (FAO 2017, target achievement ratio: 58.8%) for the rice cultivation area, which means that both, the unit yield and area, have not reached the target. The achievement ratio against the 2018 target was 45.1% for the rice production and 80.1% for the self-sufficiency ratio as of 2017.				
5) Development potential				
The irrigation potential was estimated to be 807,000 ha (1981) for the cultivated area of 600,000 ha (1992) (FAO 2005). This was a rough estimate of the area available for development from 1,165 thousand ha of low marshland included in approximately 5 million ha of the arable land. The area of cultivated land has doubled from 600,000 ha in 1992 to 1.75 million ha (FAO 2017), but the irrigated area was not increased and remained at the flat level at about 30,000 ha (1992-2017). It remains undeveloped area with high potential for the irrigation development.				
6) Direction of future support and anticipated grant aid components				
【Maintenance of farm roads】【Improving market access】【Post-harvest processing】				
Support may be available depending on the status of implementation of feeder roads to new farmland proposed in the CARD Phase 1, construction of markets and access roads, and modernization of post-harvest processing.				
【Rehabilitation of irrigation and drainage facilities】【Development of new irrigation and drainage facilities】				
It is necessary to consider the development of low-lying wetlands with high development potential to improve productivity and profitability of small-scale farmers, the construction of small-scale reservoirs, and the implementation of pilot projects for development of small-scale irrigation.				

Republic of Zambia				
Positioning of CARD		JICA Category : Priority Country CARD Category : Group 2		
Source: FAO, Country profile, 2005				
Basic information				
Population (WB, 2018)	17,350,000	Land area (2002)	75,261,000 ha	
Population (WB, 2004)	10,924,000	Agricultural Land area (2002)	22,616,000 ha	
Population growth ratio	4.2%	Farmland area ratio (2002)	30%	
GDP (WB, 2018)	US\$26,700,000,000	Arable Land area (2002)	5,289,000 ha	
GNI per capita (WB, 2018)	US\$1430	Irrigation potential (2002)	523,000 ha	
Annual precipitation	1,020 mm/year	Irrigated area (2002)	155,912 ha	
Annual water consumption per capita (2004)	768 m³/year	Irrigated area ratio (2002)	3 %	
Rice-related indexes				
Item		2008 (Basis)	2019	Remarks
Rice production	NRDS Target (2018)	41 Thousand tons	126 Thousand tons	
	FAO result (2017)		38 Thousand tons	Target achievement ratio 30.2% Growth ratio 93%
Rice unit yield	NRDS Target (2018)	1.3 t/ha	3.0 t/ha	
	FAO result (2017)		1.3 t/ha	Target achievement ratio 43.3%
Rice cultivated area	NRDS Target (2018)	31,000 ha	42,000 ha	
	FAO result (2017)		29,575 ha	Target achievement ratio 70.4%
Rice consumption (FAO, 2017)		56 Thousand tons		
Rice consumption per capita		4.11 kg (2015 Value)		
Self-sufficiency ratio		67.9% (2017 FAO)		
Current issues (Progress in CARD Phase 1)		NRDS support status	Status of CARD-related support	
			JICA	Donor
1. Seeds	Steady progress	NRDS Priority area Seed strategy development in progress	Technical cooperation	
2. Fertilizer		NRDS Priority area		
3. Irrigation and water management	Insufficient	NRDS Priority area	Technical cooperation	
4. Technology dissemination		NRDS Priority area	Technical	

			cooperation	
5. Mechanization	Insufficient	NRDS Priority area		
6. Post-Harvest Processing and Marketing		NRDS Priority area		
<b>Hypothetical cooperation concept</b>				
<b>1) Development Issues and Japan's Response Policy (June 2018)</b>				
Japan has identified "Industrial revitalization" as a priority area, and its basic policy is to contribute to industrial revitalization by providing assistance centered on technical cooperation in private sector particularly including small and medium-sized enterprises, and agricultural sector. Both sectors are important in promoting economic diversification. The implementation of effective support through "Coordinated assistance" and the income disparity between urban and rural areas in country assisted are noteworthy points.				
<b>2) Status of government efforts</b>				
The Ministry of Agriculture (MA) recognizes rice as a strategic commodity that contributes to food security and improved current account balance, in addition to increasing income and contributing to employment in rural communities. Rice is a relatively new crop in Zambia. It is recognized as one of the nine crops eligible for subsidy support and is also a target crop of the Food Reserve Agency of Zambia. The NRDS was amended and approved by both the Minister of Agriculture and the Undersecretary in July 2016. The stakeholders were widely invited to the NRDS validation meetings.				
<b>3) Government organization structure for NRDS implementation</b>				
The Agriculture Deputy Director of Crop Production of the MA has been appointed as Focal Point Person (FP) and leads the NRDS task force. The Zambia Collaborative for the Promotion of Rice Cultivation (ZCARD) was established to oversee the implementation of the NRDS and to ensure stakeholder coordination and lobbying for funding. The members include representatives from both the public and private sector appointed by the undersecretary of the MA. Initially, the undersecretary chaired the ZCARD, but the director of the MA took over due to the undersecretary's busy schedule. The Agricultural Consultative Forum (ACF) which is a non-governmental organization (NGO), serves as the secretariat of the ZCARD.				
<b>4) Achievement status of CARD Phase 1 (Target values and results)</b>				
According to the NRDS (2011), the goal was to increase unit yield from 1.3 t/ha to 3.0 t/ha and rice cultivation area from 31,000 ha to 42,000 ha by 2020. The actual yield was 1.3 t/ha (FAO 2017, 43.3% of target achieved) and the rice cultivation area was 29,575 ha (FAO 2017, 70.4% of target achieved), showing no improvement in both the unit yield and the rice cultivation area. The achievement ratio against the 2020 target was 30.2% for the rice production and 67.9% for the self-sufficiency ratio as of 2017. The seed sector is in the process of policy development and the seed sub-sector strategy is in the process of being elaborated.				
<b>5) Development potential</b>				
The irrigation potential was expected to be 523,000 ha, which was about 10% of the 5,289,000 ha of the arable land (by FAO STAT: 2,616,000 ha) (FAO 2005). This was the area estimated as economically reasonable out of the irrigation potential of 2.75 million ha, which was calculated based on water availability and soil conditions.				
<b>6) Direction of future support and anticipated grant aid components</b>				
<p><b>【Technology dissemination】【Seed supply】</b></p> <p>Although the per capita consumption of rice is low, but the demand is increasing year by year. From the perspective of crop diversification and sustainable agriculture, it is assumed that it is necessary to support small-scale farmers in establishing cultivation techniques and producing excellent seeds of a crop that contributes to improving their standard of living</p> <p><b>【Rehabilitation of irrigation facilities】</b></p> <p>In order to improve production volume, there is a great potential that rehabilitation of small-scale irrigation facilities in valleys and flooded areas proposed in the CARD Phase 1. It is necessary to consider for the rehabilitation support with the dissemination of cultivation techniques and diversification of small-scale farmers' management, as described above, incombined support packages.</p>				

Republic of Cameroon				
Positioning of CARD		JICA Category : Regional base country CARD Category : Group 1		
Source: FAO, Country profile, 2005				
Basic information				
Population (WB, 2018)		25,210,000	Land area (2002)	47,544,000 ha
Population (WB, 2004)		16,296,000	Agricultural Land area (2002)	9,160,000 ha
Population growth ratio		3.9%	Farmland area ratio (2002)	19%
GDP (WB, 2018)		US\$38,500,000,000	Arable Land area (2002)	7,160,000 ha
GNI per capita (WB, 2018)		US\$1,440	Irrigation potential (-)	290,000 ha
Annual precipitation		1,604 mm/year	Irrigated area (2000)	22,450 ha
Annual water consumption per capita (2004)		17,520 m³/year	Irrigated area ratio (2000)	8%
Rice-related indexes				
Item		2008 (Basis)	2018	Remarks
Rice production	NRDS Target (2018)	100 Thousand tons	965 Thousand tons	
	FAO result (2017)	(72 Thousand tons)	360 Thousand tons	Target achievement ratio 37% Growth ratio 360%
Rice unit yield	NRDS Target (2018)	2.4 t/ha	2.73 t/ha	
	FAO result (2017)	(1.0 t/ha)	1.3 t/ha	Target achievement ratio - %
Rice cultivated area	NRDS Target (2018)	44,300 ha	353,000 ha	
	FAO result (2017)	(72,000 ha)	270,000 ha	Target achievement ratio 76.5%
Rice consumption (FAO, 2017)		1,220 Thousand tons (FAO, 2017)		
Rice consumption per capita		36.4 kg (FAO, 2017)		
Self-sufficiency ratio		25.8% (FAO, 2017)		
Current issues (Progress in CARD Phase 1)		NRDS support status	Status of CARD-related support	
			JICA	Donor
1. Seeds	Progress made	NRDS Priority area Seed strategy formulated	Technical cooperation	
2. Fertilizer		NRDS Priority area		
3. Irrigation and water management		NRDS Priority area		



4. Technology dissemination	Ability development including human resources	NRDS Priority area	Technical cooperation	Korea
5. Mechanization	Slow progress	NRDS Priority area		Korea, WB
6. Post-Harvest Processing and Marketing		NRDS Priority area	Technical cooperation	Korea
<b>Hypothetical cooperation concept</b>				
<b>1) Development Issues and Japan's Response Policy</b>				
<p>Japan has designated "Agriculture and rural development" as a priority area (medium-term goal) for its ODA, and its policy (Business Development Plan, 2016) is to support efforts to help improve farmers' income in line with the country's Agriculture and Rural Development Strategy and cooperation in paddy rice and upland rice in accordance with the NRDS. The country analysis paper (JICA, May 2020) states that the goal is to "support the improvement of productivity and competitiveness of rice, which is highly import-dependent, and to improve domestic and regional rice self-sufficiency ratio". The direction of cooperation is to increase self-sufficiency ratio of domestically produced rice by linking technical projects with other schemes, to enhance cultivation, post-harvest processing, and marketing of paddy rice using purified seeds.</p> <p>In addition, the direction of support includes the development of irrigation facilities, improvement of productivity and quality through the introduction of agricultural machinery such as tractors and rice milling machines, and improvement of market access and distribution infrastructure (storage and market).</p>				
<b>2) Status of government efforts</b>				
<p>In Cameroon, rice is important not only as a strategic crop for hunger countermeasures but also from the viewpoint of employment and income improvement in rural areas. The NRDS was officially approved in 2009. Many projects in the rice sector that have been implemented since 2008 when the draft of NRDS was made, are based on the NRDS so that it can be said that the NRDS has been referred to the stakeholders. The government of Cameroon has demonstrated strong initiative by creating a special unit for rice promotion and allocating additional rice sector budgets.</p>				
<b>3) Government organization structure for NRDS implementation</b>				
<p>Focal Point Person (FP) is the Director of the Project and Program Office of the Ministry of Agriculture and Rural Development (MINADER). The MINADER is the lead agency for the implementation of the NRDS because it plans government-related projects and is in charge of agricultural development programs. On the other hand, the ministries in charge of research, economy, trade and small and medium-sized enterprises are also involved in the implementation of the NRDS within the framework of the Steering Committee.</p>				
<b>4) Achievement status of CARD Phase 1 (Target values and results)</b>				
<p>According to the NRDS (2009), the target was to increase rice cultivation area from 44,300 ha to 353,000 ha and production volume (paddy) from 100,000 tons to 960,000 tons by 2018. However, as a result, the cultivated area was 270,000 ha (FAO 2017, target achievement ratio: 76.5%) and the production volume was 360,000 tons (FAO 2017, target achievement ratio: 37%). Both the cultivated area and production volume did not reach the target. Based on the NRDS targets by cultivation type, the strategy is to increase the country's overall production by about 10 times in 10 years by improving the area and unit yield of rain-fed rice cultivation. The growth ratio of rice production is 360%, and it can be said that the amount of rice production has increased dramatically.</p>				
<b>5) Development potential</b>				
<p>The irrigation potential was expected to be 290,000 ha, about 4% of the 7,160,000 ha of arable land as of 2002. (FAO 2002). The irrigated area increased slightly from 26,000 ha (FAO 2002) to 29,000 ha (FAO 2017) during 15 years making a little progress in the irrigation development. The NRDS has stated an increase in development area mainly of upland rice. However, the area of cultivable land only slightly increased from 5.9 million ha to 6.2 million ha in the 1990s, and the share of agricultural land in the national land area remains low at around 20%. Lack of investment is cited as a factor. The potential for increasing production through irrigation development is high due to abundant water resources (average annual precipitation: 1,604 mm/year) and presence of a large area of the arable land.</p>				
<b>6) Direction of future support and anticipated grant aid components</b>				
<p><b>【Mechanization】【Post-harvest processing】</b></p> <p>In the Phase 1, little progress was made in mechanization because seed cultivation was prioritized and the development of a mechanization strategy was left behind. The CARD focal point person and task force are expected to implement specific mechanization projects in the phase 2 after completing the formulation of the mechanization strategy. Future cooperation support for improving productivity and quality, such as the introduction of agricultural machinery like tractors and rice mills, is anticipated.</p> <p><b>【Maintenance of farm roads】【Improving market access】</b></p> <p>Strengthening the value chain by improving market access and distribution infrastructure (storage and markets) could be supportive from the perspective of promoting domestically produced rice.</p>				

<p><b>【Rehabilitation of irrigation and drainage facilities】</b><b>【Development of new irrigation and drainage facilities】</b></p> <p>Infrastructure development has not made much progress due to difficulties in raising funds. Rather than expanding the cultivated area through the development of new irrigation facilities, the goal is to expand the area of rain-fed rice cultivation and increase the production volume through the improvement of cultivation techniques.</p> <p>Assistance by grant aid package is assumed for the development of mechanization centers and post-harvest processing facilities.</p>
--





## **Appendix 2 : Needs of CARD Grant Aid Package**



Needs of CARD Grant Aid Package (Target Countries in Alphabetical Order)

As of 2020/11/16

No.	Country/Project Name and Related Information	CARD Grant Aid Package Needs		Considerations for Case forming
		Japan's view	FP and NRDS Task Force Views	
1	<b>Cote d'Ivoire.</b> <b>"Strengthening the Rice Supply Chain (Tentative)"</b> <ul style="list-style-type: none"> <li>➤ Current CARD technical project: <b>Domestic rice promotion project Phase 2</b> (PRORIL2, April 2020~April 2025, Including market-oriented elements)</li> <li>➤ Related advisors in place : None</li> </ul>	Rehabilitation and mechanization of facilities, including irrigation, necessary for each key stakeholder in the rice supply chain (distributors, millers, producers, agricultural mechanization service providers, etc.) to strengthen actors placed at upstream and downstream in the supply chain, thereby contributing to achieving rice self-sufficiency in the country. <b>Facilities :</b> <ul style="list-style-type: none"> <li>➤ Facility renovation for PRORIL2 eligible agricultural mechanization service providers</li> <li>➤ Facility renovation for rice milling and inspection for PRORIL2 eligible rice millers and dealers</li> <li>➤ Rehabilitation of irrigation facilities for PRORIL2 eligible seed producers</li> </ul> <b>Machinery and Tools :</b> <ul style="list-style-type: none"> <li>➤ Maintenance of equipment (tillers, combines) for PRORIL2 eligible agricultural mechanization service providers</li> <li>➤ Maintenance of equipment for rice milling and inspection (rice milling machine, stone removal machine) for PRORIL2 eligible rice millers and dealers</li> <li>➤ Small model rice milling facility (2 tons/hour)</li> </ul>	In addition to the left, the following needs are included- <b>Machinery and Tools :</b> <ul style="list-style-type: none"> <li>➤ Provision of fertilizers and other materials for seed farmers</li> </ul> <b>Others :</b> <ul style="list-style-type: none"> <li>➤ Promoting contracts among stakeholders</li> </ul> <b>NRDS2, the basis of need, is in final approval. CN to be prepared after the approval.</b>	<ul style="list-style-type: none"> <li>➤ <b>Stakeholder location information can be identified based on PRORIL2 information</b></li> <li>➤ Operation and maintenance of facilities and equipment must be confirmed on site</li> <li>➤ Discussion required on a system to allow private operators to use equipment (especially post-harvest processing equipment)</li> </ul>
2	<b>Ethiopia</b> <b>"Building an Irrigated Agriculture Model (Tentative)"</b> <ul style="list-style-type: none"> <li>➤ Current CARD technical project: <b>Project to strengthen the National Rice Research and Training Center</b> (Ethio-rice, November 2015~November 2020)</li> <li>➤ Next CARD technical project : <b>Ethio-rice2</b> (February 2021~February 2026)</li> <li>➤ Related advisors in place : <b>Agricultural Advisors</b> (June 2019~June 2021)</li> <li>➤ Related technical project in progress : (1) SHEP Technical project: Market-oriented small-scale horticulture farming promotion project (Ethio-SHEP, January 2017~January 2022)</li> </ul>	To provide necessary facility renovation and mechanization, including irrigation, to farmers' organizations developed in the districts under the jurisdiction of the National Rice Research and Training Center (NRRTC) to establish an irrigated agriculture model with a view to expanding the model to other regions, thereby contributing to the achievement of rice self-sufficiency in the country <b>Facilities :</b> <ul style="list-style-type: none"> <li>➤ Development of irrigation facilities, including small-scale water source development for three farmer organizations, and post-harvest treatment facilities</li> </ul> <b>Machinery and Tools :</b> <ul style="list-style-type: none"> <li>➤ Maintenance of various equipment for irrigated agriculture (tractors, work equipment, combine harvesters) for three farmer organizations</li> </ul>	In addition to the left, the following needs are included- <b>Others :</b> <ul style="list-style-type: none"> <li>➤ Involvement of private sector</li> </ul> <b>NRDS2, the basis for the needs, has been approved. In addition, CN (irrigation and mechanization) has been prepared.</b>	<ul style="list-style-type: none"> <li>➤ <b>Location of target facilities can be identified through advisors</b></li> <li>➤ Operation and maintenance of facilities and equipment must be confirmed on site.</li> <li>➤ <u>Discuss with the office or headquarters in charge of the project</u> whether or not to establish a follow-up and monitoring system with Ethio-rice2 for the CARD grant aid package of charge.</li> <li>➤ <b>Advisor presence is advantageous</b></li> </ul>
3	<b>Ghana</b> <b>"Strengthening Rice Marketing (Tentative)"</b> <ul style="list-style-type: none"> <li>➤ Current technical project: <b>Project for Supporting Smallholder Market-oriented Agriculture and Strengthening Private Sector Linkages in Pong Irrigation District</b> (KIS, January 2016~January 2021, including SHEP) <b>Rain Water Rice Cultivation Sustainable Development Project Phase 2</b> (TENSUI, April 2016~February 2021)</li> <li>➤ Next CARD technical project : <b>Rice Productivity Improvement Project</b> (Successor to KIS&amp;TENSUI, 2021~March 2026)</li> <li>➤ Related advisors in place : None</li> </ul>	Rehabilitation and mechanization of facilities, including irrigation related to seed production, with a view to strengthening the marketing of water users associations (WUAs) in the target areas of the Ministry of Food and Agriculture (MoFA) and the Ghana Irrigation Development Authority (GIDA), thereby achieving rice self-sufficiency in the country. What contributes to the achievement. In addition, we aim to become a base with a view to supporting the overseas expansion of Japanese companies. <b>Facilities :</b> <ul style="list-style-type: none"> <li>➤ Development and rehabilitation of post-harvest treatment facilities for WUAs, and development and rehabilitation of irrigation facilities related to seed production</li> </ul> <b>Machinery and Tools :</b> <ul style="list-style-type: none"> <li>➤ Maintenance of equipment for post-harvest processing of WUA (combine harvesters), maintenance of rice milling machines, and equipment related to seed production (sorting machine plant)</li> </ul>	In addition to the left, the following needs are included- <b>Facilities :</b> <ul style="list-style-type: none"> <li>➤ Small-scale irrigation development</li> <li>➤ Storage facility development</li> </ul> <b>Machinery and Tools :</b> <ul style="list-style-type: none"> <li>➤ Procurement of storage equipment</li> </ul> <b>Materials :</b> <ul style="list-style-type: none"> <li>➤ Provision of fertilizers and other materials</li> </ul> <b>Others :</b> <ul style="list-style-type: none"> <li>➤ Cultivation trials of superior seeds</li> <li>➤ Marketing of Certified Seeds</li> <li>➤ Agricultural machinery operator development training</li> <li>➤ Training for manufacturers of agricultural machinery parts</li> </ul> <b>NRDS2, the basis for needs, is being developed by the end of November.</b>	<ul style="list-style-type: none"> <li>➤ Additional information needs to be collected on the location and specifications of the subject facility.</li> <li>➤ Operation and maintenance of facilities and equipment must be confirmed on site.</li> <li>➤ <u>Discuss with the office or headquarters in charge of the project</u> for specific details of the next CARD Technical project's response.</li> <li>➤ Desire to establish a regional center, but reconsider in light of the current situation in 9 other countries.</li> </ul>



No.	Country/Project Name and Related Information	CARD Grant Aid Package Needs		Considerations for Case forming
		Japan's view	FP and NRDS Task Force Views	
4	<b>Liberia.</b> <b>“Building an Irrigated Agriculture Model (Tentative)”</b> ➤ Current CARD technical project: <b>Smallholder Rice Production Improvement Project</b> (October 2020～September 2023 in planning) ➤ Related advisors in place : None	Assumed support for farm roads, water management, storage facilities, seed production, and distribution and marketing to promote sales of surplus rice to complement technical and professional services.	In addition to the left, the following needs are included- <b>Facilities :</b> ➤ Small-scale irrigation rehabilitation <b>Machinery and Tools :</b> ➤ Mechanization using small equipment <b>Materials :</b> ➤ Provision of seeds, fertilizers and other materials <b>Others :</b> ➤ Irrigation water management ➤ Improvement of soil fertility ➤ Financial support to the NRDS Task Force  <b>NRDS2, the basis for needs, is being prepared.</b>	➤ Additional information needs to be collected on the location and specifications of the subject facility. ➤ Operation and maintenance of facilities and equipment must be confirmed on site ➤ Comprehensive survey desired ➤ No track record of general freebies in the agricultural sector, and implementation methods need to be carefully monitored. ➤ <u>Discuss with the office or headquarters in charge of the project</u> for specific details of the next CARD Technical project's response.
5	<b>Madagascar</b> <b>“Seed Production Plots and Facilities Development Plan”</b> ➤ Current CARD technical project: <b>Rice Productivity Improvement and Watershed Management Project Phase 2</b> (PAPRiz2, December 2015～November 2020, including SHEP) ➤ Next technical project : <b>PAPRiz3</b> (2021～ ) ➤ Related advisors in place : <b>Technical Advisor for Agriculture and Rural Development</b> (July 2019～March 2021) ➤ Related technical project in progress : (1) IFNA technical project: Food and Nutrition improvement project (March 2019～February 2024)	Rehabilitation and mechanization of the irrigation facilities of the National Institute for Applied Rural Development (FOFIFA) and the Seed Propagation Corporation (CMS), and strengthening the functions of the Seed Control Office (SOC), which conducts seed certification, will increase the production of certified seeds. Contribute to achieving rice self-sufficiency in the country. <b>Facilities :</b> ➤ FOFIFA headquarters facility renovation ➤ Rehabilitation of irrigation facilities at FOFIFA's Alocha Manggul and Bunguraba provincial laboratories ➤ CMS irrigation facility rehabilitation ➤ SOC facility renovation <b>Machinery and Tools :</b> ➤ Maintenance of agricultural machinery (tractors, rotaries, rice transplanters, seedling boxes, combine harvesters, mechanical dryers, complete sorting plants, seed storage, complete replacement parts for equipment, germination testers (incubators), transmission test plates, and equipment for testing) belonging to FOFIFA Alocha-Mangul and Bungrava provincial laboratories ➤ Maintenance of large agricultural machinery for seed production belonging to CMS (tractors, rotaries, rice transplanters, seedling beds, general-purpose combines, drying areas, complete sorting plants, complete equipment replacement parts, seed storage facilities, forklifts, pallets) ➤ Maintenance of inspection equipment (germination tester (incubator), transmission inspection board, and equipment related to inspection) at the SOC	In addition to the left, the following needs are included- <b>Facilities :</b> ➤ Development of seed traceability system facilities <b>Machinery and Tools :</b> ➤ Development of equipment for seed traceability system ➤ Maintenance of production machinery ➤ Maintenance of machinery for post-harvest processing <b>Others :</b> ➤ Collaboration with the private sector (especially in mechanization of harvesting, storage, processing, and transportation) ➤ Promotion of private investment ➤ Collaboration with Public Relations  <b>NRDS3, the basis for needs, will be developed starting in November; CN will be developed thereafter.</b>	➤ <b>Location of the subject facility can be identified.</b> ➤ Operation and maintenance of facilities and equipment must be confirmed on site. ➤ <b><u>Discuss with the office or headquarters in charge of the project whether or not to establish a follow-up and monitoring system with PAPRiz3 for the CARD grant aid package of charge.</u></b> ➤ <b>Advisor presence is advantageous</b>



No.	Country/Project Name and Related Information	CARD Grant Aid Package Needs		Considerations for Case forming
		Japan's view	FP and NRDS Task Force Views	
6	<p><b>Nigeria</b>  <b>“Plan for Strengthening the Rice Seed Production and Inspection System (Tentative)”</b></p> <p>➢ Current CARD technical project : None  ➢ Next CARD technical project : Undecided  ➢ Related advisors in place :  <b>Policy Advisor, Federal Ministry of Agriculture and Rural Development</b>  (July 2018～December 2020)  ➢ Related technical projects in progress :  (1) SHEP technical project :  Market-oriented agricultural extension and promotion project for livelihood improvement  (January 2020～December 2023)  (2) IFNA technical project :  Project for Capacity building for Improved nutrition in the Federal Capital District  (January 2019～July 2024)</p>	<p>To strengthen the production capacity of certified seeds and thereby contribute to achieving self-sufficiency in rice in the country through the rehabilitation of irrigation facilities, storage facilities, and provision of equipment and materials at the National Cereal Research Institute (NCRI) and its regional stations.</p> <p><b>Facilities :</b>  ➢ Rehabilitation of irrigation facilities, storage facilities, and drying areas at NCRI  ➢ Rehabilitation of irrigation facilities, storage facilities, and drying fields in five regional stations (Kebbi, Delta, Kwara, Oyo, and Abia States)  <b>Machinery and Tools :</b>  ➢ Maintenance of NCRI's field machinery (tractors, rotaries, rice transplanters or seeders, combine harvesters), maintenance of post-harvest processing equipment (seed sorting plant), complete set of seed testing equipment (germination tester (incubator), transmission testing board, equipment for testing)  ➢ Maintenance of field machinery (tractors, rotaries, rice transplanters or seeders, combine harvesters), post-harvest processing equipment (seed sorting plant), and complete seed testing equipment (germination tester (incubator), transmission test plates, equipment for testing) in 5 regional stations (Kebbi, Delta, Kwara, Oyo and Abia States)</p>	<p>In addition to the left, the following needs are included-</p> <p><b>Others :</b>  ➢ Development and dissemination of new rice varieties (hybrid rice, climate-responsive varieties)</p> <p><b>NRDS2, the basis for the needs, has been approved; CN is to be developed as well.</b></p>	<p>➢ <b>The location of the subject facility can be identified.</b>  ➢ <b>Operation and maintenance of facilities and equipment must be confirmed on site.</b>  ➢ AfricaRice branch offices, survey requests for GIZ projects  ➢ <b>Advisor presence is advantageous</b> (Planned Procurement Projects, February 2021 ～ January 2023)</p>
7	<p><b>Rwanda</b>  <b>“Strengthening the Rice Value Chain (Tentative)”</b></p> <p>➢ 現 Current CARD technical project :  <b>Irrigation Water Management Capacity Improvement Project</b>  (WAMCAB、April 2019～March 2024, including SHEP)  ➢ Related advisors in place :  <b>Agricultural Policy Advisors</b>  (September 2019～August 2021)</p>	<p>Rehabilitation and mechanization of facilities including irrigation necessary for each stakeholder in the rice value chain (Irrigation Water Users Association (IWUO), agricultural cooperatives, agricultural machinery service provision groups, rice millers, etc.) to strengthen actors from upstream to downstream of the value chain. This will contribute to the achievement of rice self-sufficiency in the country.</p> <p><b>Favilities :</b>  ➢ Improvement and rehabilitation of irrigation facilities and access roads for rice farmers in agricultural cooperative and IWUO  ➢ Rehabilitation of rice milling facilities of rice millers  ➢ Development of facilities for production and harvesting for agricultural mechanization service provider groups  <b>Machinery and Tools :</b>  ➢ Maintenance of production and harvesting equipment (tractors or tillers, combines) for agricultural cooperatives and IWUO  ➢ Maintenance of rice milling equipment (rice milling machine, stone removing machine) for rice millers  ➢ Maintenance of production and harvesting equipment (tractors or tillers, combines) for agricultural machinery service provider groups</p>	<p>In addition to the left, the following needs are included-</p> <p><b>Machinery and Tools :</b>  ➢ Maintenance of parboiled rice processing equipment  ➢ Maintenance of small equipment (Harvester, Processor, Thresher, Cleaner, Grader, Packing, Inspection equipment, etc.) to strengthen seed supply system  <b>Materials :</b>  ➢ Provision of seeds, fertilizers, and other materials under subsidized programs  <b>Others :</b>  ➢ Research and development of competitive varieties</p> <p><b>NRDS2, the basis for the needs, is not yet approved; CN is also being developed.</b></p>	<p>➢ Additional information needs to be collected on the location and specifications of the subject facility.  ➢ Operation and maintenance of facilities and equipment must be confirmed on site.  ➢ <u>Discuss with the office or headquarters in charge of the project</u> whether or not WAMCAB will establish a follow-up and monitoring system for the CARD grant aid package of charge.  ➢ Negotiations are needed for a system to allow private operators to use equipment (especially post-harvest processing equipment).  ➢ <b>Advisor presence is advantageous</b></p>
8	<p><b>Sierra Leone.</b>  <b>“Building an Irrigated Agriculture Model (Tentative)”</b></p> <p>➢ Current CARD technical project :  <b>Sustainable Rice Production Project</b>  (SRPP、June 2017～June 2022)  ➢ Next CARD technical project : Undecided  ➢ Related advisors in place : None</p>	<p>Desire for small-scale irrigation, seed production, and small agricultural machinery that can be linked with technical projects. The destination government has requested assistance for post-harvest processing, distribution, and sales. There is a desire to supplement the Ministry of Agriculture's request for items that are outside TOR of technical projects. In addition, to involve the central and prefectural governments in technical projects to establish a base facility and equipment, and to provide support to link farmers and the central government policies. On the other hand, note that the implementation system, especially the capacity of public agency staff is low. Also, irrigation modeling is needed, but still acceptable if the model can be experienced in Ghana.</p>	<p>In addition to the left, the following needs are included-</p> <p><b>Materials :</b>  ➢ Provision of seeds, fertilizers and other materials  <b>Others :</b>  ➢ Strengthening water management  ➢ Enhanced functions of Seed Certification Agency (SCA), which has a cooperative system with SRPP  ➢ Involvement of private sector  ➢ Support for local expansion of Japanese companies (especially in agricultural machinery)</p> <p><b>NRDS2, the basis for needs, will be developed.</b></p>	<p>➢ Additional information needs to be collected on the location and specifications of the subject facility.  ➢ Operation and maintenance of facilities and equipment must be confirmed on site.  ➢ Although the country is not large, surveys in the north and south seem to be difficult due to poor access.  ➢ Impression that the needs of the destination government are highly demanding in terms of content and on a general grant scale.  ➢ A large amount of agricultural machinery has already been procured and sold with paid support from several countries; current status needs to be confirmed  ➢ Model development could benefit from training in a third country if it could be implemented in Ghana.</p>





No.	Country/Project Name and Related Information	CARD Grant Aid Package Needs		Considerations for Case forming
		Japan's view	FP and NRDS Task Force Views	
9	<b>Uganda</b> <b>“Plan for Expansion of Agricultural Research, Training and Extension Functions (tentative)”</b> <ul style="list-style-type: none"> <li>➤ 現 Current CARD technical projects :  <b>Rice Promotion Project Phase 2</b>  (PRIDe2、April 2019～March 2024)  <b>Atari Watershed Area Irrigation Facility Maintenance and management Capacity Strengthening Project</b>  (June 2020～June 2024)  </li> <li>➤ Related advisors in place :  <b>Agricultural planning advisor</b>  (December 2019～November 2021)  </li> <li>➤ Related technical projects in progress :  (1) SHEP Technical project :  北部ウガンダ生計向上支援プロジェクト  Northern Uganda Livelihood Improvement Support Project  (NUFLIP, December 2015～November 2020)</li> </ul>	Rehabilitate and mechanize irrigation facilities at the Uganda Central Regional Research Institute of Agriculture (NaCRRI) and three regional research stations on rice cultivation (ZARDI), etc. In addition, training and dissemination facilities and equipment will be established to expand the research, training, and dissemination system between the central and local governments, thereby contributing to the achievement of self-sufficiency in rice production in the country. <b>Facilities :</b> <ul style="list-style-type: none"> <li>➤ Renovation of irrigation facilities and expansion of training accommodations at NaCRRI</li> <li>➤ Rehabilitation of irrigation facilities, meteorological observation facilities, and training accommodations in three ZARDIs (Blambri and Mayuge in the eastern region, Arua in the northern region, and Kabarole in the western region)</li> </ul> <b>Machinery and Tools :</b> <ul style="list-style-type: none"> <li>➤ Provision of agricultural machinery, <u>distance learning systems</u>, and other training equipment to NaCRRI</li> <li>➤ Provision of agricultural machinery, <u>weather observation equipment</u>, and training equipment such as distance learning systems to three ZARDIs (Blambri and Mayuge in the eastern region, Arua in the northern region, and Kabarole in the western region)</li> <li>➤ Provision of field machinery (tractors, work equipment, combine harvesters) with a view to use in irrigation model areas, including the Atari area</li> </ul>	In addition to the left, the following needs are included-  <b>Machinery and Tools :</b> <ul style="list-style-type: none"> <li>➤ Overall mechanization in value chain</li> </ul> <b>Materials :</b> <ul style="list-style-type: none"> <li>➤ Provision of fertilizers and other materials</li> </ul> <b>Others :</b> <ul style="list-style-type: none"> <li>➤ Agricultural machinery operator development training</li> <li>➤ <b>Training for manufacturers of agricultural machinery parts</b></li> </ul> <b>NRDS2, the basis for the needs, is being developed.</b>	<ul style="list-style-type: none"> <li>➤ <b>Location of the subject facility can be identified.</b></li> <li>➤ Operation and maintenance of facilities and equipment must be confirmed on site.</li> <li>➤ For equipment installation, including in the Atari area, <u>negotiation with the person in charge of the project (office or headquarters) is required.</u></li> <li>➤ Negotiation with the Ministry of Agriculture, Livestock and Fisheries is required for the introduction of field machinery maintenance</li> <li>➤ <b>Advisor presence is advantageous</b></li> <li>➤ Need to explain to FP supervisor (decision maker)</li> <li>➤ Also there is need to train rice farmers in neighboring countries, which can greatly contribute to strengthening partnerships under the RICE approach in CARD Phase 2.</li> </ul>
10	<b>Zambia</b> <b>“Strengthening the Rice Value Chain (Tentative)”</b> <ul style="list-style-type: none"> <li>➤ 現行 Current CARD technical projects :  <b>Market-oriented Rice Crop Promotion Project</b>  (MOREDeP, October 2019～September 2025, including SHEP)  <b>Sustainable Community-based Irrigation Development Support Project</b>  (E-COBSI、January 2019～January 2024)  </li> <li>➤ Related advisors in place :  <b>Agriculture Bureau Advisor</b>  (May 2018～May 2021)</li> </ul>	Rehabilitation and mechanization of irrigation facilities at the central and regional test stations of the Agricultural Research Institute (ZARI). In addition, to mechanize center functions, accommodation facilities, and a rice mill to strengthen actors from upstream to downstream of the value chain, thereby contributing to achieving rice self-sufficiency in the country. <b>Facilities :</b> <ul style="list-style-type: none"> <li>➤ Renovation of irrigation facilities, inspection facilities, accommodations, and rice mills at Mansa Province Experiment Station.</li> <li>➤ Renovation of irrigation facilities at Central Agricultural Experiment Station and development of facilities for mechanization centers</li> </ul> <b>Machinery and Tools :</b> <ul style="list-style-type: none"> <li>➤ Maintenance of field machinery (tractors, rotaries, rice transplanters or seeders, combine harvesters) and inspection equipment germination testers (incubators), permeation test plates, equipment for testing) at the Mansa Province Experiment Station</li> <li>➤ Maintenance of field machinery (tractors, various work equipment, combine harvesters) and post-harvest processing equipment and machinery (dryers, small rice milling plants) at the Central Agricultural Experiment Station</li> <li>➤ Maintenance of rice milling equipment (rice milling machines, stone removing machines) for rice mills subject to MOREDeP.</li> </ul>	In addition to the left, the following needs are included-  <b>Facilities :</b> <ul style="list-style-type: none"> <li>➤ Irrigation Development (Kafue River Coast and Western Zambezi River Coast)</li> </ul> <b>Machinery and Tools :</b> <ul style="list-style-type: none"> <li>➤ <b>Maintenance of machinery for post-harvest processing</b></li> </ul> <b>Materials :</b> <ul style="list-style-type: none"> <li>➤ Provision of seeds, fertilizers, and other materials under subsidized programs</li> </ul> <b>Others :</b> <ul style="list-style-type: none"> <li>➤ Seed purification</li> </ul> <b>NRDS2 is available as a basis for needs. However, it is only until 2020, and NRDS3 will be developed in the future.</b>	<ul style="list-style-type: none"> <li>➤ <b>Location of target facilities can be identified through MOREDeP</b></li> <li>➤ Operation and maintenance of facilities and equipment must be confirmed on site</li> <li>➤ Small irrigated areas such as northern and northwestern areas need to be checked.</li> <li>➤ <b>Advisor presence is advantageous</b></li> </ul>



No.	Country/Project Name and Related Information	CARD Grant Aid Package Needs		Considerations for Case forming
		Japan's view	FP and NRDS Task Force Views	
11	<p>カメルーン 「認証種子増産ネットワーク強化(仮)」</p> <p>➤ 現行 CARD 技プロ: コメ振興プロジェクト (PRODERIP、2016 年 6 月～2021 年 6 月)</p> <p>➤ 配置中の関連アドバイザー: なし</p>	<p>Rehabilitation of seed production farms and management facilities under the jurisdiction of the Ministry of Agriculture and Rural Development (MINADER), extension worker offices and residential areas of the Nung Valley Development Authority (UNVDA), and related producer farms, and provision of necessary machinery. To strengthen functions for increasing seed production, thereby contributing to the achievement of rice self-sufficiency in the country.</p> <p><b>Facilities:</b></p> <p>➤ Rehabilitation of UNVDA extension worker office and residential area</p> <p>➤ Maintenance of seed production plots under MINADER jurisdiction and renovation of administration buildings</p> <p>➤ Maintenance of producer plots involving UNVDA</p> <p><b>Machinery and Tools:</b></p> <p>➤ Maintenance of equipment for UNVDA extension worker office and residential area</p> <p>➤ Maintenance of various equipment (tractors, combine harvesters, forklifts, flexible containers, dryers, sorting machines, packaging equipment) for seed production fields under the jurisdiction of MINADER</p> <p><b>Materials:</b></p> <p>➤ Provision of production materials (NPK compound fertilizers and urea fertilizers) for production farmers related to UNVDA</p>	<p>(Before listening to the interview)</p> <p><b>NRDS2, the basis for the needs, is being developed.</b></p>	<p>➤ <b>Location of target facilities can be identified through PRODERIP</b></p> <p>➤ Operation and maintenance of facilities and equipment must be confirmed on site.</p>



## **Appendix 3 : Survey Results in 12 Countries**



## **Appendix 3: Survey Results in 12 Countries**

### **Table of Contents**

<b>CHAPTER 1 ETHIOPIA .....</b>	<b>1</b>
1.1 Outline of Ethiopia .....	1
1.1.1 Natural Conditions .....	1
1.2 Outline of Agricultural Sector .....	1
1.2.1 Laws, policies and development plan relating to the agricultural sector. ....	1
1.2.2 Implementation Status of the NRDS .....	2
1.2.3 Rice Food Value Chain Analysis .....	3
1.2.4 Progress of Support to Rice Sector .....	5
1.2.5 Implementation Structure of Rice sector.....	5
1.3 Current Status and Issues in the Agricultural Sector .....	8
1.3.1 Irrigation Facilities .....	8
1.3.2 Agricultural .....	8
1.3.3 Agricultural Inputs .....	10
1.3.4 Status of Implementation of Grants to Assist Poor Farmers .....	13
1.4 Proposed Project Plan: Project for Support of Promotion of Rice Mechanization .....	13
1.4.1 Overview of the Survey Area.....	13
1.4.2 Current Status and Issues .....	15
1.4.3 Draft Project Plan .....	21
<b>CHAPTER 2 MADAGASCAR.....</b>	<b>24</b>
2.1 Outline of Madagascar.....	24
2.1.1 Natural Conditions .....	24
2.1.2 Social Economic Condition.....	24
2.1.3 Agricultural Condition .....	24
2.2 Outline of Agricultural Sector .....	25
2.2.1 Laws, Policies and Development Plan Relating to the Agricultural Sector. ....	25
2.2.2 Implementation Status of the NRDS .....	26
2.2.3 Rice Food Value Chain Analysis .....	26
2.2.4 Progress of Support to Rice Sector .....	27
2.2.5 Implementation Structure of Rice sector.....	29
2.3 Current Status and Issues in the Agricultural Sector .....	30
2.3.1 Irrigation Facilities .....	30
2.3.2 Agricultural Machinery .....	31
2.3.3 Agricultural Inputs .....	31
2.3.4 Status of Implementation of Grant Assistance for Under Privilege Farmers.....	32
2.4 Proposed Project Plan: Project for Development of Seed Production Field and Facilities ..	33
2.4.1 Overview of the Survey Area.....	33
2.4.2 Current Condition and Challenge.....	35
2.4.3 Draft Project Plan .....	36
<b>CHAPTER 3 RWANDA.....</b>	<b>38</b>
3.1 Outline of Rwanda.....	38
3.1.1 Natural Conditions .....	38
3.1.2 Social Economic Condition.....	38
3.1.3 Agricultural Condition .....	38
3.2 Outline of Agricultural Sector .....	38
3.2.1 Laws, Policies and Development Plan relating to the Agricultural Sector. ....	38
3.2.2 Implementation Status of the NRDS .....	39
3.2.3 Rice Food Value Chain Analysis (Quoted from NRDS2).....	39
3.2.4 Progress of Support to Rice Sector .....	40
3.2.5 Implementation Structure of Rice sector.....	41
3.3 Current Status and Issues in the Agricultural Sector .....	41

3.3.1 Irrigation Facilities .....	41
3.3.2 Agricultural Machinery .....	41
3.3.3 Agricultural Inputs .....	42
3.3.4 Status of Implementation of Grants to Assist Poor Farmers .....	42
3.4 Proposed Project Plan: Project for Increasing Total factor Productivity through Promotion of Mechanization in Smallholder Rice Farms in Rwanda .....	42
3.4.1 Overview of the Survey Area .....	42
3.4.2 Current Condition and Challenge .....	45
3.4.3 Draft Project Plan .....	46
<b>CHAPTER 4 UGANDA .....</b>	<b>48</b>
4.1 Outline of Uganda .....	48
4.1.1 Natural Conditions .....	48
4.1.2 Social Economic Condition .....	48
4.1.3 Agricultural Condition .....	49
4.2 Outline of Agricultural Sector .....	49
4.2.1 Laws, Policies and Development Plan relating to the Agricultural Sector .....	49
4.2.2 Implementation Status of the NRDS .....	50
4.2.3 Rice Food Value chain Analysis .....	50
4.2.4 Progress of Support to Rice Sector .....	51
4.2.5 Implementation Structure of Rice sector .....	52
4.3 Current Status and Issues in the Agricultural Sector .....	53
4.3.1 Irrigation Facilities .....	53
4.3.2 Agricultural Machinery .....	53
4.3.3 Agricultural Inputs .....	54
4.3.4 Status of Implementation of Grants to Assist Poor Farmers .....	54
4.4 Proposed Project Plan: Project for the National Agricultural Innovations and Skills Enhancement centre .....	55
4.4.1 Overview of the survey area .....	55
4.4.2 Current Status and Issues .....	58
4.4.3 Draft Project Plan .....	58
<b>CHAPTER 5 COTE D'IVOIRE .....</b>	<b>61</b>
5.1 Outline of Cote d'Ivoire .....	61
5.1.1 Natural Conditions .....	61
5.1.2 Social Economic Condition .....	61
5.1.3 Agricultural Condition .....	61
5.2 Outline of Agricultural Sector .....	62
5.2.1 Laws, Policies and Development Plan relating to the Agricultural Sector .....	62
5.2.2 Implementation Status of the NRDS .....	64
5.2.3 Rice Food Value chain Analysis .....	64
5.2.4 Progress of Support to Rice Sector .....	65
5.2.5 Implementation Structure of Rice sector .....	68
5.3 Current Status and Issues in the Agricultural Sector .....	69
5.3.1 Irrigation Facilities .....	69
5.3.2 Agricultural Machinery .....	69
5.3.3 Agricultural Inputs .....	70
5.3.4 Status of Implementation of Grants to Assist Poor Farmers .....	71
5.4 Proposed Project Plan: Project for Strengthening of Rice Value Chain .....	71
5.4.1 Overview of the survey area .....	71
5.4.2 Current Status and Issues .....	73
5.4.3 Draft Project Plan .....	76
<b>CHAPTER 6 GHANA .....</b>	<b>79</b>
6.1 Outline of Ghana .....	79

---



6.1.1 Natural Conditions .....	79
6.1.2 Social Economic Condition.....	79
6.1.3 Agricultural Condition .....	79
6.2 Outline of Agricultural Sector .....	80
6.2.1 Laws, Policies and Development Plan relating to the Agricultural Sector .....	80
6.2.2 Implementation Status of the NRDS .....	80
6.2.3 Rice Food Value Chain Analysis .....	81
6.2.4 Progress of Support to Rice Sector .....	82
6.2.5 Implementation Structure of Rice sector.....	83
6.3 Current Status and Issues in the Agricultural Sector .....	83
6.3.1 Irrigation Facilities .....	83
6.3.2 Agricultural Machinery .....	83
6.3.3 Agricultural Inputs .....	84
6.3.4 Status of Implementation of Grants to Assist Poor Farmers .....	84
6.4 Proposed Project Plan: Project for Enhancement of Rice Seed Multiplication System .....	85
6.4.1 Overview of the Survey Area.....	85
6.4.2 Current Condition and Challenge.....	87
6.4.3 Proposed Project Components .....	93
<b>CHAPTER 7 LIBERIA .....</b>	<b>97</b>
7.1 Outline of Liberia .....	97
7.1.1 Natural Conditions .....	97
7.1.2 Social Economic Condition.....	99
7.1.3 Agricultural Condition .....	100
7.2 Outline of Agricultural Sector .....	101
7.2.1 Contribution of Agriculture and Agribusiness to the economy.....	101
7.2.2 Laws, Policies and Development Plans for the Agricultural Sector .....	101
7.2.3 Implementation of NRDS.....	104
7.2.4 Rice Food Value Chain Analysis .....	104
7.2.5 Support for the Rice Sector .....	107
7.2.6 Implementation Structure of the Rice Sector .....	107
7.3 Current Status and Issues in the Agricultural Sector .....	107
7.3.1 Irrigation Facilities .....	107
7.3.2 Agricultural Machinery .....	108
7.3.3 Agricultural Inputs .....	109
7.3.4 Status of Implementation of Grants to Assist Poor Farmers .....	109
<b>CHAPTER 8 NIGERIA.....</b>	<b>111</b>
8.1 Outline of Nigeria.....	111
8.1.1 Natural Conditions .....	111
8.1.2 Social Economic Conditions .....	111
8.1.3 Agricultural Condition .....	112
8.2 Outline of Agricultural Sector .....	112
8.2.1 Laws, Policies and Development Plan Relating to the Agricultural Sector. ....	112
8.2.2 Implementation Status of the NRDS .....	113
8.2.3 Rice Food Value Chain Analysis .....	113
8.2.4 Progress of Support to Rice Sector .....	114
8.2.5 Implementation Structure of Rice sector.....	114
8.3 Current Status and Issues in the Agricultural Sector .....	115
8.3.1 Irrigation Facilities .....	115
8.3.2 Agricultural Machinery .....	116
8.3.3 Agricultural Inputs .....	117
8.3.4 Status of Implementation of Grants to Assist Poor Farmers .....	117
8.4 The Project for Enhancement of Rice Seed Multiplication System.....	117
8.4.1 Overview of the Survey Area.....	117

---

8.4.2 Current Status and Issues .....	119
8.4.3 Proposed Project Components .....	121
<b>CHAPTER 9 SENEGAL .....</b>	<b>125</b>
9.1 Outline of Senegal .....	125
9.1.1 Natural Conditions .....	125
9.1.2 Social & Economic Condition.....	125
9.1.3 Agricultural Condition .....	125
9.2 Outline of the Agricultural Sector .....	126
9.2.1 Laws, Policies and Development Plans Relating to the Agricultural Sector.....	126
9.2.2 Status of NRDS Implementation.....	126
9.2.3 Analysis of Rice Food Value Chains .....	127
9.2.4 Status of Support for the Rice Sector .....	128
9.2.5 Implementation Structure of Rice Sector .....	130
9.3 Current Status and Issues in the Agricultural Sector .....	130
9.3.1 Irrigation Facility.....	130
9.3.2 Agricultural Mechanization.....	130
9.3.3 Agricultural Inputs .....	131
9.3.4 Status of Implementation of Grant Assistance for Underprivileged Farmers .....	131
9.4 Proposed Project Plan: Project for Development of Seed Production Field, Inspection, Sorting and Training Facilities .....	131
9.4.1 Overview of the Survey Area.....	131
9.4.2 Current Status and Issues .....	135
9.4.3 Draft Project Plan .....	143
<b>CHAPTER 10 SIERRA LEONE .....</b>	<b>148</b>
10.1 Outline of Sierra Leone .....	148
10.1.1 Natural Conditions .....	148
10.1.2 Social Economic Condition.....	148
10.1.3 Agricultural Condition .....	148
10.2 Outline of the agricultural sector .....	149
10.2.1 Laws, Policies and Development Plans Relating to the Agricultural Sector.....	149
10.2.2 Status of NRDS Implementation.....	150
10.2.3 Analysis of Rice Food Value Chains .....	150
10.2.4 Status of support for the rice sector.....	151
10.2.5 Implementation Structure of Rice sector.....	151
10.3 Current Status and Issues in the Agricultural Sector .....	151
10.3.1 Irrigation Facility.....	151
10.3.2 Agricultural Mechanization.....	152
10.3.3 Agricultural Inputs .....	152
10.3.4 Status of Implementation of Grants to Assist Poor Farmers .....	152
10.4 Proposed Project Plan: Project for Development of Seed Production Field and Rehabilitation of Research and Training Facilities.....	153
10.4.1 Overview of the Survey Area.....	153
10.4.2 Current Status and Issues of RARC .....	156
10.4.3 Draft Project Plan .....	162
<b>CHAPTER 11 ZAMBIA .....</b>	<b>167</b>
11.1 Outline of Zambia.....	167
11.1.1 Natural Conditions .....	167
11.1.2 Agricultural Condition .....	168
11.2 Outline of Agricultural Sector .....	168
11.2.1 Laws, Policies and Development Plan Relating to the Agricultural Sector. ....	168
11.2.2 Implementation Status of the NRDS .....	168
11.2.3 Rice Food Value Chain Analysis .....	168

---

11.2.4 Progress of Support to Rice Sector.....	170
11.2.5 Implementation Structure of Rice Sector .....	170
11.3 Current Status and Issues in the Agricultural Sector .....	171
11.3.1 Irrigation Facilities .....	172
11.3.2 Agricultural Machinery .....	172
11.3.3 Agricultural Inputs .....	173
11.3.4 Status of Implementation of Grants to Assist Poor Farmers .....	174
11.4 Proposed Project Plan: Project for Development of Seed Production Field and Training Facilities.....	175
11.4.1 Overview of the survey area.....	175
11.4.2 Current Status and Issues .....	177
11.4.3 Draft Project Plan .....	181
<b>CHAPTER 12 CAMEROON .....</b>	<b>186</b>
12.1 Outline of Camerron .....	186
12.1.1 Natural Conditions .....	186
12.1.2 Social & Economic Condition.....	186
12.1.3 Agricultural Condition .....	186
12.2 Outline of the Agricultural Sector .....	187
12.2.1 Laws, Policies and Development Plans Relating to the Agricultural Sector.....	187
12.2.2 Status of NRDS Implementation.....	187
12.2.3 Analysis of Rice Food Value Chains .....	187
12.2.4 Status of Support for the Rice Sector .....	188
12.2.5 Implementation Structure of Rice Sector .....	190
12.3 Current Status and Issues in the Agricultural Sector .....	190
12.3.1 Irrigation Facility.....	190
12.3.2 Agricultural Mechanization.....	191
12.3.3 Agricultural Inputs .....	191
12.3.4 Status of Implementation of Grant Assistance for Underprivileged Farmers .....	192
12.4 Proposed Project Plan: Project for Enhancement of Rice Value Chain.....	192
12.4.1 Overview of the survey area.....	192
12.4.2 Current Status and Issues .....	196
12.4.3 Draft Project Plan .....	199



## Units and Currency

kg	kilogram
t, MT	Metric tons = 1,000 kg
h	hour
mm	millimeter
cm	centimeter
km	kilometer
ha	hectare
HP	Horsepower
km <sup>2</sup> , sq.km	square kilometer
m <sup>3</sup>	cubic meter
MCM	million cubic meter
MSL	Mean Sea Level
MW	mega Watt
LPS, l/s	litters per second
mm/mon	millimeter per month
mm/d	millimeter per day
m/s	meter per second
m <sup>3</sup> /s	cubic meter per second
°C	degrees centigrade
%	percent
US\$	United States of America Dollar
EUR	EURO

## List of Abbreviations

### 【All Chapter】

Abbreviations	English (French)
<b>AAA</b>	Africa Agribusiness Academy
<b>AfDB (BAD)</b>	African Development Bank ( <i>Banque Africaine de Développement</i> )
<b>AfricaRice</b>	Africa Rice Center
<b>AGRA</b>	Alliance for a Green Revolution in Africa
<b>ARC (CRA)</b>	Agricultural Research Center ( <i>Centre de Recherche Agricole</i> )
<b>BADEA</b>	Arab Bank of Economic in Africa
<b>BMGF</b>	Bill & Melinda Gates Foundation
<b>BS</b>	Breeder Seed
<b>CAADP</b>	Comprehensive Africa Agriculture Development Program
<b>CARD</b>	Coalition for African Rice Development
<b>CARI</b>	Competitive African Rice Initiative
<b>CECAM</b>	Caisse d'Épargne Mutual Agricultural Credit Fund ( <i>Caisse d'Épargne et de Crédit Agricole Mutuels</i> )
<b>COVID-19</b>	Coronavirus Disease 2019
<b>CS</b>	Certified Seed
<b>C/N</b>	Concept Note
<b>DAP</b>	Diammonium phosphate
<b>D/D</b>	Detail Design
<b>DED</b>	German Development Service ( <i>Deutscher Entwicklungsdienst</i> )
<b>DFI</b>	Development Finance Institutions
<b>DFID</b>	The Development for International Development U.K.
<b>DF/R</b>	Draft Final Report
<b>DTM</b>	Digital Terrain Model
<b>E/N</b>	Exchange of Note
<b>ECOWAP</b>	Economic Community of West Africa Agricultural Policy
<b>ECOWAS</b>	Economic Community of West African States
<b>F/R</b>	Final Report
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FARA</b>	Forum for Agricultural Research in Africa
<b>FDA (AFD)</b>	French Development Agency ( <i>Agence Française de Développement</i> )
<b>FOB</b>	Free on Board
<b>FP</b>	Focal Point Person
<b>FS</b>	Foundation Seed
<b>FVC</b>	Food Value Chain
<b>G/A</b>	Grant Agreement
<b>GAFFSP</b>	Global Agriculture and Food Security Program
<b>GDP</b>	Gross Domestic Product
<b>GIS</b>	Geographic Information System
<b>GIZ</b>	German Agency for International Cooperation ( <i>Deutsche Gesellschaft für Internationale Zusammenarbeit</i> )
<b>GTZ</b>	German Agency for Technical Cooperation ( <i>Deutsche Gesellschaft für Technische Zusammenarbeit</i> )
<b>IC/R</b>	Inception Report
<b>IFAD (FIDA)</b>	International Fund for Agricultural Development ( <i>Fonds international de développement agricole</i> )
<b>IFDA</b>	International Foodservice Distributors Association
<b>IFNA</b>	Initiative for Food and Nutrition Security in Africa
<b>IMF</b>	International Monetary Fund
<b>IITA</b>	International Institute of Tropical Agriculture
<b>IRRI</b>	International Rice Research Institute
<b>IsDB / IDB</b>	Islamic Development Bank
<b>ISTA</b>	International Seed Testing Association
<b>IT/R</b>	Interim Report

Abbreviations	English ( <i>French</i> )
<b>JICA</b>	Japan International Cooperation Agency
<b>JIRCAS</b>	Japan International Research Center for Agricultural Sciences
<b>KOICA</b>	Korea International Cooperation Agency
<b>KR</b>	Kennedy Round
<b>MCA</b>	Millennium Challenge Account
<b>MoA</b>	Ministry of Agriculture
<b>NELSAP</b>	Nile Equatorial Lakes Subsidiary Action Program
<b>NEPAD</b>	New Partnership for Africa's Development
<b>NGO</b>	Non-Governmental Organizations
<b>NPO</b>	Non-Profit Organization、Not-for-Profit Organization
<b>NRDS</b>	National Rice Development Strategy
<b>OPEC</b>	Organization of the Petroleum Exporting Countries
<b>PNIA</b>	National Agricultural Investment Plan ( <i>Plan National d' Investissement Agricole</i> )
<b>RS</b>	Registered Seed
<b>SC</b>	Steering Committee
<b>SDGs</b>	Sustainable Development Goals
<b>SHEP</b>	Smallholder Horticulture Empowerment & Promotion
<b>SP</b>	Service Provider
<b>SPFS</b>	Special Program for Food Security
<b>SRI</b>	Système de Riziculture Intensive
<b>SSA</b>	Sub-Saharan Africa
<b>TICAD</b>	Tokyo International Conference on African Development
<b>TF</b>	Task Force
<b>USAID</b>	U.S. Agency for International Development
<b>VC</b>	Value Chain
<b>WB</b>	World Bank
<b>WFP</b>	World Food Programme
<b>2KR</b>	Kennedy Round Two
<b>本調査</b>	Data collection survey for enhancement of CARD initiative on rice sector infrastructure and equipment in Africa

### 【Chapter 1: Ethiopia】

Abbreviations	English ( <i>French</i> )
<b>ADLI</b>	Agricultural Development Led Industrialization
<b>AIMD</b>	Agricultural Input Marketing Department
<b>AISE</b>	Agricultural Input Supply Enterprise
<b>CSA</b>	Central Statistical Agency
<b>EIAR</b>	Ethiopian Institute of Agricultural Research
<b>FSS</b>	Food Security Strategy
<b>FTC</b>	Farmers Training Centers
<b>GTP-I &amp; II</b>	Growth and Transformation Plan
<b>NRDSEI</b>	National Rice Research and Development Strategy of Ethiopia
<b>FNRRTC</b>	Fogera National Rice Research And Training Center
<b>NRSC</b>	National Rice Steering Committee
<b>NRTC</b>	National Rice Technical Committee
<b>PASDEP</b>	Plan for Accelerated and Sustained Development to End Poverty
<b>PM&amp;ED</b>	Planning Monitoring and Evaluation Directorate
<b>PPD</b>	Planning and Programming Department
<b>PPP</b>	Public Private Partnership
<b>QDS</b>	Quality Declared Seed
<b>RARIs</b>	Regional Agricultural Institutes
<b>RBoA</b>	Regional Bureaus of Agriculture
<b>SDPRP</b>	Sustainable Development and Poverty Reduction Program
<b>WOoA</b>	Woreda Agriculture and Rural Development Office
<b>ZDoA</b>	Zonal Agriculture & Rural Development Office

## 【Chapter 2: Madagascar】

Abbreviations	English (French)
<b>CFFAMMA</b>	Centre for Manufacturing, Training and Application of Agricultural Machinery and Mechanisation ( <i>Centre de Fabrication, de Formation et d' Application du Machinisme et de la Mécanisation Agricole</i> )
<b>CMS</b>	Seed Multiplier Center ( <i>Centre Multiplicateur de Semences</i> )
<b>CSA</b>	Agricultural Service Center ( <i>Centre de Services Agricoles</i> )
<b>DAAB</b>	Agro-Business Support Department ( <i>Direction d'Appui à l'Agro-Business</i> )
<b>DAPV</b>	Directorate of Plant Production Support ( <i>Direction d'Appui à la Production Végétale</i> )
<b>DGA</b>	Directorate General of Agriculture ( <i>Direction Général de l'Agriculture</i> )
<b>DGR</b>	Directorate of Rural Engineering ( <i>Direction du Génie Rural</i> )
<b>EPA</b>	Public establishments of an administrative nature ( <i>Etablissements Publics à caractère Administratif</i> )
<b>EPIC</b>	Public establishments of an industrial and commercial nature ( <i>Etablissements Publics à caractère Industriel et Commercial</i> )
<b>FAPP</b>	Agricultural Training and Professionalization of Producers ( <i>Formation Agricole &amp; Professionnalisation des Producteurs</i> )
<b>FDA</b>	Agricultural Development Fund ( <i>Fonds de Développement Agricole</i> )
<b>FIFAMANOR</b>	Norwegian Malagasy Agricultural Farm ( <i>Fiompianasy Fambolena Malagasy Norveziana</i> )
<b>FOFIFA</b>	National Center for Applied Research on Rural Development
<b>GPS</b>	Group of Seed Producers ( <i>Groupe des Producteurs Semenciers</i> )
<b>IEM</b>	Initiative Emergence Madagascar
<b>MAEP</b>	Ministry of Agriculture, Livestock and Fisheries ( <i>Ministère de l'Agriculture et de l'Elevage et de la Pêche</i> )
<b>PAPRiz</b>	Project for Rice Productivity Improvement and Management of Watershed and Irrigation Area
<b>PCP-Riz</b>	Platform for Consultation and Steering of the Rice sector ( <i>Plateforme de Concertation et de Pilotage de la filière Riz</i> )
<b>PEM</b>	Plan Emergence Madagascar
<b>SNAB</b>	National Strategy on Agribusiness ( <i>Stratégie Nationale de l'Agribusiness</i> )
<b>SOC</b>	National Agency for Official Seed and Plants Control ( <i>Service Officiel de Contrôle des Semences et Matériel Végétal</i> )
<b>SPDR</b>	Rice Development and Promotion Support Service ( <i>Service d'Appui au Développement et Promotion Rizicole</i> )

## 【Chapter 3: Rwanda】

Abbreviations	English (French)
<b>CIP</b>	Crop Intensification Program
<b>EDPRS</b>	Economic Development and Poverty Reduction Strategy
<b>FFS</b>	Farmers Field School
<b>IWUO</b>	Irrigation Water Users' Organization
<b>MINAGRI</b>	Ministry of Agriculture and Animal Resources
<b>MINICOM</b>	Ministry of Trade and Industry
<b>NAEB</b>	National Agricultural Export Development Board
<b>NAP</b>	National Agricultural Policy
<b>PRSP</b>	Poverty Reduction Strategy Paper
<b>PSTA4</b>	Strategic Plan for Agriculture Transformation
<b>RAB</b>	Rwanda Agriculture and Animal Resources Development Board
<b>RADA</b>	Ruwanda Agriculture Development Authority
<b>SMAP</b>	Small-Scale Farmers' Market-Oriented Agriculture Project
<b>WAMCAB</b>	Project for Water Management and Capacity Building in the Republic of Rwanda

## 【Chapter 4: Uganda】

Abbreviations	English (French)
<b>AEATREC</b>	Agricultural Engineering and Appropriate Technology Research Centre
<b>ASSP</b>	Agriculture Sector Strategic Plan



Abbreviations	English (French)
<b>DAIMWAP</b>	Department of Agricultural Infrastructure, Mechanisation and Water for Agricultural Production
<b>MAAIF</b>	Ministry of Agriculture, Animal Industry and Fisheries
<b>MWE</b>	Ministry of Water and Environment
<b>NAADS</b>	National Agricultural Advisory Services
<b>NaCRRI</b>	National Crops Resources Research Institute
<b>NAISE center</b>	National Agricultural Innovation and Skills Enhancement center
<b>NARO</b>	National Agriculture Research Organization
<b>NaSARRI</b>	National Semi-Arid Resources Research Institute
<b>NDP III</b>	Third National Development Plan
<b>NIP</b>	National Irrigation Policy
<b>NSCS</b>	National Seed Certification Service
<b>PRiDe</b>	Promotion of Rice Development Project
<b>ZARDI</b>	Zonal Agricultural Research and Development Institute

### 【Capter 5: Cote d’Ivoire】

Abbreviations	English (French)
<b>ADERIZ</b>	Rice Development Agency ( <i>Agence pour le Développement de Filière Riz</i> )
<b>ANADER</b>	National Agency for Support to Rural Development ( <i>Agence Nationale d'Appui au Développement Rural</i> )
<b>CNRA</b>	National Centre of Agronomical Research ( <i>Centre National de Recherche Agronomique</i> )
<b>FIRCA</b>	Interprofessional Fund for Agricultural Research and Advisory Services ( <i>Fonds Interprofessionnel pour la Recherche et le Conseil Agricoles</i> )
<b>MEMINADER</b>	Ministry of State, Ministry of Agricultural and Rural Development ( <i>Ministère d'État, Ministère de l'Agriculture et du Développement Rural</i> )
<b>PDDA</b>	Agricultural Development Master Plan ( <i>Plan Directeur de Développement Agricole</i> )
<b>PMEA</b>	Small and Medium Agricultural Entrepreneurs ( <i>Petites et Moyens Entrepreneurs Agricoles</i> )
<b>PND</b>	National Development Plan ( <i>Plan National de Développement</i> )
<b>PRORIL</b>	Local Rice Promotion Project in Côte d'Ivoire ( <i>Projet de Promotion du Riz Local en République de Côte d'Ivoire</i> )
<b>PUR</b>	Rice Emergency Program ( <i>Programme d'Urgence Riz</i> )
<b>SNDMA</b>	National Agricultural Mechanization Strategy ( <i>Stratégie Nationale de Développement de la Mécanisation Agricole</i> )

### 【Chapter 6: Ghana】

Abbreviations	English (French)
<b>AESD</b>	Agricultural Engineering Service Directorate
<b>AMSEC</b>	Agricultural Mechanization Service Center
<b>CRI</b>	Crop Research Institute
<b>CSIR</b>	Council for Scientific and Industrial Research
<b>FAPIM</b>	Project on Farmers' Participation in Irrigation Management
<b>FASDEP II</b>	Food and Agriculture Sector Development Policy II
<b>GCAP</b>	Ghana Commercial Agriculture Project
<b>GIDA</b>	Ghana Irrigation Development Authority
<b>GLDB</b>	Grains and Legumes Development Board
<b>ICOUR</b>	Irrigation Company of Upper Region
<b>METASIP</b>	Medium Term Agriculture Sector Investment Plan
<b>MoFA</b>	Ministry of Food and Agriculture
<b>PPRSD</b>	Plant Protection and Regulatory Service Directorate、
<b>SARI</b>	Savanna Agriculture Research Institute

### 【Chapter 7: Liberia】

Abbreviations	English (French)
<b>FAPS</b>	Food and Agriculture Policy and Strategy

Abbreviations	English (French)
<b>IWRM</b>	Integrated Water Resources Management
<b>LASIP</b>	Liberia Agriculture Sector Investment Program
<b>LNRDS</b>	Liberia National Rice Development Strategy
<b>NBSAP</b>	National Biodiversity Strategy and Action Plan
<b>PRS</b>	Poverty Reduction Strategy

### 【Chapter 8: Nigeria】

Abbreviations	English (French)
<b>ADP</b>	Agricultural Development Programme
<b>APP</b>	Agricultural Promotion Policy
<b>ATA</b>	Agricultural Transformation Agenda
<b>FMARD</b>	Federal Ministry of Agriculture and Rural Development
<b>LNRBDA</b>	Lower Nigeria River Basin Development Authority
<b>NASC</b>	National Agricultural Seed Council
<b>NCAM</b>	National Centre for Agricultural Mechanization
<b>NCRI</b>	National Cereals Research Institute
<b>RBDA</b>	River Basin Development Authority
<b>RIPMAPP</b>	Rice Post-Harvest Processing and Marketing Pilot Project in Nasarawa and Niger States
<b>RTA-AP</b>	Rice Transformation Agenda Action Plan

### 【Chapter 9: Senegal】

Abbreviations	English (French)
<b>CIFA</b>	Interprofessional Training Center for Agricultural Professions ( <i>Centre Interprofessionnel de Formation sur les métiers de l'Agriculture</i> )
<b>DAPSA</b>	Directorate of Analysis, Forecasting and Agricultural Statistics ( <i>Direction de l'Analyse, de la Prévision et des Statistiques Agricoles</i> )
<b>DISEM</b>	Seed Division ( <i>Division des Semences</i> )
<b>DRDR</b>	Regional Directorate of Rural Development ( <i>Direction Régionale du Développement Rural</i> )
<b>ISRA</b>	Senegalese Institute of Agricultural Research ( <i>Institut Sénégalais de Recherche Agricole</i> )
<b>MAER</b>	Ministry of Agriculture, Rural Equipment and Food Security ( <i>Ministère de l'Agriculture et de l'Équipement Rural et de la Souveraineté Alimentaire</i> )
<b>PAP</b>	Priority Action Plan ( <i>Plan d'Actions Prioritaires</i> )
<b>PASAD</b>	Agricultural Program for Sustainable Food Sovereignty ( <i>Programme Agricole pour une Souveraineté Alimentaire Durable</i> )
<b>PNAR</b>	National Program for Self-sufficiency in Rice ( <i>Programme National d'Autosuffisance Alimentaire en Riz</i> )
<b>PRACAS</b>	Program of Acceleration of the Rate of Senegalese Agriculture
<b>PRES</b>	Economic and Social Resilience Program ( <i>Programme de Résilience Économique et Sociale</i> )
<b>PSE</b>	Plan for an Emerging Senegal ( <i>Plan Sénégal Emergent</i> )
<b>SAED</b>	National Society for the Development and Exploitation of the land of the Senegal River Delta and the Valleys of the Senegal River and the Falémé ( <i>Société d'Aménagement et d'Exploitation des Terres du Delta du Fleuve Sénégal et des Vallées du fleuve Sénégal et de la Falémé</i> )
<b>SODEFITEX</b>	Textile Fibres Development Corporation of Senegal ( <i>Société de développement et des fibres textiles</i> )

### 【Chapter 10: Sierra Leone】

Abbreviations	English (French)
<b>MAFFS</b>	Ministry of Agriculture, Forestry and Food Security
<b>MTNDP</b>	Medium-Term National Development Plan
<b>NATS</b>	National Agricultural Transformation Strategy
<b>NSADP</b>	National Sustainable Agriculture Development Plan
<b>RARC</b>	Rokupr Agricultural Research Centre
<b>SLARI</b>	Sierra Leone Agricultural Research Institute
<b>SLeSCA</b>	Sierra Leone Seed Certification Agency
<b>SLRVCDS</b>	Sierra Leone Rice Value Chain Development Strategy

Abbreviations	English (French)
SMP	Seed Multiplication Project

### 【Chapter 11: Zambia】

Abbreviations	English (French)
COBSI	Community Based Smallholder Irrigation
DSP	Rice Dissemination Project
E-COBSI	Support for Sustainable Community Based Irrigation Development Project
FISP	Farmer Input Support Program
FoDiS-R	Support the Food Crop Diversification Support Project, Focusing on Rice Production
MOFNP	Ministry of Finance and National Planning
MOReDeP	Market-Oriented Rice Development Project
NAIP	National Agricultural Investment Plan
R-SNDP	Revised Sixth National Development Plan
SCCI	Seed Control and Certificate Institute
S-NAP	Second National Agricultural Policy
TSB	Technical Service Branch
ZARI	Zambia Agricultural Research Institute
ZCARD	Zambia Consortium for Accelerated Rice Development

### 【Chapter 12: Cameroon】

Abbreviations	English (French)
CENEEMA	Center of Studies and Experimentation of Agricultural Machinery ( <i>Centre d'Études et d'Expérimentation du Machinisme Agricole</i> )
DDA	Directorate of Agriculture Development ( <i>Direction du Développement de l'Agriculture</i> )
DEPC	Directorate of Studies, Programs and Cooperation ( <i>Direction des Etudes, des Programmes et de la Coopération</i> )
DRCQ	Directorate of Regulation, Quality Control of Agricultural Inputs and Products ( <i>Direction de la Réglementation, du Contrôle de Qualité des Intrants et Produits Agricoles</i> )
DSCE	Strategy Paper for Growth and Employment ( <i>Document de Stratégie pour la Croissance et L'Emploi</i> )
IRAD	Institute of Agricultural Research for Development ( <i>Institut de Recherche Agricole pour le Développement</i> )
MIDERIM	Mission for the Development of Rice Cultivation in the M'bo Plain, Society for the Development of Rice Cultivation in the M'Bo Plain ( <i>Mission pour le Développement de la Riziculture dans la plaine des M'bo, Société de Développement de la Riziculture dans la plaine des M'Bo</i> )
MINADER	Ministry of Agricultural and Rural Development ( <i>Ministère de l'Agriculture et du Développement Rural</i> )
PDRM	Mont Mbappit Rural Development Project ( <i>Projet de Développement Rural du Mont Mbappit</i> )
SDSR	Rural Sector Development Strategy ( <i>Stratégie de Développement du Secteur Rural</i> )
SEMRY	Society for the Expansion and Modernization of Rice Cultivation of Yagoua ( <i>Société d'Expansion et de Modernisation de la Riziculture de Yagoua</i> )
UNVDA	Upper Nun Valley Development Authority



## Chapter 1 Ethiopia

### 1.1 Outline of Ethiopia

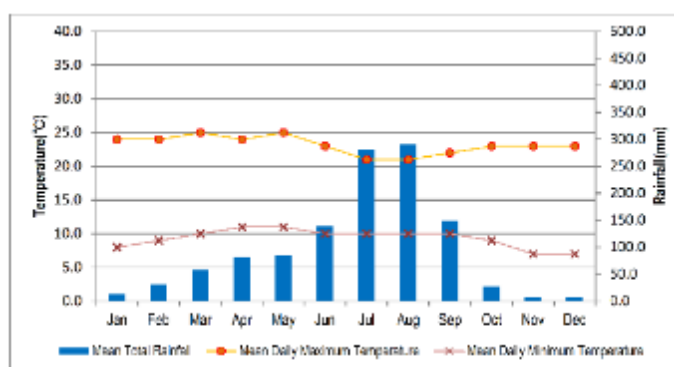
#### 1.1.1 Natural Conditions

##### (1) Topography

Ethiopia has an elevated central plateau varying in height from 2,000 to 3,000 meters above sea level. In the North and center of the country there are some 25 mountains whose peaks reach over 4,000 meters. The most famous Ethiopia river is Blue Nile or Abbay, which flows a distance of 1,450 km from its source to join the White Nile at Khartoum<sup>1</sup>.

##### (2) Weather Conditions

Ethiopia has a tropical monsoon climate with wide topographic-induced variation. Three climatic zones can be distinguished: a cool zone consisting of the central parts of the western and eastern section of the high plateaus, a temperate zone between 1,500 m and 2,400 m above sea level, and the hot lowlands below 1,500 m. (FAO, country profile, 2016)



**Figure 1.1 Temperature and Rainfall in Addis Ababa)**

The figure on the right shows the monthly average temperature and rainfall for 30 years in Addis Ababa (located at 2,344 m above sea level). Mid-November to January is a season for occasional rain with dry winter. The short rainy season i.e. from February to May, is followed by the long wet season, from June to mid-September. The average annual rainfall in Addis Ababa is 1,165 mm.

##### (3) River System

Ethiopia is endowed with a substantial amount of water resources but very high hydrological variability. The surface water resource potential is impressive, but little developed. The country possesses twelve major river basins, which form four major drainage systems, which are Nile Basin, Rift Valley, Shebelli-Juba, and North-East Coast<sup>2</sup>.

### 1.2 Outline of Agricultural Sector

#### 1.2.1 Laws, policies and development plan relating to the agricultural sector.

The Ethiopian government has developed agricultural development policies and strategies in line with the overall strategy framework of ADLI (Agricultural Development Led Industrialization) formulated in 1991. ADLI places very high priority on accelerating agricultural growth and achieving food security. The agriculture sector has held the core strategic position within the medium and long-term plans as outlined in Sustainable Development and Poverty Reduction Program (SDPRP) approved in 2002, the 2004 Food Security Strategy (FSS), Plan for Accelerated and Sustained Development to End Poverty (PASDEP) implemented from 2005/06 to 2009/10 and The Growth and Transformation Plan (GTP-I & II), which is under implementation since 2010/11 after PASDEP. Recently, Ethiopia has endorsed the

<sup>1</sup> <https://ethiopianembassy.be/ethiopia/country-profile/>, access 2021/3/1

<sup>2</sup> FAO, AQUASTAT Country Profile, 2016

2030 Agenda for Sustainable Development Goals (SDGs) as an integral part of its national development framework. These strategies intend, among others, to attain food self-sufficiency at national level by increasing productivity of smallholders through research-generated information and technologies, increasing the supply of industrial and export crops and ensuring the rehabilitation and conservation of natural resource base. Rice is among the targeted commodities that have received due emphasis under promotion of agricultural production. With recognition of comparative advantages of rice over other food crops, it is considered as the “Millennium crop” that is expected to contribute to ensuring food security in the country. The recognition of the importance of rice has also been reflected in the preparation of National Rice Research and Development Strategy of Ethiopia (NRRDSE 1; 2009-2018) that has played crucial role in guiding the overall rice research and development in the country.

### **1.2.2 Implementation Status of the NRDS**

Government of Ethiopia is committed to develop the rice sub-sector. Since rice was a relatively new crop in Ethiopia, NRRDSE 1 was developed to address several challenges in the rice sub-sector. Since the NRRDSE 1 has expired, the second phase of the National Rice Development Strategy (NRDS 2; 2019-2030) was developed to replace NRRDSE 1 and show the overall direction for rice development in the country. By highlighting the current status of rice production, challenges, goals, priority areas/interventions, and concrete actions along the rice value chain, the NRDS 2 aims to enable all stakeholders in coordinating their efforts towards the development of the rice sector.

There is an increasing trend in both area and production of rice although the rate of increase is not greater than targeted in NRRDSE 1. The area of rice was 35,088 ha in 2009, which has increased to 41,811 ha in 2013 and to 53,107 ha in 2018 production seasons. The production of rice was 71 thousand tons in 2009, and has increased to 121 thousand tons in 2013 and to 151 thousand tons in 2018 production seasons. The increased production could be linked with the expansion of wetland and upland areas. However, the irrigation area that could contribute to high yields and production hasn't increased.

Rice yield is a key factor related to the total production of rice. Major crops' yields except rice, have increased in recent years. In 2018 production season, the national average yield of rice was about 2.8 t/ha, which is far lower compared to the targeted average yield of 5.1 t/ha in 2019 production season under NRRDSE 1.

Achievements during the previous strategic period (2009-2018) indicated that the performances of the rice research and source seed maintenance activities were more or less achieved fully except the introduction and adaptation of pre- and post-harvest technologies. On the other hand, the performances of the rice development with respect to production and productivity showed much small increment against the set targets. This is associated with the extension system and rice seed system in particular which are biased to other cereal crops like maize, tef, sorghum and others; overlooking the potential contributions of rice to small holder farmers. Other notable achievements and lessons include:

- Establishment of rice research and training center with moderately equipped facilities at Fogera
- Capacity building for rice researchers, extension staffs and farmers locally and internationally
- Development and release of 23 new rice varieties
- The need to strengthen capacity of partner institutions engaged in the rice research and development activities
- Address systemic inadequacies present in:
  - ✓ coordination and partnership mechanisms between regional and federal government offices
  - ✓ data collection and difficulties in monitoring and evaluation system (M&E)
  - ✓ gaining attention from government and development partners

The NRDS 2 aims to achieve increased production, productivity and quality of locally produced rice in order to drive the rice sector towards self-sufficiency in Ethiopia. The major objectives of the strategy are:

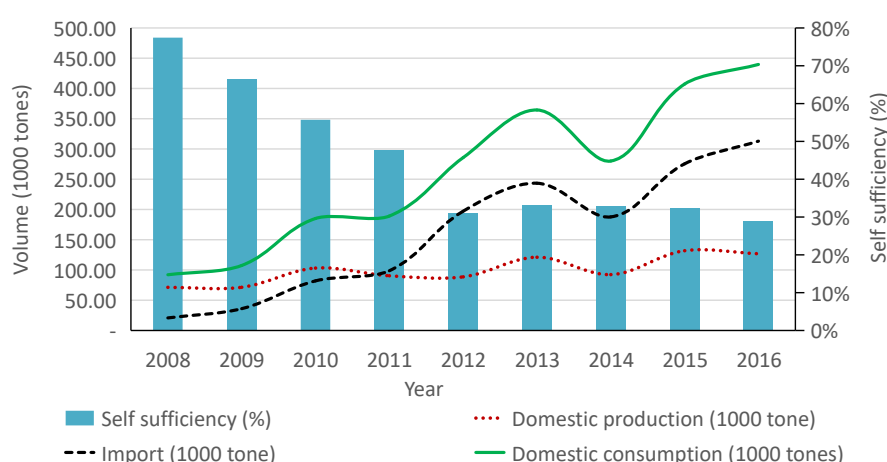
- To increase domestic rice production by increasing rice area
- To increase rice yield under both smallholders' and large-scale production environments through improved management of both on-farm and off-farm practices
- To improve the quality of domestic rice through improved handling and processing

### 1.2.3 Rice Food Value Chain Analysis

In Ethiopia, rice is recognized as a “millennium crop” with the scope of high job creation potential and significance on food security especially in places where other food crops like tef, maize, wheat and sorghum do not do well. Among the existing production ecologies of Ethiopia, 81.2% is rain-fed lowland, 18.6% rain-fed upland and 0.2% is irrigated (Ethiopian Institute of Agricultural Research: EIAR 2019). Ethiopia has land areas for rain-fed rice production in nearly 6 million ha and irrigated rice production in about 3.7 million ha of land. The total area under rice production in Ethiopia has recently increased from about 10,000 ha in 2006 to over 50,000 ha in 2017; and production has increased from 71,316.07 tons in 2008 to 151,018.33 tons in 2017. The increase in rice production is mainly due to an increase in expansion of cultivation in the wetland and upland areas. Despite such a growth however, the rate of increase in rice importation was considerably higher during the same period. Hence the self-sufficiency in rice consumption in Ethiopia has decreased from about 70% in 2008 to about 30% in 2016.

There are three (3) basic types of rice consumers in Ethiopia. The first type represents the consumers who preferred quality rice (aromatic, long grain and packed rice). These consumers generally fall under a high-income group and are the smallest in numbers of the three. This market is currently served entirely by importers who import from large rice producing countries. The second category is comprised of the consumers who prefer both local and imported rice. Consumers in this category consume rice both as flour in Injera as well as boiled rice especially for their children. This market is relatively less sensitive to brand, and more price sensitive than the higher-income group. For these consumers, quality is important and local rice is currently able to serve the needs of the consumers. The third category of consumers prefer local rice, especially rice flour to make Injera. The vast majority of the local rice market falls within this category. This market is growing very quickly.

The total consumption of rice in Ethiopia has grown faster than the domestic production, which has resulted in a considerable decline in the rate of self-sufficiency. As indicated in the figure below, the rate of self-sufficiency has decreased from about 70% in 2008 to about 30% in 2016.



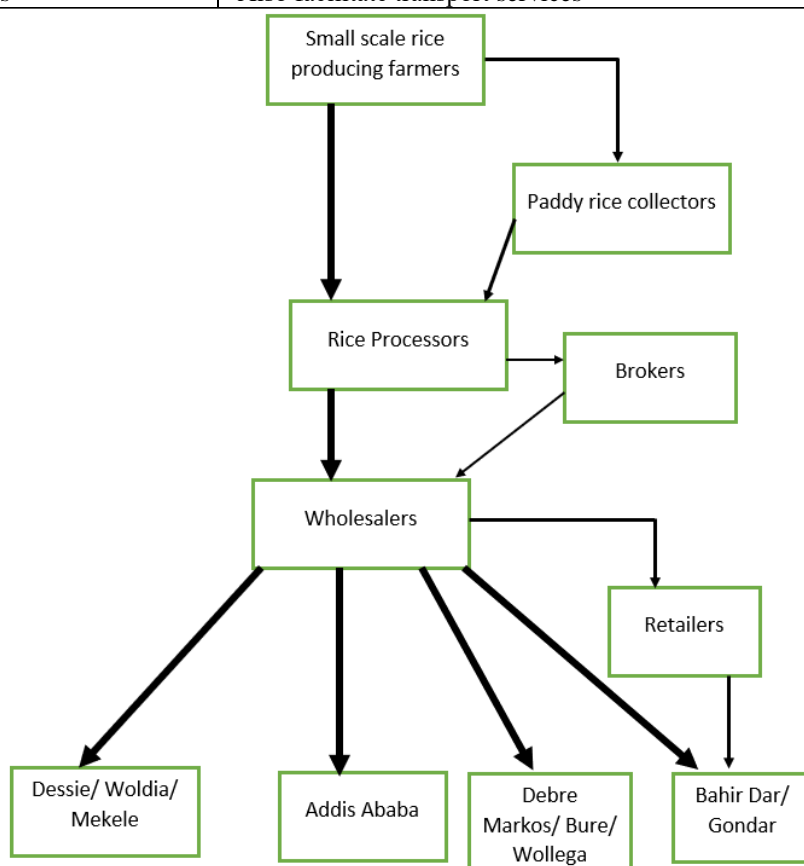
**Figure 1.2 Rice production, importation, consumption and self sufficiency**

Since rice is considered as a cash crop in several wetland and upland areas, the type and number of actors engaged in the rice value chain has increased considerably through time. Previous studies show that from 2010 to 2016, the proportion of produced rice sold in the markets has increased from about

75% to 98%. This has provided diverse options for the value addition and marketing channels and has enhanced the commercial orientation of smallholders. Most of the processors operate as traders in addition to the processing service they provide, and they channel the processed rice either through brokers or directly to wholesalers and retailers. The table below outlines the key actors involved in rice marketing in Fogera, with a brief description of their characteristics and the main roles they play. The processed rice is often sold to wholesalers through brokers in distant bigger city markets such as in Gonder, Dessie, Mekele, and Addis Ababa. The following figure presents the marketing channels for rice mainly functioning in the country. In most cases, the traders control the price of rice coming to the market.

**Table 1.1 Characteristics and role of actors in rice marketing channels**

Actor	Characteristics	Role
Paddy rice collectors	Village-level operations on behalf of processors	<ul style="list-style-type: none"> <li>• Operate as aggregators</li> <li>• Often they themselves are rice producers.</li> </ul>
Processors	Private processors	<ul style="list-style-type: none"> <li>• Provision of processing services (de-husking, bran cleaning, and milling)</li> <li>• Purchase main product and by-products (operate as traders)</li> </ul>
	Cooperatives	<ul style="list-style-type: none"> <li>• Provision of processing services (de-husking, polishing, and milling)</li> </ul>
Traders	Wholesalers and retailers	<ul style="list-style-type: none"> <li>• Market processed rice to other traders in distant markets or to local consumers</li> <li>• There is an emerging trend that paddy rice traders from Chewaka sell to processors in Fogera especially when there is shortage in local supply</li> </ul>
Brokers	Operate on commission basis	<ul style="list-style-type: none"> <li>• Link processors with wholesalers including those in distant markets</li> <li>• Also facilitate transport services</li> </ul>



**Figure 1.3 The dominant rice marketing channels in Ethiopia**

Rice is a good source of food and cash for the farmers. The market demand for rice is rising fast in the national and regional markets, both. The price of rice is comparable to that of tef in the local market.



Its straw and other by products such as husk and bran are also used for different purposes (animal feed, roofing, energy and articles such as hat). The major comparative advantages of domestic production of rice in Ethiopia are the following:

- Existence of research support with good linkages with regional and international research institutes like IRRI, Africa Rice Centre, and JIRCAS
- Existence of huge production potential under both rain-fed and irrigation conditions,
- Domestically produced rice is of acceptable types, having good taste compared with the imported ones and high water holding capacity for baking Injera,
- Existence of huge competitiveness in domestic rice production, mainly because of the existing cheap labor, which can improve the competitiveness of Ethiopian rice in the international markets,
- Price of locally produced rice is cheaper than the imported rice
- Existence of considerably high domestic demand of rice; which has been increasing with the time.

Domestic rice is, however, not immune from challenges. It hasn't been participating in the market of imported rice that is characterized as milled, aromatic and long grain rice. It only participates in the low-quality and low-priced rice market that is mainly consumed in rural areas. This is due to the following challenges:

- Domestic rice hasn't been adapted to the preferences of urban areas, and aromatic seeds haven't been developed at the research level in Ethiopia
- Limited opportunities for farmers to access the market
- Limited mechanism or organizations that allow farmers to store rice properly and negotiate prices with traders based on the demand of the rice market
- The quality of domestic rice being inferior to that of imported rice

#### **1.2.4 Progress of Support to Rice Sector**

The main source of finance for implementing NRDS 2 is the government. Implementation will be co-financed with resources from a number of sources including, development partners, non-government organizations, private investors, and financial institutions such as commercial banks, Development Finance Institutions (DFIs) and micro-finance institutions. Based on the impacts of the interventions proposed under the NRDS, key intervention packages will be prioritized and developed as project concept notes. The concept notes shall be submitted to National Rice Technical Committee (NRTC) for verification and affirmation. The confirmed project concept notes will then be submitted to National Rice Steering Committee (NRSC), for approval of direct funding from the government and/or for consultation with the development partners on potential funding. The concept notes that hold the potential for funding will be elaborated into the full projects. Upon approval of the projects, the activities will be implemented through regional and national institutions.

#### **1.2.5 Implementation Structure of Rice sector**

##### **<Governance Structure>**

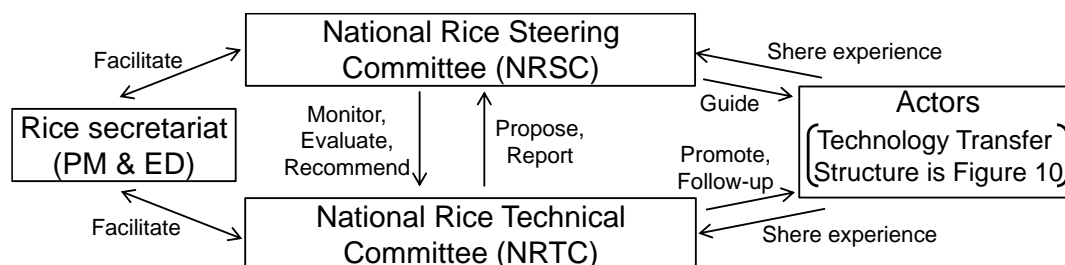
To ensure the proper implementation of the NRDS 2, there is a need to have a governance structure in place. Ministry of Agriculture (MoA) is the lead implementer. NRSC and NRTC coordinate the implementation at the national level (See figure below).

NRSC is chaired by State Minister and co-chaired by Director General of EIAR. NRSC members meet twice a year and urgent meetings can be called whenever required. The main tasks include:

1. Overlook and supervise the implementation of NRDS at the national level
2. Facilitate all actors involved in rice research and development
3. Identify constraints and opportunities and propose interventions
4. Facilitate experience sharing among regions engaged in rice activities
5. Support, monitor and evaluate NRTC

NRTC is chaired by Crop Development Director of MoA and co-chaired by Crop Research Directorate Director of EIAR. NRTC members meet twice a year. The main tasks include:

1. Based on the recommendation from NRSC, prepare an annual plan, follow the implementation
2. Implement the activities approved by NRSC and by the secretariat (Planning Monitoring and Evaluation (PM&E) Directorate of MoA)



**Figure 1.4 NRDS Governance Structure**

#### <Technology Transfer Structure>

Dissemination of technologies and information to farmers by the implementation of NRDS is an important and desired change. It is essential to share roles and responsibilities among implementing partners, individuals and leadership at all levels. The main roles and responsibilities of each institution and rice platform are described below.

**Ministry of Agriculture (MoA):** Directorates in MoA lead and are responsible for the coordination of development of technologies, approval and implementation through its extensive federal and regional clear line of reporting and feedback system. Ethiopian Institute of Agricultural Research (EIAR) is responsible for the coordination of nationwide research and generating, adapting and promoting agricultural technologies.

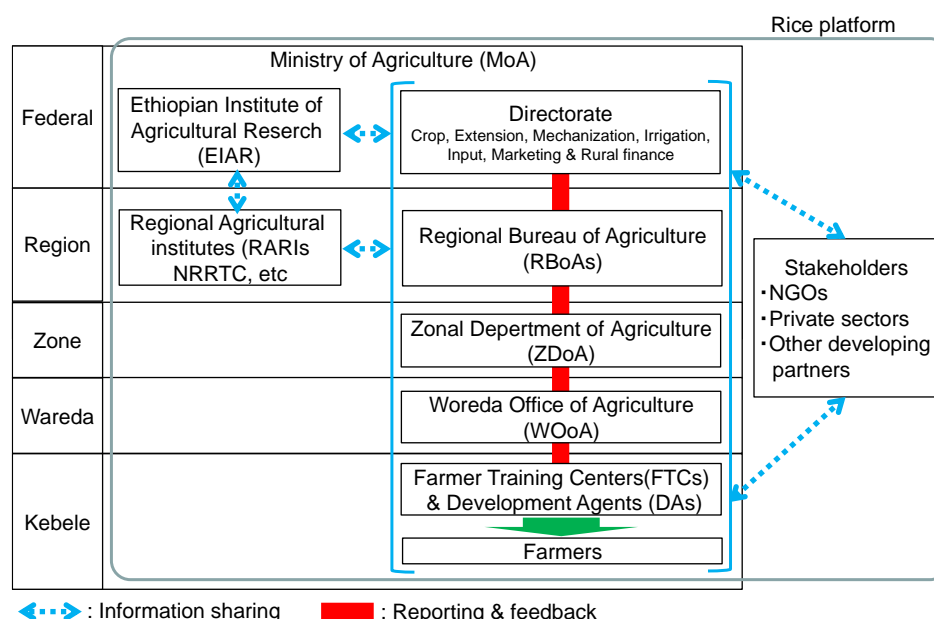
**Regional Agricultural Research Institutes (RARIs):** RARIs conduct more targeted research in their centers and sub centers located in various agro-ecological zones of the respective regions. Fogera NRRTC conducts generating, adapting, promoting rice-specific technologies, and capacity building trainings to researchers, experts, Development Agents (DAs) and farmers.

**Regional Bureaus of Agriculture (RBoA):** RBoA is responsible for coordinating and leading agricultural development in their respective regions. It oversees the implementation of the extension packages and provides support to Zonal Department of Agriculture and Woreda Offices of Agriculture.

**Zonal Department of Agriculture (ZDoA) and Woreda Offices of Agriculture (WOoA):** ZDoA plays coordination and technical support roles for WOoA and DAs. WOoA also plays coordination and technical support roles for DAs.

**Farmers Training Centers (FTCs):** The Ethiopian agricultural extension system is based on FTCs supported by trained DAs. FTCs serve as an entry point to bring about behavioral changes among farmers. DAs give a wide range of agricultural extension services to the farmers.

**Rice platform:** Rice platform is vital to promote dialogue, enhance learning, decision making and collective action and to develop partnerships and strengthen relationships amongst the actors.



**Figure1.5 Rice related technology transfer structure**

In the value chain of rice, there are following actors as well:

**Farmers:** Majority of rice farmers in Ethiopia are smallholders, who produce rice mostly for domestic consumption, and sell surplus directly to processors or paddy collectors located close to them. About 161,376 smallholders are involved in producing rice, with an average land holding size of 0.59 ha (Meron Abebe, 2016). In most rice production areas, mixed farming system (crop and animal farming) is practiced as an integral part of agricultural production. Consequently, farmers use power generated from animals and human beings for soil tillage, threshing and farm transport. Upland rice farmers are often engaged in mixed cultivation management, in which rice is grown with other cereals and pulses. Farmers in most of the lowland flooded ecology practice continuous rice cultivation. Commercial rice farming is practiced mainly in Gambella Regional State, where the Saudi-Star has so far established rice cultivation over 1,700 ha out of the potential 300 thousand ha of land under concession.

**Processors (millers):** Farmers are responsible for most of the pre-milling postharvest operations of rice operations such as harvesting, threshing, drying and storage. Harvesting and threshing of rice are carried out using traditional tools and practices. Private entrepreneurs process rice husking and milling mostly by using small-scale rice milling machines. Although the availability of efficient milling machines is reported to be a major constraint in rice processing, the number of registered rice processors in the country has increased from 10 in 2009 to over 150 in 2018. In addition, one modern large-scale rice milling factory is established by the Saudi-Star with modern large-scale processing facilities at Bisheftu town, Oromia region. These trends show an increased demand for value addition and the scope for rice milling as a potential business enterprise.

**Traders:** Wholesalers and retailers of both paddy and milled rice are scattered all over the country. Most of the milled rice is handled by traders. Since many of the production areas have poor transportation facilities, the paddy traders play a role of providing services to bring the product from production sites to markets in nearby and distant towns. In most cases, the traders control the price of rice coming to the market.

## **1.3 Current Status and Issues in the Agricultural Sector**

### **1.3.1 Irrigation Facilities**

#### **(1) Challenges**

Irrigation and appropriate drainage infrastructures in rice producing areas can dramatically increase rice yield. It is also indispensable for scaling up mechanization and other modern agronomic practices. Since irrigation of rice fields require a high level of coordination of the amount and timing of water availability, farmers need to cooperate in accessing and efficiently using the available water. Hence the management of irrigation in rice requires canny coordination that is different from that of vegetables and other crops. Construction of an environment friendly irrigation scheme that will ensure climate smart irrigation system needs large scale of finance, labour and time. In Ethiopia, the rice irrigation areas haven't increased due to the following major challenges:

- Irrigation sector has no strong linkages with research and extension sector
- Capacity of research related to irrigation (water management, water conservation, drainage, etc.) is low
- Priority of irrigated rice cultivation hasn't gained track
- Best practices and schemes where the effects and importance of irrigated rice are visible are not shared with farmers, investors, researchers, and extension staff

#### **(2) Interventions Described in NRDS2**

Irrigation including drainage has the effect of dramatically increasing rice yield. Improving traditional irrigation systems as well as expanding areas under modern irrigation are important to increase productivity and improve rural livelihood. The rice strategy under irrigation shall focus on the following points:

- Rehabilitate the existing irrigation schemes and demonstrate best agronomic practices for upland and irrigated lowland rice production
- Conduct assessment study on rice irrigation potential of the country
- Encourage and enhance the involvement of private investors in rehabilitation and construction of irrigation schemes and irrigated rice production through collection or identification of best practices at national and international level in irrigated rice investment
- Expand irrigation schemes development through construction of new irrigation schemes and enhance community participation in rice irrigation potential areas of the country
- Develop recommendations for irrigation water management (water requirement, scheduling, water application methods, salinity and drainage, water harvesting, water conservation etc.)
- Develop upland and lowland climate resilient water management practices (supplementary irrigation, water harvesting, water conservation etc.)
- Create and strengthen the capacity of irrigation water user associations (IWUAs) in rice growing areas for efficient scheme management and administration, scheme maintenance and operation
- Increase access to improved water lifting and water saving technologies and spare parts and maintenance services
- Increase access to infrastructure and mechanization technologies
- Adopt and apply land consolidation and clustering
- Improve extension services on irrigated rice production through demonstration, experience sharing visit, farmer's field days and staff training

### **1.3.2 Agricultural**

#### **(1) Challenges**

The Pre-harvest, harvest and post-harvest mechanization technologies' supply and usage are at infant

stage due to the following challenges:

- Weak institutional capacity in identification, verification and production of mechanization technologies
- Weak extension system that could not efficiently promote mechanization technologies that is suitable to the rice sector
- Absence of technical skill amongst rice growers and public technical personnel in handling machines especially motorized equipment
- Higher interest rate or inadequate financial institutions that lend money for medium- and long-term credit for the equipment supply chain
- Escalated price of machines and limited purchasing capacity of smallholder farmers
- Lack of efficient and effective distribution models and commercial milling industries for mechanization technologies
- Lack of importers/distributors in the vicinity of smallholder farmers in rural areas

The high proportion of broken rice grains in domestically processed rice and the various losses during milling that lower the value and reduce farmers' income are mainly due to the poor performance of the milling machines. The situation has not changed over the years due to the following challenges:

- Farmers aren't well aware that harvesting activities, such as excessive drying, sand mixing, and improper storage, can affect the quality of the milled rice
- There is no close communication with rice processors because farmers generally sell rice through traders, and farmers cannot give strong opinions to processors on improving rice quality and reducing losses

## **(2) Interventions Described in NRDS2**

The National Mechanization Strategy gave detail areas of interventions in improving utilization of machineries across crops and ecosystems. In the upcoming years, special emphasis will be given to the below strategies to improve mechanization utilization.

- Promote the creation of a distribution network for agricultural machineries at the federal and regional levels for small and medium tools and implements
- Establish a “machine distributor” fund to provide liquidity to local distributors
- Strengthen the tax-exemption opportunities to import of agricultural machineries and spare parts

Timeliness of tillage and planting, weeding and/or harvesting are critical factors where affordable labour is insufficient to permit timely operation. In order to improve the yield and quality, and reduce post-harvest losses, the following strategic interventions are proposed:

- Evaluate, adapt and promote verified pre and post-harvest mechanization technologies which includes;
  - ✓ Improved animal drawn implements and farm tools like row seeders, row weeders, mold-board ploughs, animal drawn harrows, wheel barrows and animal drawn carts
  - ✓ motorized pre-harvest implements (tillage implements, row-planters, row weeders)
  - ✓ Cost and energy saving post-harvest and processing technologies such as harvesters, threshers, cleaners, driers, storages, parboilers, millers
- Establish pre and post-harvest service providers for mechanized farming, with special attention to involvement of rural youth groups
- Improve knowledge and skills on pre and post-harvest mechanization technologies. This includes:
  - ✓ Training mechanization experts, extension agents, farmers and manufacturers on proper handling and utilization of pre harvest mechanization technologies
  - ✓ Training farmers, traders and product handlers on proper drying, storage and cleaning of paddy and milled rice

- ✓ Training mill operators on optimized rice milling techniques and create awareness of processors to upgrade processing capacity of milling machines
  - ✓ Training youth groups on operation, handling and maintenance of rice harvesting and threshing mechanization technologies and create awareness on establishment of small and micro enterprises for service provision
  - ✓ Capacity building on business management and technical aspects to service providers
  - ✓ Capacity building of manufacturers on fabrication and marketing of mechanical equipment
- Encouraging manufacturers and service providers by developing more suitable policy, and financial access
  - Strengthen capacity and familiarize researchers and experts with current state-of-the-art knowledge and scientific tools through short and long-term trainings
  - Create enabling environment for private investments on manufacturing agricultural machineries, service provision, and rice milling
  - Encourage cooperatives to establish rice milling industries
  - Provide electric power in rice processing areas at private and cooperative level

Establishment and strengthening of maintenance centres for agricultural equipment mainly in rural areas are very important in promoting rice production and productivity. Therefore, the NRDS will focus on the following strategic interventions:

- Provision of reliable and timely maintenance services, spare parts, fuel, and lubricants for farm equipment, water lifting and saving technologies and other tools
- Technical backstopping for timely maintenance and skill development
- Encourage small and micro scale enterprises for effective management and maintenance of farm machineries
- Capacity development of technicians and farmers in technical issues, business management and entrepreneurship

### **1.3.3 Agricultural Inputs**

Currently, the Ethiopian seed system is characterized by its three major components namely, the formal, intermediate and informal sector. All of the three components operate in their respective domains. The formal sector is subject to compulsory certification and is strictly regulated unlike the informal which is regulation exempted; the intermediate sector is managed by the less stringent Quality Declared Seed (QDS) certification system (which has its own directive and standards) and allows full responsibility of the producers with the regulatory engagement in field and seed certification. Moreover, the intermediate sector is strongly managed by regional states to identify crop and production areas. Since rice is a recent introduction to Ethiopia and its seed production is focused on limited geographies under low levels of engagement of the public, private and cooperative based enterprises. Overall, the supply, marketing and usage of the rice seed are at an infant stage.

According to the MoA's 9-year administrative data (2008-2017), a total of 1,133.5 tons of certified seed (C1) and 3,127.3 tons of C2 seed was utilized. The reported C2 by the MoA is believed to be farmer to farmer exchange without the approval of the regulatory authority. The unpublished National House Hold Heads survey by EIAR indicated that over 58% of the seed source is farmer to farmer seed exchange. The survey also found that rice farmers used seeds supplied by government sources, NGOs etc. The regional breakdown showed that maximum seed is utilized by Amhara and that the sources of the seeds vary amongst the regions. Majority of the HHHs also showed preference to the ever-existing local variety X-Jigna (67%), unknown old varieties (10%), Gumera (9%) and Nerica-4 (3%). In general, the amount of rice supplied is inconsistent across data sources.

The Fertilizer supply system is fully public and cooperative based with no private sector participation. The Government generally takes all sort of responsibility from import to farm gate delivery of fertilizer. Through a voucher fertilizer supply system, the supply chain has become more facilitative and easier to

access.

Central Statistical Agency (CSA) reports showed that an average of 20,545 Qt of fertilizer per annum (both Natural & Inorganic) is used for rice. Taking a three-year consistent data from 2014 to 2016, the CSA report showed that some of the farmers use on average 950 Qt of sole DAP/annum (at an average rate of 2kg per ha) and some use 8,532 QT of Urea + DAP at an average rate of 18kg/ha. Unlike rice, the utilization of sole DAP per ha and Urea + DAP for wheat is 77 kg/ha and 85 kg/ha respectively. The total number of smallholder rice farmers/annum who used both Urea and DAP were 26,603 (19% of the total holders).

## **(1) Challenges**

### **<Rice Varieties>**

The national rice research program of Ethiopia targets three production environments; namely, lowland rain-fed, upland rain-fed and irrigated rice growing ecosystems. The major challenges related to varieties include:

- Lack of adequate policy & legal framework that leads to;
  - ✓ Lack of strong variety release system and institution that results in supply of incompetent varieties in the rice sector.
  - ✓ Inadequate involvement of the private sector in variety development including rice varieties
- Lack of competitive, location based recommended and multi-trait inclusive rice varieties
- Inadequate market orientation in variety development
- Poor knowledge in rice seed and extension systems across the value chain limits the popularization and utilization of seeds of released varieties
- Lack of effective demand assessment for rice seed resulted in poor level of engagement of seed companies in rice seed production and marketing
- Lack of special financial inclusion specific to rice, unlike other crops such as coffee

### **<Fertilizer>**

The fertilizer supply chain is characterized by its weak capacity with the following major bottlenecks:

- Lack of working policy environments that encourage private engagement in fertilizer value chain contributes to low fertilizer technology usage in the rice sector
- Lack of accuracy in rice fertilizer demand assessment
- Lengthy processing time in fertilizer supply chain
- Inadequate supply of fertilizer in amount and kind in rice ecologies
- Lack of alignment with the crop calendar and it is not price signal inclusive
- Recommended fertilizer rates for rice are not well popularized and usage is often below the expected levels

### **<Pesticide>**

The challenges in pesticide supply and usage include:

- Weak regulatory system for monitoring the quality of available agro-chemicals
- Intrusion of unregistered pesticides and low quality pesticides in the market
- Environmentally and economically inadequate pesticides

## **(2) Interventions Described in NRDS2**

### **<Seed>**

The targets for the usage of certified seeds are set as percentage of the projected area under rice cultivation. The assumption for certified seed use for the year 2020 to 2024 is 10% of the total cultivated area. At 2027, it is projected that it will be increased to 20% and by the end of 2030 it will reach to 30% of the total cultivated area. It is also understood that requirement of upstream classes of

Breeder, Pre-basic and basic seed can be established based on the certified seed projections and effective seed usage during implementation. It is assumed that supply of certified rice seeds by seed firms will increase in the coming years due to various policy interventions and aggressive promotional activities.

Certified rice seed utilization will increase in the upcoming 10 years due to the interventions mentioned herein below.

- Enhance knowledge on the use of quality rice seed: this includes enhancing awareness on available seeds of rice varieties to every public and private value chain actor, farmer and other stakeholder through demonstrations, trainings, mass media promotion tools
- Introduce innovative and systematic interventions that enhance improved seed utilization. This includes:
  - ✓ Design a strong variety approval & release system for rice varieties
  - ✓ Strengthen seed out-grower schemes in rice agro-ecologies, ensure quality seed production
  - ✓ Incorporate rice in seed marketing intervention of rice agro-ecologies
  - ✓ Introduce rice seed small packs through one stop shopping services
  - ✓ Support agro-dealership
  - ✓ Support Voucher Credit system in rice agro-ecologies
  - ✓ Prioritize special financial access in terms of credit or revolving fund for both farmers and rice seed producers
- Strengthen institutional capacity: This includes to enhance the rice seed production capacity of public, cooperative and private seed companies to ensure production of pre-basic, basic and certified rice seeds. Moreover, strengthen Regional & Federal Seed Certification capacities to enhance their support for quality seed supply
- Use irrigation for seed production during main cropping seasons: This includes to engage potential private grain producer companies to produce improved rice variety seeds. Moreover, it requires linking them to farmers in potential rice agro-ecologies in terms of variety popularization, awareness creation and marketing of their varieties
- Involve foreign seed companies in hybrid rice seed production and marketing: This requires creating joint venture among local and foreign seed companies, promoting engagement of foreign companies of potential rice varieties in rice seed business at local level

#### <Fertilizer and Pesticide>

Improving inorganic fertilizer and pesticide supply and utilization is one of the mechanisms that are expected to enhance production and productivity of rice in the upcoming 10 strategic years. No one expect separate intervention to supply fertilizers and pesticides for rice production. However, unlike the previous strategic years, an emphasis will be given to the following strategic interventions to transform inorganic fertilizer and pesticide utilization in the rice potential agro-ecologies.

- Improve fertilizer demand assessment mechanisms and improve awareness on utilization of fertilizer: This will be done by digitalizing the demand assessment and intensive trainings to demand assessment linked partners
- Develop a strong knowledge base at the DA level to carry out soil test-based assessment: To ensure effective fertilizer utilization, development agents will be supported to improve their knowledge in soil test through trainings and providing quick test methods. A mobile soil test will be also promoted across rice agro-ecologies. Moreover, wide scale promotions and demonstrations will be carried out to improve fertilizer utilization of small holder farmers and investors
- Improve fertilizer and pesticide supply chain efficiency: This shall be achieved by incorporating fertilizer voucher system in all rice producing areas, shortening fertilizer supply chain, considering alignment to rice crop calendar, scaling up one stop shopping to ensure access of pesticides to rice growing areas, and incorporating pesticides, herbicides and other agro-chemicals in the current fertilizer supply chain.



### 1.3.4 Status of Implementation of Grants to Assist Poor Farmers

Second Kennedy Round (2KR) grant aid for the Ethiopia started in 1981, and the assistance has been implemented more consistently and continuously in comparison to the other African countries. The aid continued even after the scheme shifted from “Grand Aid for the Increase of Food Production” to the “grant assistance for underprivileged farmers” in the year 2005. The main component of the assistance was predominantly confined to the procurement of fertiliser. The following table indicates the past result of the 2KR grant aid.

**Table 1.2 Past result of 2KR grant aid for Ethiopia**

Year	1981~2005	2007	2009	2011	2012	Total
E/N basis (million yen)	14,048	450	590	490	490	16,068
Procured item	Fertilizer, Agricultural machinery	Fertilizer	Fertilizer	Fertilizer	Fertilizer	—

Source: JICA Preparatory survey report for 2KR in Ethiopia, MOFA data book of Official Development Assistance by country

The scheme aimed to increase the production of target crops by applying fertilisers, and hence, the fertilisers were the main target procurement items. The target crops for the grant aid were Teff, Maize, Sorghum, Wheat, and Barley. The main target areas were the Amhara region with high agricultural potential, the Oromia region, the South ethnic region, and the Thigulai region.

According to the “basic research report for the assistant of small scale farmers institutional design”, the price of procured fertilisers was lower than the regular fertiliser market price, and the procured fertiliser has overwhelming competitiveness compared to other market crops. Due to such situation, private fertiliser importers insisted that the scheme constitutes the development of the private business is bad practice from the scheme. Meanwhile, positive opinion was raised from agricultural cooperatives and the government side. Although Ethiopia repeatedly witnessed the occurrence of drought and serious famine caused by a plague of mobile pests, the counterpart fund was utilised for emergency food supply.

The implementing agency of this program was the Ministry of Agriculture. The planning and Programming Department under the ministry controls the program's implementation, and Agricultural Input Marketing Department controls the distribution of fertiliser, agrochemicals, and quality seeds. Procured fertilisers were distributed and sold by subcontracted national enterprise i.e. the Agricultural Input Supply Enterprise.

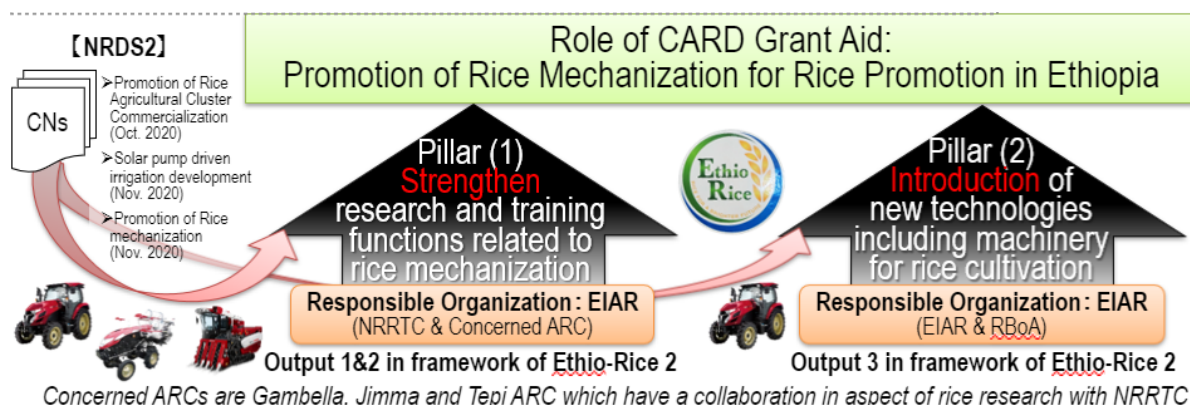
## 1.4 Proposed Project Plan: Project for Support of Promotion of Rice Mechanization

### 1.4.1 Overview of the Survey Area

#### (1) Project Outline

- Country Name: Federal Democratic Republic of Ethiopia
- Project Site: Fogera, Amhara Region; Gambella, Gambella Region; Jimma, Oromia Region; Tepi, Southern Nations Region
- Project Title: The Project for Support of Promotion of Rice Mechanization
- Project Summary: The project aims to support the promotion of rice mechanization by providing necessary agricultural equipment and materials for the development, training, and introduction of appropriate technologies for agricultural mechanization at the National Rice Research and Training Center (NRRTC) and the Agricultural Research Center (ARC). The total cost of the project is roughly estimated to be 400 million yen.
- Background of Project Planning: The NRDS2 sets the goal of improving rice productivity and quality in order to reach 100% self-sufficiency in rice by 2030, compared to the current rate of 20%. Based on this, the NRDS Task Force has identified three priority areas: rice cluster commercialisation promotion, solar pump irrigation development and mechanisation promotion. Meanwhile, the supply and use of pre-harvest, harvest and post-harvest mechanisation technologies for rice is considered to be at an infant stage. JICA is implementing the Ethio-Rice project to

strengthen research and training functions for the NRRTC established by the Ethiopian Institute of Agricultural Research (EIAR) in Fogera, Amhara region, which is a suitable rice growing area. As the previous support had focused on research and training in rice cultivation at the NRRTC, Ethio-Rice 2, the second phase of the Ethio-Rice, will train NRRTC staff as trainers and disseminate the technology to farmers in Amhara region, with a view to disseminating the knowledge to external stakeholders. At the same time, the project plans to strengthen cooperation among stakeholders, including rice stakeholders other than NRRTC, and promote the use of small-scale irrigation and agricultural machinery and its proper operation and maintenance in the three priority areas mentioned above. In the area of agricultural machinery, It is planned to conduct (i) selection and development of appropriate technologies, preparation of training materials and implementation of training in NRRTC, and (ii) support for demonstration of agricultural machinery, its O&M and inspection in rice extension training areas, in order to internalise a certain level of general O&M functions of agricultural machinery into the NRRTC, which were previously outsourced while specialising in rice production. Taking into account the past findings and future activities, the draft project plan aims to equip the NRRTC as well as the ARC responsible for rice promotion in other regions with the necessary equipment including agricultural machinery and maintenance equipment to carry out these activities. On the other hand, during the interview phase, the development of production fields, including the development of solar pump irrigation, was also raised as a need, but was excluded as it is difficult to include in the proposed project plan as rice is still a new crop and the capacity of farmers to take responsibility for its operation and maintenance is still unknown.

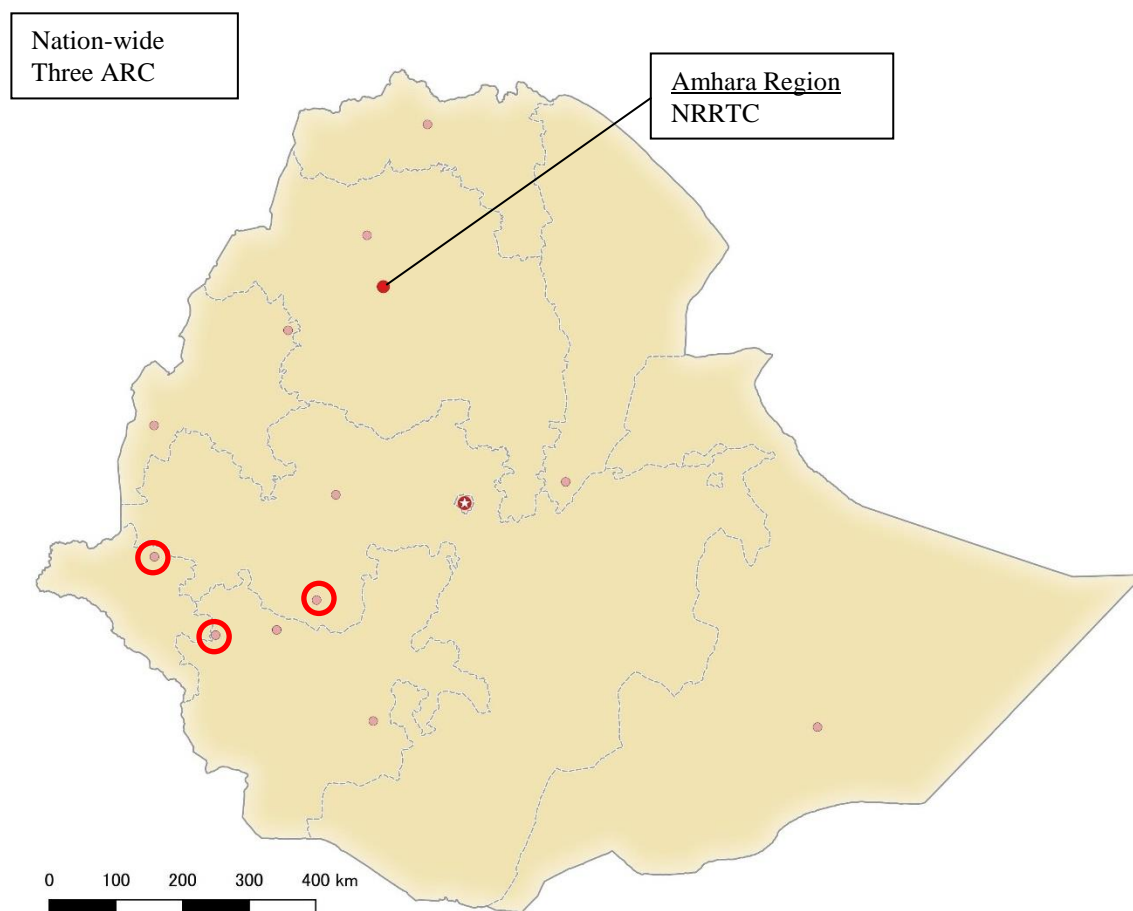


**Figure 1.6 Image of Ethiopia's CARD Grant Aid**

## (2) Project site

The target sites are Amhara, Oromia, and two other provinces.

- NRRTC: Fogera, Amhara Region;
- ARC: Gambella, Gambella Region; Jimma, Oromia Region; Tepi, Southern Nations Region



**Figure 1.1 Location of Project Site (Ethiopia)**

### **(3) Implementation/Responsible Agency**

EIAR will be the implementing agency for the project, and NRRTC will have responsibility for operate and maintain the project after its implementation.

#### **1) Ethiopian Institute of Agricultural Research (EIAR)**

EIAR is a research institute with a total of 450 researchers.

#### **2) National Rice Research and Training Centre (NRRTC)**

NRRTC is a research institute of the Ethiopian government located in Fogara District, on the eastern shore of Lake Tana, about 60 km northeast of Bahardar, the capital of Amhara State. EIAR established NRRTC in October 2017 in Fogara District, mainly with the counterpart funds. NRRTC is working on the research and its capacity building of research sector, which is one of the most prioritized issue in NRRDSE.

### **1.4.2 Current Status and Issues**

#### **(1) NRRTC**

##### **1) Outline**

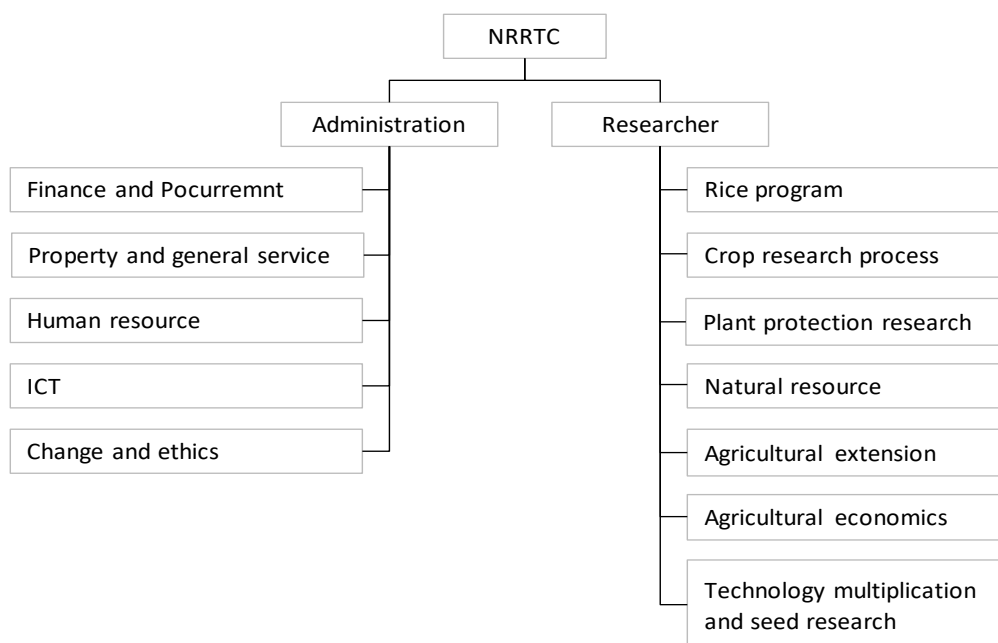
The NRRTC plays an extremely important role in rice research and development and promotion of

mechanization in the country with its rice program, agricultural extension, technology multiplication, and seed research. However, although the facility has been constructed, it does not have sufficient basic equipment and devices for research and mechanization promotion.



**Figure 1.7 Current Status of NRRTC Headquarters (Facilities)**

The organizational structure of NRRTC is shown in the figure below. Seven research departments have been established; NRRTC has 55 researchers and a total of 155 staff, including technical department staff and administrative staff.



**Figure 1.8 NRRTC Organization Structure**

**Table 1.1 NRRTC Staff Breakdown**

Staff Profile	Number of staff	Male	Female
Researcher	55	44	11
Technical support	17	15	2
Admin support	81	55	26
Tractor operator	1	1	0
Mechanic	1	1	0
Total	155	116	39

## 2) Current Status and Challenges of Agricultural Mechanization

In the rice farming area of Fogara district, where NRRTC is located, land preparation is mainly done by oxen plowing, harvesting by human labour, and threshing by oxen foot trampling, with little use of agricultural mechanization except for large-scale operations. These methods have led to delays in timely operations and limited the expansion of production areas. The public sector does not provide machinery hiring services, and it is important to extend machinery hiring services to farmers by the private sector and farmers' organizations.

The Concept Note for agricultural mechanization includes additional functions to the NRRTC, operator training, a simple equipment prototype with local application, and establishing a network with the Ministry of Agriculture and related organizations, including the private sector.

In addition, to promote agricultural mechanization, the Ethiopian government supports the provision of tax exemptions for farm machinery and long-term loans to encourage the purchase of agricultural machinery.

As for as support of agricultural machinery from other development partners is concerned, a project by Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ), has been implemented at the Kulumsa Experiment Station in Oromia Region, a subordinate agency of the EIAR, mainly concerned with the operator training for agricultural mechanization for wheat production (2011-2020). The EIAR envisages the same level of agricultural mechanization training, as of the Kulumsa Agricultural Mechanization Training Centre, will be provided at the NRRTC for agricultural mechanization of rice production.



The Kulumsa Agricultural Machinery Training Centre offers classroom and practical training for operators. It offers various courses for new operators (50-60 days) and refresher training for existing operators (3-10 days). Researchers posted at the station are in charge of classroom training, and agriculture machinery engineers are in charge of practical training. The plan is to conduct agricultural machinery training for rice production at the NRRTC using these available human resources, the curriculum, and training materials which the Kulumsa Agricultural Machinery Training Centre has already developed (it needs some additions and modifications for rice farming).

In addition, the Concept Note also considers the conduction of prototype and practical trials of simple equipment such as threshers and winnows at NRRTC to encourage the private sector to manufacture and sell it to the farmers. The project will utilize the human resources of the MERCASA Experimental Station in the Oromia Region which leads the research related to agriculture mechanization in Ethiopia. The project conducts a trial production and practical test of simple equipment using small-scale machine tools at the NRRTC.

NRRTC possess agricultural machineries (field machinery, harvesting, and post-harvest processing machinery) for testing and research but not for training or demonstration.



**Figure 1.9 Current situation of NRRTC Head Quarters (Machinery and Equipment)**

### 3)NRRTC Experimental Farm

The NRRTC headquarters is situated at the vicinity of 18 ha of test plots, which are used for experimental cultivation, research, and seed production. Of the test plots, 2 ha are irrigated by

pumping water from a deep well (118 m), while the remaining 16 ha are dependent on rainfed agriculture.

The east bank of Lake Tana, where the test plots are located, is a rice cultivation area developed on a wetland that used to become a flood plain during the rainy season, making it difficult to control drainage and causing waterlogging. In addition, the river flowing into Lake Tana, which runs north of the test site, is a seasonal river and is not suitable as a source of water for irrigation due to insufficient water availability during the dry season. In order for the test site to function as a base facility for rice mechanization, it is necessary to develop roads and plots within the test site that are suitable for mechanization and to develop new water sources. The NRRTC staff is considering using a portion of the test plot (about 1 ha) to impart training in agricultural machinery. Even if no new plots are developed for training, it should be possible to conduct research and training in agricultural mechanization.



**Figure 1.10 Test Plots at NRRTC Headquarters**



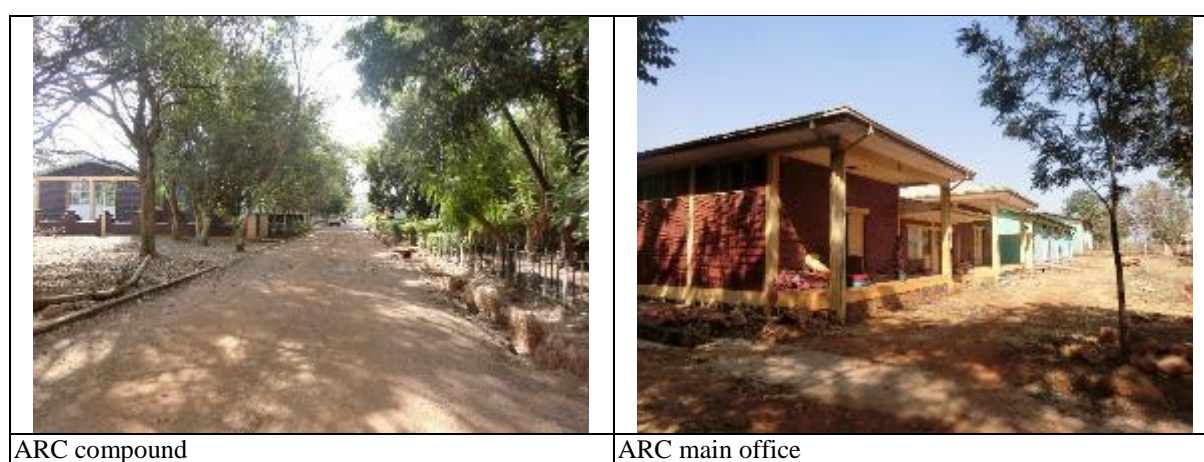
## (2) Agriculture Research Station (ARC)

### 1) Pawe ARC



**Figure 1.11 Current status of Pawe ARC**

### 2) Assosa ARC





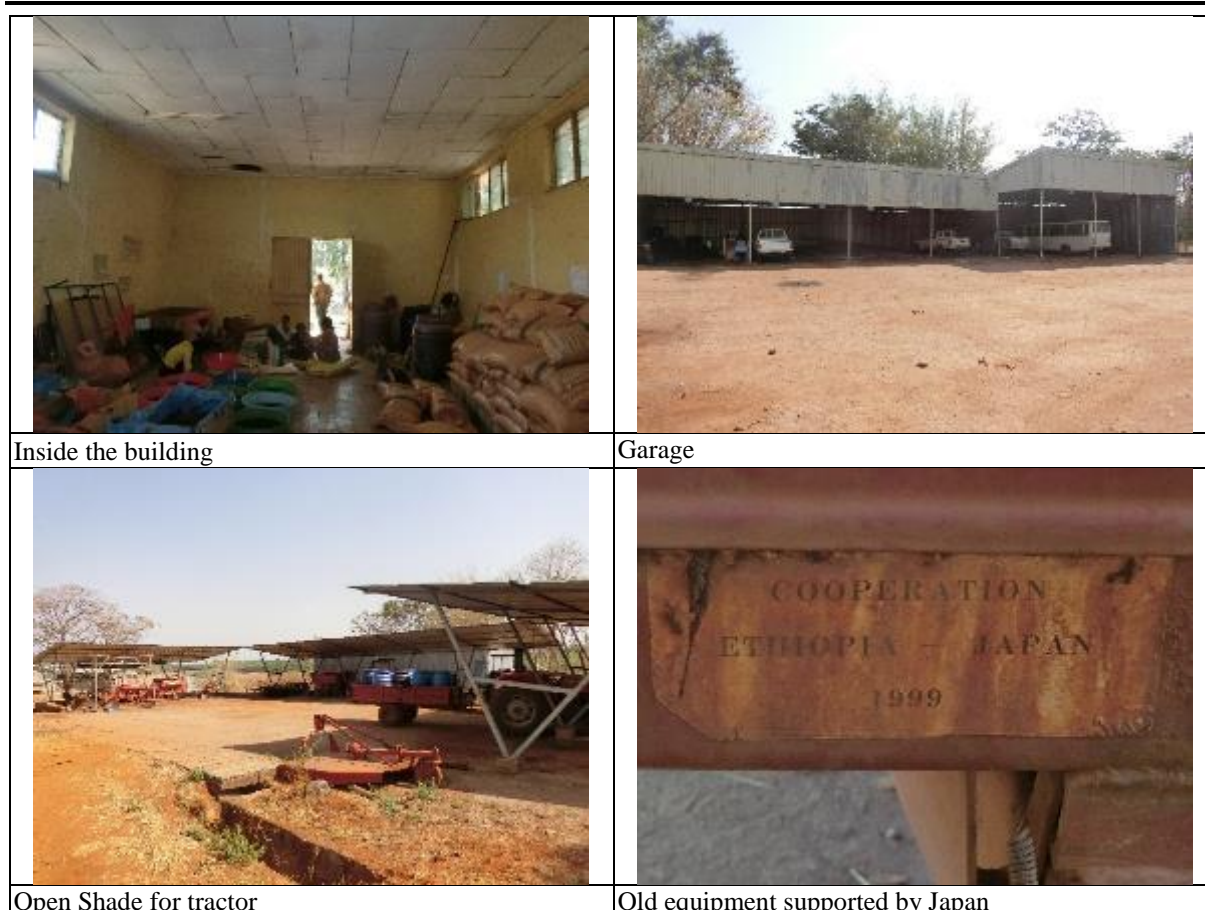


Figure 1.12 Assosa ARC

### 1.4.3 Draft Project Plan

This project will install necessary agricultural equipment and materials at NRRTC and ARC (Gambella, Jimma, and Tepi) in collaboration with NRRTC to promote the mechanization of rice cultivation. Through cooperation with Ethio-Rice, the project will increase rice production in the country by strengthening appropriate technology development, training, and referral functions.

#### (1) Component

Table 1.2 Details of machinery and equipment

Name	Item	Specification
Fogara	Tractor	Tractor (100os), disk plow, rotary tiller, harrow, seeder, broadcaster
	Tractor	Tractor (40-50os), rotary tiller, harrow, seeder, broadcaster, trailer
	Transplanter	6-row transplanter, seeder for seedling tray, seedling tray
	Combined harvester	Reaper width 2m
	Batch type mobile dryer	Batch capacity 2 tons
	Machine tools	Lathe, milling machine, drilling machine, welding machine, bending machine, thread saw
	Pick-up truck	3 L Diesel engine
	Station wagon	3 L Diesel engine
	Forklift	1.5ton
	Truck for equipment	4-ton truck with aluminium bridge for loading equipment
	Laboratory equipment (paddy)	
	Inspection equipment	White rice and seed inspection equipment
	Tools for maintenance	Tool set, maintenance tools

Agri research stations	Tractor	Tractor (1000s), disk plow, harrow
	Laboratory equipment (paddy)	
	Inspection equipment	White rice and seed inspection equipment
	Tools for maintenance	Tool set, maintenance tools

## (2) Soft Component

Technical guidance on equipment operation and maintenance: guidance on the basic knowledge and skills required to operate and maintain equipment related to various types of agricultural machinery, post-harvest processing and machine tools.

## (3) Project Cost Estimation

The total project cost is estimated at 400 million yen.

**Table 1.3 Proposed Estimated Project Cost of CARD Grant Aid in Ethiopia**

	Item	Amount (million JPY)
1)	Cost for equipment	341
2)	Soft component	-
3)	Costs for detailed design and supervision	25
4)	Contingency	34
	Total	400

## (4) Expected Outputs

### 1) Quantitative Effect

The quantitative evaluation assumes the following.

**Table 1.3 Indicators for Quantitative Evaluation of CARD Grant Aid in Ethiopia**

Indicator	Baseline value (actual value in 202X)	Target value (202X) (3 years after project completion)	Remark
Total number of trainees (persons/year)	To be confirmed		
Total number of training session (times/year)			

### 2) Qualitative Outputs

Dissemination of mechanization of rice farmers in the vicinity through training and introduction of new technologies conducted within and outside the NRRTC (details to be confirmed in the preparatory survey)

## (5) Tentative Schedule

The overall schedule is shown in the figure below, and is expected to take approximately 15 months from the Exchange of Note (E/N) to the completion of the project.

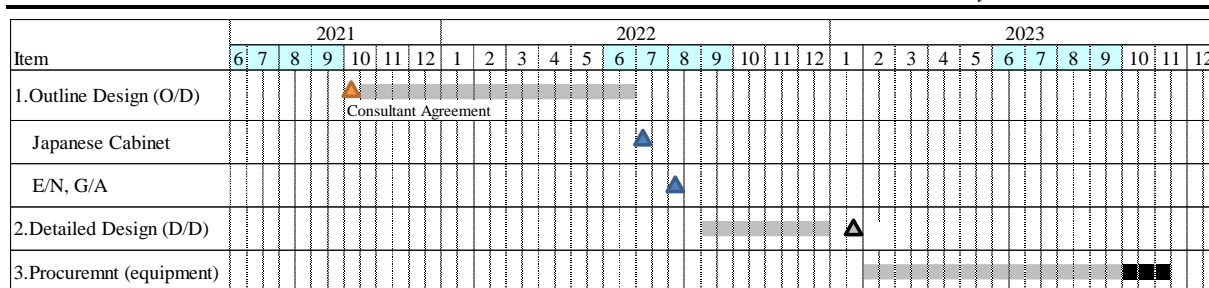


Figure 1.13 Tentative Overall Schedule (Ethiopia)

#### (6) Obligation of Recipient Country

- Assignment of a person in charge during project implementation
- Installation of commercial power supply to the facility
- Maintenance of facilities and equipment after construction

#### (7) Points to Note

The following are issues and points to be considered in conducting the preparatory survey for future cooperation and in implementing the proposed cooperation menu.

- Facility construction projects where the period of stay of Japanese experts exceeds 8 months were excluded from the scope of this project in consideration of local conditions.
- Two local sites were remotely surveyed as samples. However, the three candidate sites, which were not surveyed during this survey should be surveyed at an early stage of the preparatory survey to confirm the components.

## Chapter 2 Madagascar

### 2.1 Outline of Madagascar

#### 2.1.1 Natural Conditions

##### (1) Topography

Madagascar is an island nation measuring approximately 1,600 km from north to south and 570 km from east to west, with a total area of 587,040 km<sup>2</sup>. Madagascar covers an area of 587,040 km<sup>2</sup>. The island of Madagascar is roughly divided into the Central Highlands, with its highest peak at 2,876 m above sea level, and asymmetrical overseas regions to the east and west.

##### (2) Weather Conditions

Madagascar receives an average of 1,513 mm of precipitation per year. However, some places on the island suffer water shortages due to large temporal and spatial rainfall disparities, and hence, resulting in four climatic zones:

- The eastern coast area has the tropical humid climate: the rainfall is over 1,500 mm/year with one (1) or two (2) dry months and the temperature of the coolest month is 15°C.
- The central highlands regions have a tropical climate with altitude of 900 to 2,000 m: the pluviometry is higher than 1,500 mm/year with four or five dry months and the temperature of the coolest month is between 10°C and 15°C.
- The western coastal region have a dry tropical climate: the rainfall is less than 800 mm/year with eight dry months.
- The southern area has a semi-arid climate: the rainfall is less than 400 mm/year with eight dry months and the temperature of the coolest month is 20°C.

The Figure on the right shows the monthly average temperature and rainfall for 30 years in Antananarivo (1,276 m above sea level). It is clearly divided into the rainy season from November to March and the dry season from April to October. The average annual rainfall in Antananarivo is 1,727 mm.

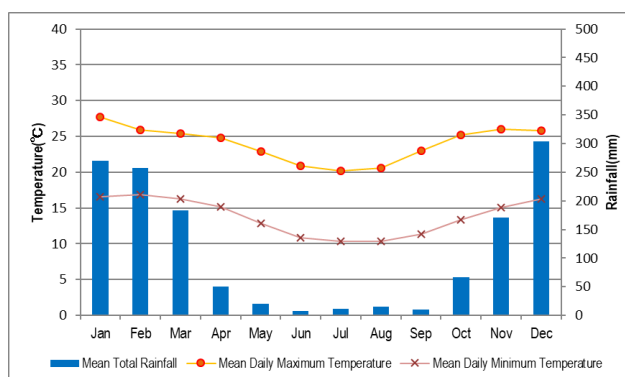


Figure 2.1 Temperature and Rainfall in Antananarivo

Madagascar was one of the fastest growing economies in Africa in the 1960s, but political turmoil in 2009 caused the economy to stagnate, with a gross national income per capita of only about US\$400 (2017). About 75% of the population lives on the international poverty line (US\$1.90 per day), making it one of the poorest countries in the world. The main industries are agriculture, forestry, fisheries, mining, and tourism.

#### 2.1.3 Agricultural Condition

Approximately 64% of the working population is engaged in agriculture, but agriculture accounts for only 23.2% of GDP. In the background, it has been pointed out that there are significant problems with agricultural productivity and underdeveloped infrastructure. The low productivity of rice, the most important crop in Madagascar, is also a problem.

## 2.2 Outline of Agricultural Sector

### 2.2.1 Laws, Policies and Development Plan Relating to the Agricultural Sector.

The new government established in January 2019 has developed a national vision, “The Initiative for the Advancement of Madagascar 2019-2023 (Initiative Emergence Madagascar: IEM)”, and the National Development Plan is being revised. The Plan Emergence Madagascar (PEM), which translates the IEM into a national strategy and provides a framework for future development planning, is under development and a preliminary version was released in October 2019. The PEM aims to boost agricultural exports as well as self-sufficiency in rice production as a means of agriculture and food security.

The Ministry of Agriculture, Livestock and Fisheries (Ministère de l'Agriculture et de l'Elevage et de la Pêche: MAEP) has announced the "Contrat Programme MAEP 2019". The strategic objectives related to the rice sector include the objectives and action plans set forth in Strategy 19: Promoting Rural Development. The MAEP's National Strategy for Agribusiness (SNAB) is also currently being developed.

The MAEP has prepared a "100 Days Report" (100 jours), which outlines the development plan and progress of the agricultural sector during the first 100 days of the new administration. The report includes targets and action plans for the governance, agricultural sector, livestock sector, and the fisheries sector, as well as the progress for each action plan. The action plan for the rice sector includes the rehabilitation and construction of irrigation facilities, including a list of candidate areas covering 100,000 ha, dissemination of the ‘Système de Riziculture Intensive (SRI) technology’ to support rice sector development, and the JICA technical cooperation project "Central. In addition to the renovation and construction of the rice sector, the project also supports the dissemination of the technology established in the JICA technical cooperation project “Projet d'Amélioration de la Productivité Rizicoles sur les hautes terres centrales (PAPRiz)” for the purpose of the production of original seeds, the creation of soil fertility maps, and the dissemination of rice productivity improvement technology. The table herein below shows the degree of achievement of each action plan listed in MAEP 2019 annual activity report published in January 2020.

**Table 2.1 Strategies for the Rice Sector in the MAEP Program Agreement 2019**

Strategy	Strategy 19: Promote rural development				
Goal	Objective-1: Achieve self-sufficiency in rice by June 2020, 60 years after independence.				
Expected Output	Increase production of unhulled rice by 500,000 tons (325,000 tons of milled rice) by June 2020.				
Action Plan	Indicators	Target	Achievement	Percentage of Achievement	
Strengthen dissemination of SRI	Train 15,000 model farmers and extension workers in 22 prefectures	15,000 farmers	8,111 farmers	54%	
	Increase production by 3t/ha on 90,000 ha through SRI	90,000 ha	39,674 ha	44%	
Rice farming contests	220 farmers were awarded in 22 provinces	220 farmers	318 farmers	144%	
Rehabilitation of small and medium irrigated areas	50,000 ha rehabilitation project started	50,000 ha	36,507 ha	73%	
	Completion of renovation of 35,000 ha	35,000 ha	25,464 ha	73%	
Development of new large-scale irrigation areas	Selection of development areas for 30,000 ha and commencement of surveys	30,000 ha	50,000 ha	167%	
	Completion of development of 10,000 ha	10,000 ha	10,480 ha	104.8%	
Expansion of upland rice cropping area	50,000 ha upland rice cropping implemented	50,000 ha	23,568 ha	47%	
	Start packs distributed to 25,000 upland rice farmers	25,000 farmers	5,365 farmers	21%	

Source : MAEP Contrat Programme 2019, Rapport Annuel 2019 and "Data collection survey on rice production and distribution in Madagascar" Final Report

## 2.2.2 Implementation Status of the NRDS

Under the NRDS 2016-2020, the six strategies pertaining to seed, fertilizer, irrigation, farm mechanization, rural finance, and agricultural extension had been the pillars of the NRDS. However, as mentioned above, the IEM was formulated by the new government, which prompted a revision of the NRDS.

## 2.2.3 Rice Food Value Chain Analysis

In Madagascar, rice cultivation accounts for about 40% of the total arable land, and the total production of unhulled rice is 4.03 million t/year (2018) and consumption is about 100 kg/person/year, both the highest in Africa. In addition, about 75% of the production is consumed domestically, and rice farmers depend on rice for about half of their household income, making it extremely important not only for food security purpose but also for farm household management. However, although about 80% of all rice cultivated land is irrigated, including traditional irrigation, the average yield is less than 2.7 t/ha, which is low for irrigated rice cultivation, and the farmers have not yet achieved self-sufficiency in rice. The shortfall in achieving self-sufficiency is covered by imported rice, which over the past five years has been imported in the quantity of 266,000 tons in 2016, 235,000 tons in 2016, 596,000 tons in 2017, 607,000 tons in 2018, and 407,000 tons in 2019. A trade-off relationship can be observed: in years when domestic production decreases (increases), the volume of imported rice increases (decreases). Imported rice is sold at a relatively low price compared to domestically produced rice due to zero tariffs, value-added taxes, and import fees, and there is a tendency for the supply of imported rice to increase during the off-seasons when domestically produced rice is less available in the market.

The factors that contribute to the failure to achieve self-sufficiency include challenges at each stage of the value chain, but the priority of these challenges differs from region to region due to differences in socioeconomic conditions and stages of development in each region. In the information gathering and verification survey<sup>3</sup> conducted by JICA, the challenges at each stage of the value chain in the six regions selected as having high potential for rice production (Analamanga, Alaotra, Mangoro, Vakinankaratra, Boeny, Menebe, and Sofia) and the measures to improve them were summarized. Furthermore, based on the national strategy, the report identified directions for cooperation to achieve self-sufficiency in rice and to promote the rice industry in Madagascar. The following is a summary of the report.

**Table 2.2 Value Chain Stage-Specific Improvement Proposals**

Stage	Increasing rice production to achieve self-sufficiency.	Improvement of the value chain to promote the rice industry
Agricultural inputs	<ul style="list-style-type: none"> <li>Promotion of the use of organic fertilizers</li> <li>Purification, production, and distribution of superior seeds</li> <li>Development of disease and blight resistant varieties</li> </ul>	<ul style="list-style-type: none"> <li>Support for building mutual trust among material wholesalers, material retailers, and producers (holding forums for all parties concerned)</li> <li>Strengthen enforcement against unauthorized dealers of agricultural materials</li> </ul>
Production	<ul style="list-style-type: none"> <li>Improvement of agricultural technology extension system and extension content</li> <li>Selection of recommended varieties, establishment of cultivation calendar and fertilizer application methods</li> <li>Creation and dissemination of recommended cultivation calendar</li> <li>Dissemination of proper use of agricultural</li> </ul>	<ul style="list-style-type: none"> <li>Agricultural Machinery Installation and Service Provider Training</li> </ul>

<sup>3</sup> Republic of Madagascar, study on the potential for better production and distribution of the rice sector in 2020

Stage	Increasing rice production to achieve self-sufficiency.	Improvement of the value chain to promote the rice industry
	<ul style="list-style-type: none"> <li>chemicals</li> <li>Irrigation development (irrigation district renovation and new development, improvement of irrigation maintenance and management capacity (strengthening of water users' associations))</li> <li>Improvement of production environment (field preparation for mechanization, improvement of soil fertility, establishment of rational fertilizer application methods, soil conservation, conservation of forests in watersheds (including prohibition of open burning), establishment of environmentally friendly pest control methods)</li> </ul>	
Post harvesting	<ul style="list-style-type: none"> <li>Reduction of post-harvest losses (introduction of engine threshing machines, countermeasures against storage pests such as coccoliths, drying areas (installation of concrete yards))</li> </ul>	<ul style="list-style-type: none"> <li>Support for establishing a joint shipping system through a community warehouse</li> <li>Support for introduction of high-performance rice milling machines</li> <li>Improvement of rice milling machine technology for export</li> </ul>
Distribution		<ul style="list-style-type: none"> <li>Support for Strengthening PCP-Riz</li> <li>Support for matching farmers and distributors</li> <li>Distribution infrastructure development (roads)</li> <li>Distribution security enhancement</li> </ul>
General	<ul style="list-style-type: none"> <li>Building a database to support strategy development in high-potential regions</li> <li>Strengthening the organization of CFFAMMA</li> <li>Improvement of FOFIFA operations (Strengthening national resilience)</li> </ul>	

Source: "Data collection survey on rice production and distribution in Madagascar", Final Report

## 2.2.4 Progress of Support to Rice Sector

JICA has been cooperating with Madagascar as the first group of CARD countries in terms of development and dissemination of appropriate cultivation technologies and watershed management. As of 2020, two technical cooperation projects (one of them is SATREPS) and one grant aid project are being implemented in the rice sector. The main aid agencies currently implementing activities related to the rice sector are IFAD, AFD, and AfDB.

**Table 2.3 List of Project for rice sector in Madagascar**

Partner	Project	Summary
FIDA (IFAD)	AD2M (Projet d'Appui au Développement du Menabe et du Melaky – Phase II) Period : 2016~2023	<p>The following activities will be carried out in Migodo I and II irrigation districts in Menabe and Melaky prefectures.</p> <p>Rehabilitation of irrigation facilities (Phase I started in 2010, irrigable area expanded to 2,450 ha)</p> <p>Strengthening of water management organization and training of farmer leaders</p> <p>Dissemination of SRI/SRA through Farmer Field School (Champ Ecole Paysan; CEP)</p> <p>Promotion of vegetable crops such as beans and onions during the non-rice cropping season</p> <p>Financial inclusion through collaboration with CECAM</p> <p>Land security using aerial imagery</p> <p>Improved material distribution through support to agricultural</p>

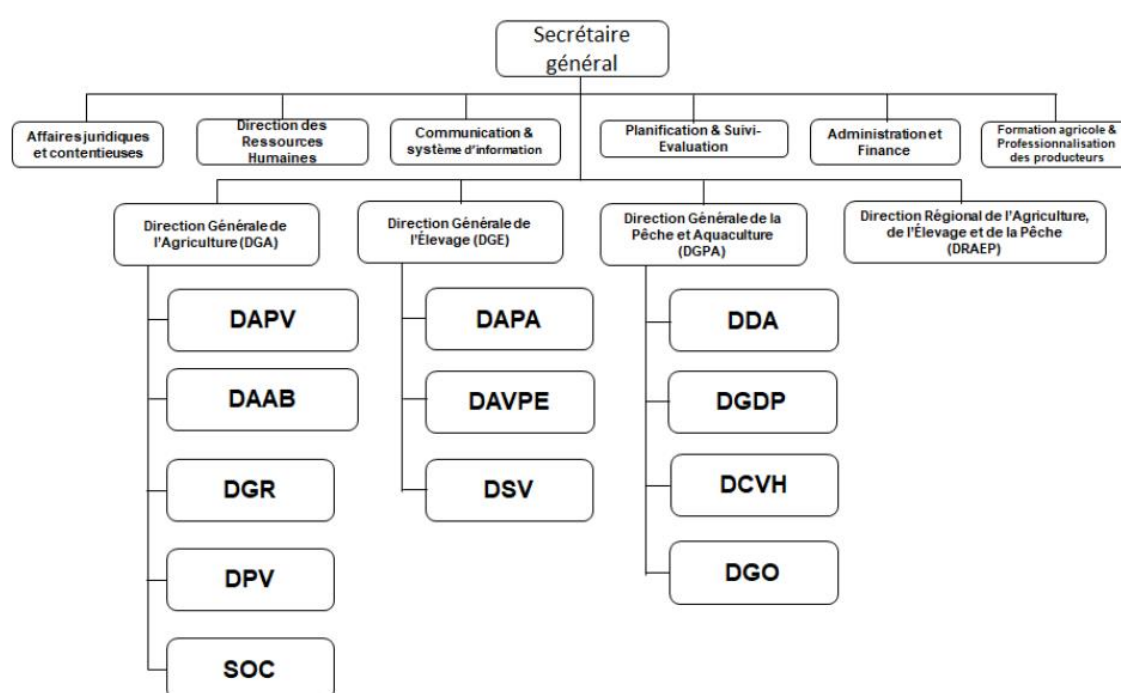
Partner	Project	Summary
		input stores Nutrition improvement Promotion of compost production technology and agricultural mechanization Fruit tree cultivation and afforestation The project has contracted with 4 NGOs through QCBS procurement and is working with about 82 NGO personnel, including 40 agricultural technicians, 36-37 social organizers, and 5-6 agricultural civil engineers. agricultural and civil engineers.
AFD (FDA)	PAPAM (Projet d'Amélioration de la Productivité Agricole à Madagascar) Period : 2016~2020	Activities aimed at improving agricultural production and farm income with a focus on "agro-ecology" in the districts of Alaotra Mangoro, Vakinankaratra, Atsinanana and Vatovavy Fitovinany. <ul style="list-style-type: none"> <li>• Reinforcement of diversity and agro-ecological systems in production activities in districts where existing irrigation facilities have been renovated.</li> <li>• Promotion of agro ecology and reforestation, including the use of firewood in terms of environmental protection</li> <li>• Strengthening of FDA/CSA/farmer organizations</li> </ul>
AFD (FDA)	PADAP (Projet Agriculture Durable Par une Approche Paysage) Period : 2019~2022	Implemented sustainable agricultural development through a "landscape approach" in Sava, Analanjirifo, Sofia, and Boeny provinces. <ul style="list-style-type: none"> <li>• Improve irrigation access and disseminate sustainable agricultural technologies</li> <li>• Promotion of sustainable watershed management by local people</li> </ul>
BAD (AfDB)	PROJERMO (Projet Jeunes Entreprises Rurales du Moyen Ouest) Period : 2016 ~2021	Conducted the following activities in Bongolava and Amoron'i Mania provinces <ul style="list-style-type: none"> <li>• Capacity building of youth and support for entrepreneurship</li> <li>• Rehabilitation of irrigation facilities covering 2,100 ha</li> <li>• Supporting producers through MAEP technicians</li> </ul>
BAD (AfDB)	PEPBM (Projet d'Extension du Périmètre du Bas Mangoky) Period : 2015~2021	The following activities were carried out in Atsimo Andrefana Province Rehabilitation (5,000 ha) and construction of new irrigation facilities (3,400 ha: final planned area) using the Bas Mangoky River as a source of water <ul style="list-style-type: none"> <li>• Training of rice growers</li> <li>• Promotion of seed cultivation</li> <li>• Introduction of agricultural machinery loan system</li> </ul>
BAD (AfDB)	PRIASO (Projet de réhabilitation des infrastructures agricoles dans le Sud-Ouest) Period : 2014~2019	The following activities were carried out in the province of Atsimo Andrefana <ul style="list-style-type: none"> <li>• Irrigation rehabilitation (5,000 ha) and new development (4,500 ha) in Manombo</li> <li>• Irrigation rehabilitation in Bezaka (2,440 ha)</li> </ul>
BAD (AfDB)	PATASO (Projet d'Appui à la Transformation Agro-industrielle dans le Sud-ouest) Period : 2020	The following activities will be carried out in the province of Atsimo Andrefana <ul style="list-style-type: none"> <li>• Construction of four (4) agricultural centers to make effective use of the irrigation facilities newly constructed or rehabilitated by PEPBM and PRAISO, and support in the areas of product processing, agricultural materials supply, production technology, and organization. One of the centers will be located on the site of the PEPBM project construction management office (3 ha).</li> </ul>

Source: "Data collection survey on rice production and distribution in Madagascar" Final Report



## 2.2.5 Implementation Structure of Rice sector

The MAEP, which has jurisdiction over the agricultural sector, was created by the reorganization of ministries after the new government took office in 2019, merging the former Ministry of Agriculture and Livestock and the Ministry of Fisheries. Departments related to the rice sector include those directly under the Directorate General of Agriculture (Direction Générale de l'Agriculture: DGA), and for rice production, those under the Directorate General of Agricultural Production (Direction d'Appui à la Production Végétale: DAPV). For rice production, it is the Service d'Appui au Développement et Promotion Rizicole (SPDR) of the Department of Agricultural Production Végétale (DAPV); for irrigation development, it is the Direction du Génie Rural (DGR) of the Department of Agricultural Works (DGR); and the Seed Inspection Service (Service Officiel de Contrôle des Semences et matériel végétal (SOC)) for seed certification. In addition, the Department of Agribusiness (Direction d'Appui à l'Agro-Business: DAAB) has been established to promote the rice industry by improving the rice value chain. The Formation Agricole & Professionnalisation des Producteurs (FAPP) is also involved in the dissemination of rice farming technology.



Source: "Data collection survey on rice production and distribution in Madagascar", Final Report

**Figure 2.2 Organization Map of MAEP**

In addition to these MAEP-related departments, there are related major organizations. Some of the major organizations are public institutions that can be engaged in for-profit activities in the form of EPIC (Etablissements Publics à caractère Industriel et Commercial), and EPIC is required to cover its own costs for its activities, other than staff salaries, through its own for-profit activities. In contrast, the non-profit organizations are called EPAs (Etablissements Publics à caractère Administratif). The main organizations are listed below.

**Table 2.4 Organizations associated with the rice sector (Madagascar)**

Category	Name of Organization	Type
Agricultural Development and Extension	Agricultural Service Center (Centre de Services Agricoles: CSA)	NGO
	Agricultural Development Fund (Fonds de Développement Agricole: FDA)	EPA
Seed Production	FOFIFA (Foibe Fikarohana momba ny Fambolena sy Fiompihana Ampiharina ho Fampandrosoana ny eny Ambanivohitra)	EPIC

Category	Name of Organization	Type
	FIFAMONOR (Fiompianasy Fambolena Malagasy Norveziana)	EPIC
	Group of Seed Producers (Groupement des Producteurs Semenciers : GPS)	Cooperative or Company
	Seed Multiplication Centre (Centre Multiplicateur de Semences: CMS)	EPIC
Agricultural Machinery	Centre for Manufacturing, Training and Application of Agricultural Machinery and Mechanization (Centre de Fabrication, de Formation et d'Application du Machinisme et de la Mécanisation Agricole : CFFAMMA)	EPIC
Platforms	PCP-Riz (Plateforme de Concertation et de Pilotage de la filière Riz)	-
Financial Institutions	Otiv, CECAM (Caisse d'Epargne et de Crédit Agricole Mutuels) etc.	Cooperative or Company
Irrigation Association	Each irrigation district	-

Source: "Data collection survey on rice production and distribution in Madagascar" Final Report

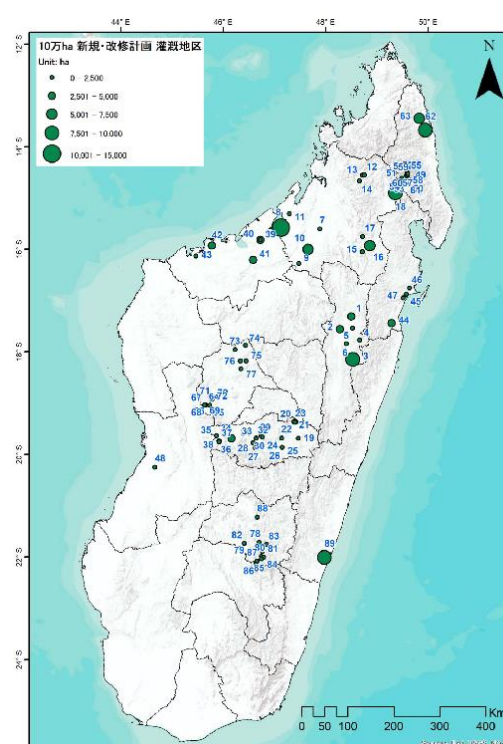
## 2.3 Current Status and Issues in the Agricultural Sector

### 2.3.1 Irrigation Facilities

#### (1) Current Situation

Irrigation districts are defined by the MAEP Department of Agriculture and Civil Engineering as large irrigation districts (>2,000 ha), medium districts (>100 ha and <2,000 ha), and small districts (<100 ha). There are 3,891 irrigated districts nationwide, and the number of districts by size is 45, 1,302, and 2,252 for large, medium, and small districts, respectively. The number of irrigated sites is as follows: 60% of the total irrigated sites are under 100 ha, 17% are between 100 ha and 200 ha, and 77% are under 200 ha. The surface of irrigated sites under 200 ha accounts for 28% of the total irrigated area. In terms of the distribution of irrigated districts by province, the largest number of irrigated districts are in Haute Matsiatra, followed by Vakinankaratra, Analamanga, and Amoron'i Mania, with small irrigated districts concentrated in these provinces (JICA<sup>4</sup>, 2020).

Rice cultivation in Madagascar is characterized by irrigated rice cultivation using rivers as the main source of water in the low-lying areas of the north-western and south-western provinces, irrigated areas in the vast plains around Lake Arocha, and small-scale irrigation facilities in the mountains, which are often found in the central highlands. As shown in the figure above, MAEP's "100-day Report" cites the rehabilitation of large-scale irrigation areas around Lake Arocha in the northwest and northeast and the development and rehabilitation of small-scale irrigation facilities in the central highlands. As for the water management and maintenance of the irrigation system, the government is in charge of the major facilities, while the water user associations are in charge of the rest.



Source: JICA, 2020

**Figure 2.3 Irrigation Development/Rehabilitation Candidate Sites Shown in MAEP 100-day Report**

<sup>4</sup> JICA, 2020, Etude sur le potentiel pour une meilleure production et distribution de la filière riz

## **(2) Challenge**

The JICA survey report<sup>4</sup> describes the characteristics and issues in each surveyed area, and the following issues can be extracted related to the construction, operation, and maintenance of irrigation facilities in the country.

- Necessity of rehabilitation due to deterioration of irrigation facilities
- Sedimentation in canals due to soil erosion in river basins
- Strengthening of maintenance and management systems by water users' associations
- Destruction of farmland due to urbanization in the suburbs of the capital city

### **2.3.2 Agricultural Machinery**

The number of oxen in farming villages is decreasing, and in some large irrigated areas, the area of farmland per farmer exceeds 2 ha. Such phenomenon has made it impossible to complete the plowing and paddling work for the second crop season in a short period using oxen and human labour. Furthermore, rising wages for farm labourers have created a demand for farm labour contractors, and the need for agricultural mechanization has increased. On the other hand, in irrigated areas developed from the 1960s to the 1990s, paddy fields are not levelled, and the plots are too small, which inhibits the promotion of mechanization.

The Centre de Fabrication, de Formation et d'Application du Machinisme et de la Mécanisation Agricole (CFFAMMA). CFFAMMA is one of the organizations involved in agricultural machinery. The organization's three main business pillars are-

- Human resource development for agricultural mechanization
- Development, manufacture, and sale of agricultural machinery, with associated technical assistance to private manufacturers, and certification of agricultural equipment
- Lending large agricultural machinery for a fee and producing agricultural products at their farm

The business activity of CFFAMMA, a public organization that can operate as a for-profit EPIC, is profitable, which is unusual for a government-related organization. Its primary source of income used to be from the manufacture and sale of agricultural machinery. In recent years, a large portion of its income has come from providing operator training for construction equipment and large agricultural machinery and procurement of services with these machines. In addition, the demand for agricultural machinery in rural areas is more than supply as there are few mechanics available, and human resource development for repair and maintenance has become an issue. The roles of CFFAMMA as the human resource development organization are still important.

### **2.3.3 Agricultural Inputs**

#### **(1) Certified Seed Distribution**

In Madagascar, FOFIFA maintains rice breeder and primary seed and produces primary seed from original seed. This original seed is purchased by seed production companies, grower groups, and individual growers for seed multiplication. Seed producers who purchase the original seed and propagate certified seed under the guidance and control of SOC seed inspectors. There are 105 officially appointed SOC seed inspectors nationwide (as of June 2019). A seed law is also in place and the process for seed certification is stipulated by law, but due to shortfalls in government budget, the application of the law is not being complied with; SOC lacks inspection equipment and materials, and the necessary transportation and travel allowances to conduct inspections in the field are not being provided. This has resulted in low quality certified seed and created problems of having non-certified seed being distributed as certified seed. The following table shows irrigated rice seed production over the past three years.

**Table 2.5 Seed production performance of irrigated rice varieties**

2016				2017				2018			
Number of seed producers	Number of certifications	Area (ha)	Production (t)	Number of seed producers	Number of certifications	Area (ha)	Production (t)	Number of seed producers	Number of certifications	Area (ha)	Production (t)
98	288	300.1	936.8	78	253	306	1061.2	71	259	316.2	1128.7

Source: "Data collection survey on rice production and distribution in Madagascar" Final Report

Considering the use of certified seed for rice cultivation on an actual irrigated area of 400,000 ha, the amount of certified seed needed per year would be 12,000 tons, assuming a seeding rate of 30 kg per ha. With good field management, the quality of certified seed can be maintained for about three crops after one renewal, and thus, 4,000 tons of certified seed would be required if the seed were renewed at every three crop cycle. As shown in the table above, certified seed production is on the increase nationwide, with approximately 1,130 tons produced in 2018, but the country has yet to secure the required 4,000 tons, which is the target quantity of certified seeds.

## (2) Fertilizer Distribution

Almost 100% of chemical fertilizers used in Madagascar are imported. Imports and sales are conducted by seven major agricultural material companies, with a nationwide sales network. There is one agricultural material company that sells domestically produced ammonium sulfate, but most of it is exported. This is due to the fact that the price competitiveness of domestically produced chemical fertilizers is not necessarily high because imported fertilizers are exempt from customs duties, value-added tax, and import fees, and because producers are not familiar with the application of ammonium sulfate as a commodity. Demand for chemical fertilizers is increasing year by year, but in many cases such fertilizers are not applied directly to rice crops because of expansiveness the producers do not have the funds to purchase them, however, applying fertilizers to back-crop vegetables and other crops also improves the growth of subsequent rice crops, leading to increased income. Some agricultural material companies promote sales by providing free instruction to growers on the use of chemical fertilizers and pest control agents, and the efforts of these private companies are contributing to increased demand for fertilizers. A business license is required to sell agricultural inputs, and while there are many retailers that pay a registration fee and sell seasonally (May to October, the peak horticultural season), there are also middlemen who sell inputs purchased from these retailers in remote rural areas without a license. The trust of producers in the quality of these products is low. In addition, few of these large agricultural supply companies deal in seeds also.

### 2.3.4 Status of Implementation of Grant Assistance for Under Privilege Farmers

Second Kennedy Round (2KR) grant aid for Madagascar has been implemented continuously from 1979 to 2004 except for the year 2002 and 2003 during the period of political confusion. The procurement for Madagascar was relatively longer and more frequent than in other African countries. The following table indicates the past result of the 2KR grant aid.

**Table 2.6 The past result of 2KR grant aid for Madagascar**

Year	1979~1998	1999	2000	2002	2004	Total
E/N basis (million yen)	6,020	400	350	400	300	7,470
Procured item	Fertiliser, Agrochemical, Agricultural machinery	Fertiliser, Agrochemical, Agricultural machinery	Fertiliser, Agrochemical, Agricultural machinery	Fertiliser, Agrochemical, Agricultural machinery	Fertiliser	—

Source: JICA Preparatory survey report for 2KR in Madagascar, MOFA data book of Official Development Assistance by country

The main 2KR programme items were agricultural machinery, including irrigation pumps, tractors,

vehicles, agrochemicals, and fertiliser. Target crops of the program were main staple crops such as rice, maize, and potato.

The implementing agency of the 2KR scheme was Ministry of Agriculture, Livestock and Fisheries (MAEP: Ministère de l'Agriculture, de l'Élevage et de la Pêche). The Department of fertiliser and agrochemical, and the department of agricultural machinery were responsible bodies for the distribution of procured items and monitoring them, respectively.

## **2.4 Proposed Project Plan: Project for Development of Seed Production Field and Facilities**

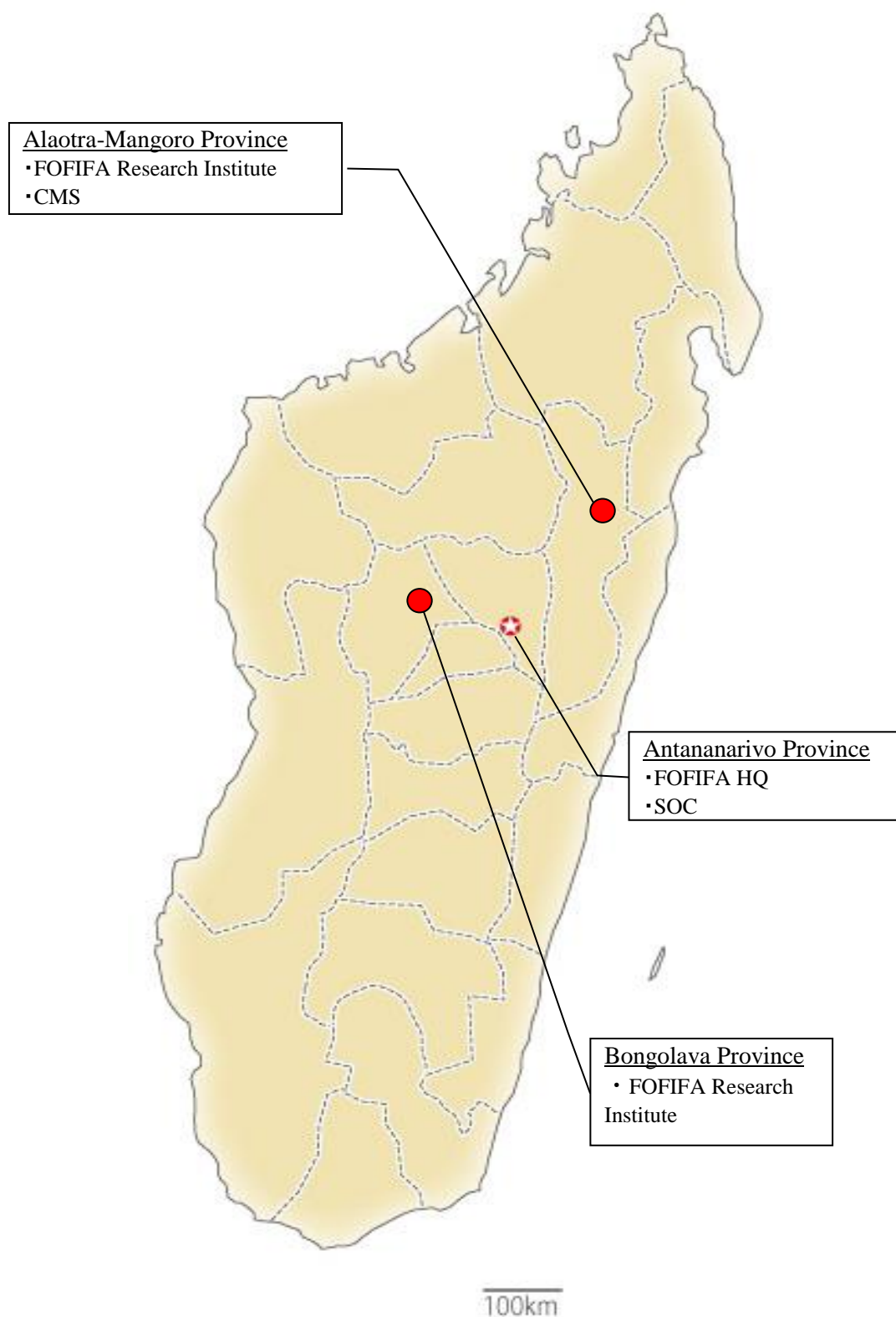
### **2.4.1 Overview of the Survey Area**

#### **(1) Project Outline**

- Country Name: Madagascar
- Project Site: Antananarivo Province, Alaotra-Mangoro Province and Bongolava Province
- Project Name: The Project for development of seed production field and facilities
- Project Summary: The project aims to increase the production of highly productive certified seeds by improving and renovating the facilities and equipment of the institutions responsible for the production and management of certified rice seeds and the original seeds necessary for the production of certified seeds, thereby achieving self-sufficiency and increasing the production of rice in the country. The total estimated project cost is approximately 1,000 million yen
- Background of Project Planning: The production system for certified seed is described as follows: National Center for Applied Research on Rural Development (FOFIFA) develops the production plan for the registered seed required for the production of certified seed and actually produces the raw seed. In addition, the Seed Production Company (SOC) is in charge of seed quality control and under its guidance, Seed Multiplication Center (CMS), seed production companies, farmer groups and individual farmers produce certified seed from the registered seed, which is then sold to rice producers. On the other hand, the FOFIFA headquarters, the two experimental and seed production sites located in Alaotra-Mangoro Province, which accounts for 50-60% of the certified seed production in the country, and Bongolava Province in the mid-western Central Highlands, which accounts for about 20%, are not productive due to deterioration of irrigation facilities, non-levelling of the fields, and lack of agricultural machinery and equipment. As a result, they are not performing to half of their expected seed production capacity. In addition, the lack of research equipment for certification and dilapidated laboratories at SOC, which is in charge of seed certification management, have made seed certification inefficient and its management system problematic. Furthermore, the CMS in Alaotra-Mangoro Province, which produces about 20% of the certified seeds in the country, owns 500 ha of paddy fields and has a production capacity of 2,000 tonnes, but productivity improvement is also an issue due to deteriorated irrigation facilities, unlevelled fields and a lack of agricultural machinery. Based on the above background, the objective of the project is to contribute to stabilising and strengthening a certified seed production.

#### **(2) Project Site**

Target areas are Antananarivo Province, Alaotra-Mangoro Province and Bongolava Province



**Figure 2.4 Location of Project Sites (Madagascar)**

### **(3) Organization**

The project implementing agency : Ministry of Agriculture and Livestock (MAEP)

#### **1) MAEP**



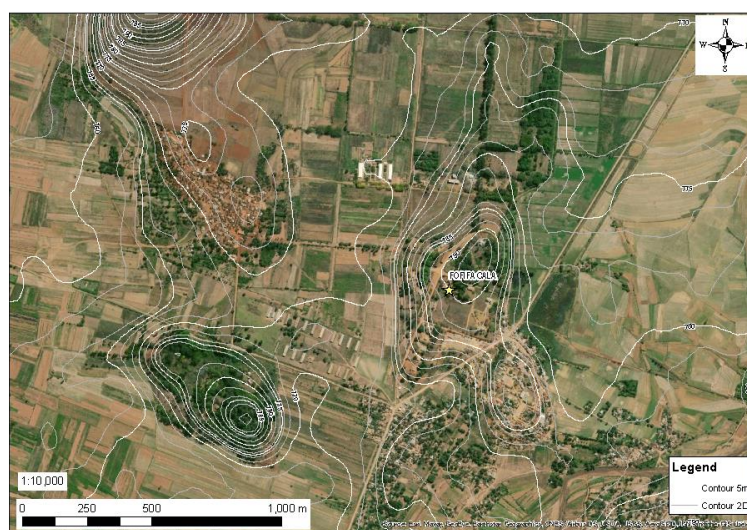
The Ministry responsible for the agricultural sector, created by the merger of the former Ministry of Agriculture and Livestock and the Ministry of Fisheries as a result of the reorganization of ministries after the new government took office in 2019. There are nine bureaus under the direct supervision of the Undersecretary to the Minister. The most relevant department for the rice sector is the Rice Crops Division within the Department of Agricultural Production of the Directorate General of Agriculture (DGA), the Department of Agricultural Engineering for irrigation development, and the Seed Inspection Office (SOC) for seed certification.

## **2.4.2 Current Condition and Challenge**

### **(1) Challenges in seed production**

The National Institute for Rural Development and Applied Research (FOFIFA) plans and actually produces the original seed required for certified seed production. The Seed Office (SOC) is in charge of seed quality control, and under its guidance, the Seed Multiplication Service (CMS), seed production companies, farmers' groups and individual farmers produce certified seed from original seed and sell it to the rice growers.

However, the test sites and seed production fields at FOFIFA headquarter, Arocha-Manggul Province, which accounts for 50-60% of the national certified seed production, and Bunguraba Province in the central highlands and mid-west, which accounts for about 20% of the national certified seed production, are not productive due to aging irrigation facilities, uneven fields, and lack of agricultural machinery and equipment. Productivity is low, and not even half of the expected seed production capacity is being realized. In addition, the SOC, which is in charge of seed certification management, has not been able to improve seed certification efficiency due to a lack of research equipment for certification and aging laboratories. Further, there are fake seeds circulating in the market under the name of "certified seeds," which is also causing problems with the management system. CMS in Alocha Manggul, which produces approximately 20% of the nation's certified seeds, has a paddy field area of 500 ha and a production capacity of 2,000 tons, but productivity improvement is an issue due to aging irrigation equipment, uneven fields, and lack of agricultural machinery.



**Figure 2.5 Location of FOFIFA**

### 2.4.3 Draft Project Plan

#### (1) Proposed Project Components

**Table 2.7 Objectives, Functions and Components of the CARD grant aid project in Madagascar**

Objectives		
To improve the production of certified seed needed to increase rice production, the project will renovate and upgrade irrigation facilities at the original seed production centre and certified seed growers.		
Components		
Item	Facilities	Content
Seed production plots	FOFIFA Bongolava Province	2 ha、
	FOFIFA Alaotra-Mangoro Province	2 ha
	CMS	550 ha
Rehabilitation of existing irrigation facilities	FOFIFA Alaotra-Mangoro Province	1 reservoir
	FOFIFA Bongolava Province	1 Permanent weir and reservoir
Rehabilitation of existing facilities	FOFIFA Head Queter	Office, etc.
	FOFIFA Alaotra-Mangoro Province	Research building, seed laboratory , seed storage, etc.
	FOFIFA Bongolava Province	Research building, seed laboratory
	CMS	Office, seed storage
Machinery	FOFIFA Alaotra-Mangoro Province	Agricultural machinery (rice transplanters, tractors, etc.)
	FOFIFA Bongolava Province	
	SOC	Inspection equipment for seed certification (dryers, chemical testing equipment, etc.), agricultural machinery (rice transplanters, tractors, etc.)

#### (2) Soft Component

The soft component will plan the following item related to the agricultural machinery to be installed.

- Reinforcement of facility maintenance and management systems

#### (3) Project Cost Estimation

The total project cost is roughly estimated as 1,000 million yen. The item and its costs will be surveyed in the preparatory survey.

#### (4) Expected Outputs

##### 1) Quantitative Outputs

**Table 2.8 Proposed quantitative Outputs of the CARD grant aid project in Madagascar**

Indicator	Reference value (Actual result in 20XX)	Target value (202X) (3 years after the project completion)	Remarks
Certified seed production (tons)	To be confirmed		
Number of seed tests by SOC (times)			

#### (5) Obligation of Recipient Country

- Assignment of a person in charge during project implementation



**(6) Points to Note**

- The effect of the rainy season needs to be taken into account when considering the schedule of civil works.

## **Chapter 3 Rwanda**

### **3.1 Outline of Rwanda**

#### **3.1.1 Natural Conditions**

Rwanda possess a moderate climate condition with two rainy seasons per year and is a landlocked country in the mountainous region of Central Africa and is known as the “Land of a Thousand Hills” for its topography. It shares borders with Uganda, Tanzania, Burundi and the Democratic Republic of Congo.

#### **3.1.2 Social Economic Condition**

Rwanda with few natural resources, is the most densely populated country in Africa (416 persons /ha). About 80% of the working population is engaged in agriculture, which accounts for 34% of gross domestic product (GDP). The coffee and tea are the main agricultural products, and the country has achieved constant economic growth since 1994, and is now globally recognized as a successful example of recovery after Rwandan Civil War.

#### **3.1.3 Agricultural Condition**

Approximately 70% of the total population lives in rural areas and 96% of rural households depend directly or indirectly on agriculture for their livelihoods. Agriculture is an important sector for poverty reduction and economic growth in rural areas, but about 56.8% of farmers cultivate less than 0.5 ha of land, and land has been progressively subdivided in recent years as the rural population has increased (the average plot size per household is 0.76 ha). Furthermore, Rwandan agriculture is characterized particularly poor use of agricultural inputs, with high risk of erosion and declining soil fertility on hillsides. Furthermore, farmers' incomes are low due to low agricultural productivity (average annual income per adult farmer is USD 194).<sup>5</sup>

### **3.2 Outline of Agricultural Sector**

#### **3.2.1 Laws, Policies and Development Plan relating to the Agricultural Sector.**

The Government of Rwanda formulated and implemented the Poverty Reduction Strategy Paper (PRSP) in the year 2002. Agriculture is one of the six key sectors mentioned in the EDPRS 2008-2012, and the Government has identified increasing agricultural productivity to boost farmers' incomes as a key priority<sup>6</sup>.

The Ministry of Agriculture and Animal Resources (MINAGRI) is in charge of agricultural policy and has jurisdiction over the Rwanda Agriculture and Animal Resources Development Board (RAB), which is in charge of cereals, and the National Agricultural Export Development Board (NAEB), which is in charge of horticultural crops, as policy implementing agencies. MINAGRI works to improve agricultural productivity through promoting intensive use of inputs and farmland conservation. In 2018, the Government developed the National Agricultural Policy (NAP) with a vision of 'Becoming a nation that benefits food security, nutritional health and sustainable agricultural growth from a high-productivity, environmentally friendly and market-oriented agriculture sector'. To implement the NAP, MINAGRI developed the Strategic Plan for Agriculture Transformation (PSTA 4). PSTA 4 aims to transform current sustainable agriculture into knowledge-based, value-creating commercial agriculture. In line with the NAP, PSTA 4 also seeks to strengthen the linkages between agricultural research and extension to achieve the desired productivity and resilience by working to establish a new, autonomous

---

<sup>5</sup> JICA

<sup>6</sup> IMF, 'IMF Country Report No.08/90, Rwanda: Poverty Reduction Strategy Paper', March, 2008  
<<https://www.imf.org/external/pubs/ft/scr/2008/cr0890.pdf>>[accessed 14 January 2021].

department responsible for agricultural research and extension<sup>7</sup>.

### **3.2.2 Implementation Status of the NRDS**

The first NRDS was developed in 2011, with the overall goal of achieving self-sufficiency in rice and increasing the competitiveness of Rwandan rice by 2018.<sup>8</sup> Although the NRDS resulted in a significant increase in the area of rice production, the target was not achieved. Against this background, NRDS2 (2020-2030) was developed in 2020. NRDS2 aims to achieve the targets by making research and extension services more effective, increasing rice farmers' resilience to climate change, promoting sustainable and market-oriented production systems and boosting private sector investment as a driving force for sustainable growth in rice production.<sup>9</sup>

### **3.2.3 Rice Food Value Chain Analysis (Quoted from NRDS2).**

59,286 tons of rice was produced during the agricultural season (September-February) in 2019, with an area of 14,671 ha. Total rice consumption in Rwanda increased to 10,662 tons, an increase of 76% from the NRDS (2010-2018) period. Although the Rwandan Government has significantly increased the area of marshland for rice cultivation, the supply does not meet the demand and it is still necessary to import the rice. Most rice in Rwanda is produced by 62,000 smallholder farmers in the western, southern and eastern provinces, with an average area of 0.2 ha per household and a total cultivated area of 14,000 ha. These smallholder farmers grow rice under cooperative and government-supported irrigation schemes. Although there is irrigation potential of 589,711 ha, only about 7.5% is being utilized. The current yield is 3.51 t/ha, but the NRDS2 (2020-2030) aims to achieve 6.5 t/ha by 2030.

The analysis results of factors related to rice production specifically input supply, water management, marketing, access to financial and extension services, and infrastructure, are presented in the following sections.

#### **(1) Input supply**

Certified seed is mainly multiplied from Basic Seed by cooperatives and provided to farmers. On the other hand, there are some challenges to be solved, such as the accessibility of Basic Seed and certified seed, lack of private sector involvement and low inspection capacity.

Fertilizers issue have been addressed by the Government of Rwanda through the launch of the Crop Intensification Program (CIP), which enables farmers to purchase fertilizers on subsidies and thus, addressing low fertilizer use. MINAGRI selected eight importers and one distributor in 2016, so that farmers can purchase subsidized fertilizers from their nearest agro-dealer.

#### **(2) Marketing**

In rice marketing, individual rice farmers bring their paddy to cooperatives for sale, cooperatives then sell it to rice millers, and the millers provide inputs to farmers at the beginning of the rice production. This arrangement is based on a partnership between the rice miller and the cooperative. The price of paddy is determined by MINAGRI based on production costs and the actual price of milled rice, in consultation with farmers, rice millers, the Ministry of Trade and Industry (MINICOM) and other stakeholders. In order to protect domestic rice, imported rice is charged with a high tariff (45%).

---

<sup>7</sup> Ministry of Agriculture and Animal Resources, Rwanda, 'Strategic Plan for Agriculture Transformation 2018-24', June, 2018

<<http://extwprlegs1.fao.org/docs/pdf/rwa180543.pdf>>[accessed 14 January 2021]

<sup>8</sup> Ministry of Agriculture and Animal Resources, Rwanda, 'National Rice Development Strategy (2011-2018)', September 15, 2011

<[https://riceforafrica.net/images/stories/PDF/rwanda\\_revised\\_aug2013.pdf](https://riceforafrica.net/images/stories/PDF/rwanda_revised_aug2013.pdf)>[accessed 14 January 2021]

<sup>9</sup> Ministry of Agriculture and Animal Resources, Rwanda, 'National Rice Development Strategy (2020-2030)', March, 2020

---

### (3) Access to financial and Extension Services

Access to finance is poor and limited, as standard credit products provided by commercial banks are not suitable for the agricultural sector, and only 7 % of all credit products are allocated to the agricultural sector.

Rwandan farmers acquire various agricultural techniques through a national agricultural extension service called 'Twigire-Muhinzi'. This model comprises two complementary approaches such as the use of demonstration plots and Farmers Field Schools (FFS), where extension program facilitate the development of the skills necessary for farmers to effectively manage their own economic activities.

### (4) Infrastructure

Factors limiting the expansion of irrigated area has been identified as the high cost of constructing new reservoirs and dams, and the managerial and the management and financial difficulties of the Irrigation Water Users' Organization (IWUO), which is responsible for directly managing irrigation facilities with funds from the cooperatives.

#### 3.2.4 Progress of Support to Rice Sector

Rwanda participated to CARD, an international initiative to double rice production in African countries, as one of the second group of countries in 2009. During Phase 1 of the NRDS (2010-2018), rice production in marshlands achieved more than double, but the development and rehabilitation progress in the marshlands slowed down considerably. Therefore, to overcome this constraint, the NRDS Task Force, organized by the Government, formulated NRDS 2 (2020-2030) with technical support from the CARD Secretariat.<sup>10</sup>

JICA has implemented various agricultural development projects, including the technical cooperation projects "Small-Scale Farmers' Market-Oriented Agriculture Project (SMAP)" and "Project for Water Management and Capacity Building in the Republic of Rwanda (WAMCAB)", and the Grant Aid Projects 'Project for Development of Irrigation Scheme in Ngoma District' and 'The Project for Rehabilitation of Irrigation Facilities in Rwamagana District'. The table herein below shows the list of projects, including non-JICA projects, as listed in NRDS 2.

**Table 3.1 List of Project for rice sector in Rwanda**

No.	Project Name	Development partner
1	Rural Sector Support Project Phase Two	World Bank
2	The Bugesera Agricultural Development Support Project (PADAB)	AfDB
3	Support to the development of a national Agricultural extension System (PASNVA)	BTC
4	Kirehe Community-based Watershed Management Project (KWAMP)	IFAD, DED, WFP, GoR
5	Support Project for the Strategic Plan for the Transformation of Agriculture (PAPSTA II)	IFAD, DFID, Netherland, GoR
6	Integrated Pest Management- Farmer field School (IPM/FFS)	FAO
7	Support to the seed bearing sector in Rwanda (AFSR)	BTC
8	Project for Increasing Crop Production with Quality Extension Services in the Eastern Province (JICA Extension)	JICA
9	Establishing System of Integrated Resources Utilisation (ESIRU II)	AAA
10	Grant Assistance for the Food Security Project for underprivileged Farmers (2KR)	JICA
11	PROJET D'APPUI AUX INFRASTRUCTURES RURALES DE LA REGION NATURELLE DU BUGESERA (PAIR)	ADB/BAD(FAD)
12	Mitigating the impact of climate change on rice diseases virulence	AfricaRice

<sup>10</sup> COALITION for African Rice Development, 'Rwanda'  
<<https://riceforafrica.net/card-countries/card-group-2-contact-list/rwanda>>[accessed 20 January 2021]

No.	Project Name	Development partner
13	Privatization of Rwanda's Fertilizer Import and Distribution System (PReFER)	USAID
14	Rwanda Agrodealer Development Project (RADD)	AGRA
15	Rural Sector Support Project (RSSP) - Phase III	World Bank
16	Stress Tolerant Rice for Africa and South Asia (STRASA) - Phase II	Bill and Melinda Gates Foundation
17	Land Husbandry, Water Harvesting and Hillside Development Project	World Bank
18	Project for Increasing Crop Production with Quality Extension Services in the Eastern Province	JICA
19	Stress-tolerant rice for poor farmers in Africa and South Asia	AfricaRice
20	Developing the next generation of new rice varieties for sub-Saharan Africa and Southeast Asia	AfricaRice
21	Green Super Rice for Resource-Poor of Africa and Asia	AfricaRice
22	Interspecific Hybridization Project	AfricaRice
23	Mitigating impact of climate change on rice disease resistance	AfricaRice

Source : COALITION for African Rice Development

### **3.2.5 Implementation Structure of Rice sector**

Rice is considered as a sub-program of the cereals program in the RAB and is placed at a lower priority than maize and wheat. Regarding RAB budget execution, the production of quality seed alone accounts for 71% of the total budget, out of which 24% is spent on training program for FFS facilitators and farmer promoters, establishment of demonstration plots, and preparation and distribution of training materials. The RAB has a rice extension officer at each provincial level, while at the district level, the Agricultural and Cooperative Officer at each station is in charge of rice development. At the sector level under the district level, an agriculture officer is assigned and the 'Twigire-Muhinzi' is implemented on the basis of a partnership between both district and sector level officers.

## **3.3 Current Status and Issues in the Agricultural Sector**

### **3.3.1 Irrigation Facilities**

While Rwanda has irrigation potential of 589,711 ha (47% marshland and 63% hillside), only about 7.5% (48,508 ha) has been developed. The third PTSA (2013-2018) aimed to increase the irrigated area to 100,000 ha, but this target has not been achieved. Furthermore, the operation, maintenance and management of irrigation facilities by IWUOs, which provide water fees from cooperatives, deteriorates due to poor system integration and lack of capacity of both the government and IWUOs, which needs to be improved. The NRDS2 addresses such challenge by setting targets for improving resilience to climate change and equity in water distribution, strengthening the organizational capacity of IWUOs for the operation and maintenance of irrigation infrastructure in rice wetlands, and improving the capacity of farmers and their cooperatives for water management.

### **3.3.2 Agricultural Machinery**

Agricultural mechanization is a strong tool for achieving sustainable agricultural production, but it has not progressed at all in Rwanda. About 96% of agricultural practices are still carried out by human labour and animal power, and the number of agricultural machinery which is imported by the Rwandan Government is limited.<sup>11</sup> In addition, most of the paddy fields are not ready for mechanization due to lack of infrastructure development.

<sup>11</sup> Yuichi OHASHI (2016). Effective methodologies for knowledge and technology transfer with regard to the promotion of agricultural mechanization in developing countries, doctoral thesis, Graduate School of Life and Environmental Sciences, University of Tsukuba

### 3.3.3 Agricultural Inputs

MINAGRI has been strengthening the supply of agricultural inputs to increase agricultural productivity, and this has achieved positive results. On the other hand, smallholders still face severe credit constraints, which is also said that this is causing a lower rate of use of agricultural inputs among smallholders.

### 3.3.4 Status of Implementation of Grants to Assist Poor Farmers

In Rwanda, 2KR assistance was continuously provided from the year 1983 to 1994, but implementation was subsequently suspended due to the occurrence of civil war, and the programme was resumed later in 2006. The table herein below shows the results of 2KR assistance provided up to date.

**Table 3.2 Past result of 2KR grant aid for Rwanda**

Year	1983~1992	1993	2006	2008	2010	Total
E/N basis (million yen)	27.00	4.00	1.30	3.00	1.90	37.20
Procured item	Fertiliser, Agrochemical, Agricultural machinery	Fertiliser, Agrochemical	Fertiliser	Fertiliser	Fertiliser	—

Source: JICA Preparatory survey report for 2KR in Rwanda, MOFA data book of Official Development Assistance by country

Most of the population in Rwanda is engaged in agriculture and agriculture practices are conducted intensively, but due to the limited national land area and the topographical conditions where most of the land is hilly, the fertility of the land is significantly reduced by over-utilisation, and soil degradation caused by run-off of topsoil and thus, is also considerable. Increasing agricultural productivity through the input of agricultural materials and equipment is desired, especially the input of fertilisers and composts is also limited. Further, the increased production effect of fertilisers is desired, but as most farmers are small-scale farmers with weak purchasing power, the 2KR aid has mainly been provided in the form of fertilisers. Although the target crops varied from year by year, rice, potatoes, maize, wheat were the main food crops, and the areas covered were distributed to the target beneficiary farmers and farmer groups in the main production areas of such target crops. MINAGRI is the responsible authority for the 2KR programme in Rwanda, and RADA (Rwanda Agriculture Development Authority) has been the implementing agency for the programme since 2007, responsible for procurement and marketing of materials.

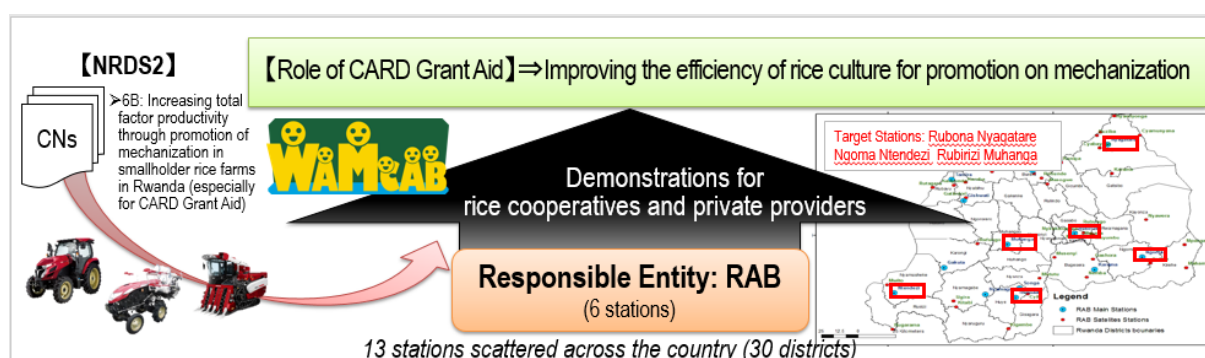
## 3.4 Proposed Project Plan: Project for Increasing Total factor Productivity through Promotion of Mechanization in Smallholder Rice Farms in Rwanda

### 3.4.1 Overview of the Survey Area

#### (1) Project Outline

- Country Name : the Republic of Rwanda
- Project Site : Huye, Nyagatare, Ngoma, Nyamasheke, Kicukiro and Muhanga District
- Project Title : The Project for increasing total factor productivity through promotion of mechanization in smallholder rice farms in Rwanda
- Project Summary: The project aims to promote agricultural mechanisation in the region through operational trials of agricultural machinery, demonstration of operation for youth, cooperatives and service providers, and training for operators and technicians in the area around RAB's regional stations, together with other government initiatives to support the introduction of agricultural machinery. The total expected project cost is approximately JPY 1,200 million.
- Background of Project Planning: Promotion of mechanisation is raised in the NRDS2 as an important initiative to improve rice productivity and quality, alongside the dissemination of modern agricultural technologies, particularly the use of quality seeds and chemical fertilisers. RAB, which is the implementation agency for the rice sector, conducts demonstrations and training using agricultural machinery in several areas to promote mechanisation, but the quantity of agricultural

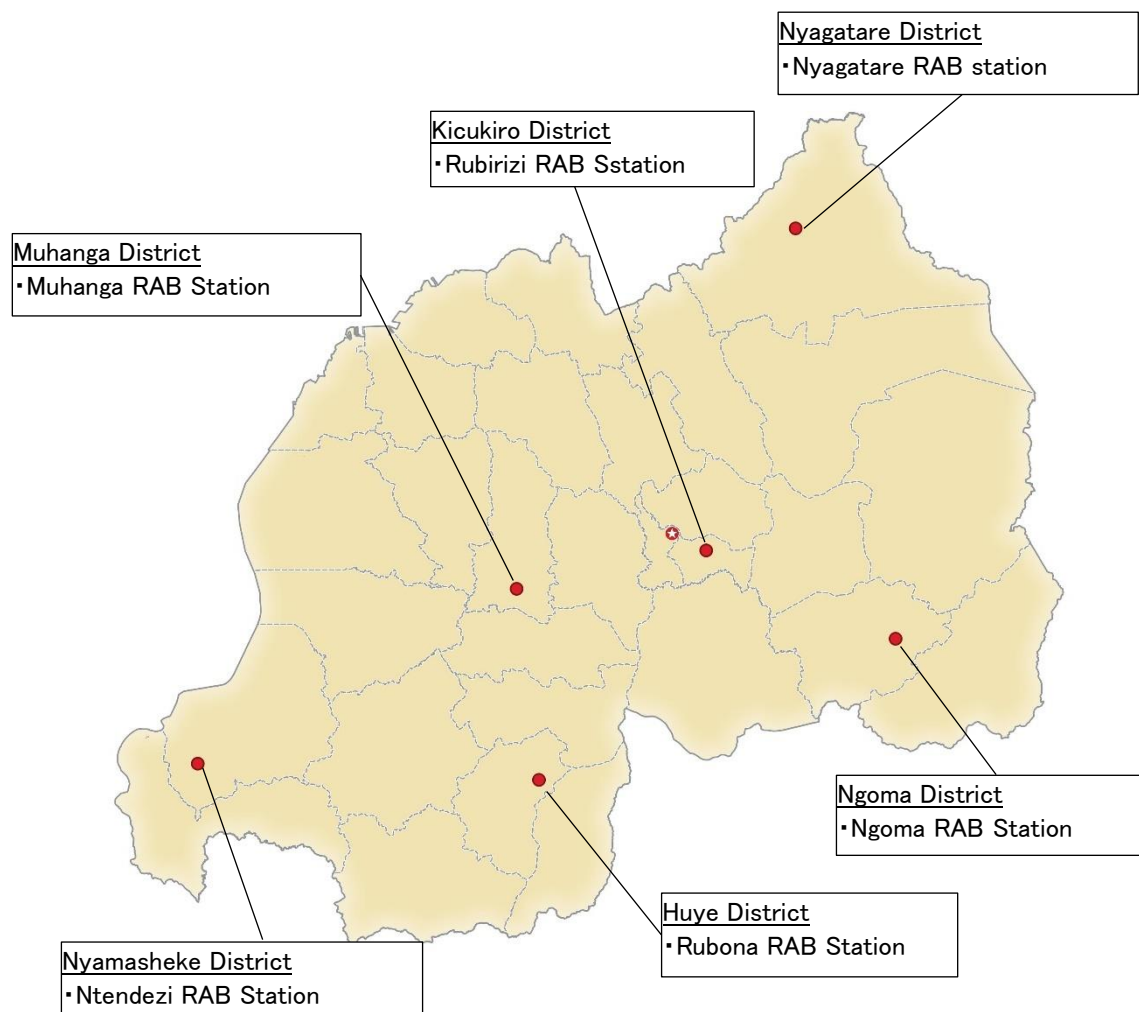
machinery is not sufficient for effective dissemination and promotion, and the rapid decentralisation in Rwanda results in a limited number of officials, including technicians in the RAB. Therefore, in terms of improving access to agricultural machinery except for demonstrations and training, the government is responsible for the maintenance and management of the machineries, but the RAB has taken measures to involve the private sector, such as service providers and cooperatives, to provide services to farmers. Some succeeded private service providers in this approach have purchased machines themselves and operate mechanisation services completely independent of the government, but their absolute numbers remain limited and there are disparities between areas. To further promote mechanisation, it is important to increase the number of private service providers working in partnership with the government, and more agricultural machinery is needed to achieve this. Based on “The study on sustainable rural and agricultural development in Bugesera District, eastern province in the Republic of Rwanda”, JICA has implemented a technical cooperation project “Project for Increasing Crop Production with Quality Extension Services in the Eastern Province” and its successor, “Smallholder market-oriented agriculture project in the Republic of Rwanda (SMAP)”, to strengthen the capacity of cooperatives handling horticultural crops and cereals, and grant aid projects on irrigation development (“The Project for Development of Irrigation Scheme in Ngoma District” and “The Project for Rehabilitation of Irrigation Facilities in Rwamagana District”) have been implemented in two target districts. In addition, the Project for Water Management and Capacity Building (WAMCAB) is under implementation, utilising the results of an SMAP and grant aid projects. In order to further the promotion of rice, it is necessary to develop a new approach of cooperation to promote high value-added and business-oriented agriculture through the effective use of existing irrigation facilities. WAMCAB is working on both policy aspects and capacity development of organisations, such as organisation management, O&M, water management and farming, with a view to improving irrigation water management capacities. The promotion of mechanisation in farming, which is proposed as one of the new approach of cooperation, is not currently included in WAMCAB. However, the draft project plan is prepared based on the assumption that it could be included in WAMCAB in the future and is designed for RAB as a implementation agency that currently work in cooperation with WAMCAB.



**Figure 3.1 Conceptual diagram of the Project in Rwanda.**

## (2) Target Area

The target districts are the main rice production areas around Huye, Nyagatare, Ngoma, Nyamasheke, Kikukiro and Muhanga districts, where RAB's regional stations are located, and three of the target districts are covered by WAMCAB.

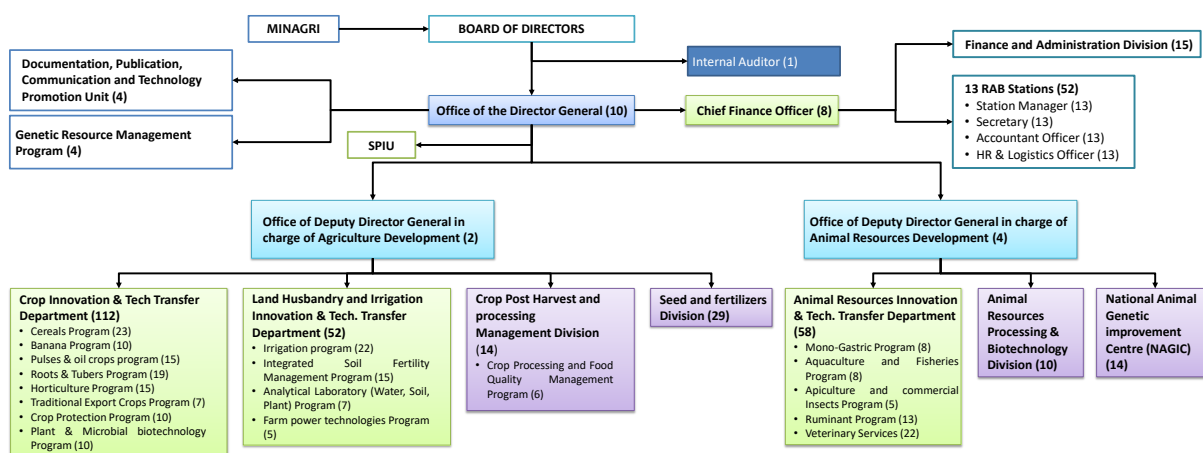


**Figure 3.2 Location of Project Sites (Rwanda)**

### (3) Organization

#### 1) Project Implementation Agency

The organizational chart of the project implementing agency, RAB, is shown herein below.



Source : Official Gazette n° Special of 20/08/2020

**Figure3.3 Organization Chart of RAB**

The RAB consists of the Department of Agricultural Development and the Department of Livestock



Resources Development and is the agency responsible for agricultural policy implementation. RAB possess certain technical level of knowledge due to association with several cooperation project of JICA, WB, AfDB and IFDA assistance and got experience of chairing international conferences many time.

## **2) Operation and Maintenance Structure**

RAB Stations are responsible for operation and maintenance for the project equipment.

### **3.4.2 Current Condition and Challenge**

#### **(1) Agriculture Mechanization for Rice Cultivation**

The Government of Rwanda aims to transform agriculture into a productive, high-value, market-oriented sector through modernizing 50% of the agricultural sector by 2030, which will improve the livelihoods of rural people, achieve food security and increase exports of agricultural products.

The Government estimates that the mechanization rate (use of agricultural machinery) in Rwanda's agricultural sector remained at about 17% as at the end of 2017, compared to the target of 25%. According to reports from the JICA office and JICA experts, agricultural mechanization is currently not progressing in rice cultivation areas, and the reasons for it are as follows.

- Small area available for farmers to cultivate (high population density in mountainous areas, limited arable land).
- Rice cultivation is often conducted on hilly terrain, such as valley bottom marshland, which causes safety issues while operating agricultural machinery.
- The fields are fragmented and the area of each field is very small and in uneven shape.
- Lack of agricultural access roads makes it difficult to transport machinery to the fields, and there is potential to introduce agricultural machinery if the plots, irrigation facilities and agricultural roads are improved.
- There is a surplus of low-cost labour in rural areas and rice cultivation provides many employment opportunities (labour productivity is not expected to increase).

Under such given situations, rapid progress in agricultural mechanisation in rice cultivation are not expected. Therefore, it is necessary to proceed with research and development and demonstrations using farmers' plots to verify and guarantee the local adaptability of agricultural machinery from a medium-to long-term perspective, assuming as a precondition that the environment for agricultural mechanisation (such as farm development, irrigation development, access road development, decrease in rural labour force, etc.) will be improved in the future.



Man-powered ploughing



Transplanting practice



Source: JICA detailed survey for agricultural mechanization promotion, 2017

**Figure 3.4 Actual situation towards agricultural mechanization in Rwanda.**

### 3.4.3 Draft Project Plan

#### (1) Proposed Project Components

**Table 3.3 Purpose, Functions and Components in Rwanda**

<b>Purpose and Function</b>
Install equipment to improve rice productivity and quality in areas surrounding RAB stations in the WAMCAB target areas and in the main rice production areas.
<b>Component</b>
<b>【Equipment】</b> Equipment for improving rice productivity: 3 large tractors , 24 medium tractors, 20 transplanters, 12 boom sprayers, 20 harvesters, 31 threshers, 31 winnowers, 15 combine harvesters, 14 dryers, 11 trailers, 1 pick-up truck, 6 sets of maintenance equipment.
<b>Contents</b>
<ul style="list-style-type: none"> <li>• Equipment for improving rice productivity</li> <li>• Maintenance tools</li> <li>• Spare parts</li> </ul>

The details of the equipment content are shown in the table below.

#### (2)Soft Component

The soft components assume the following cooperation related to the agricultural machinery to be installed.

- Guidance on equipment operation and maintenance methods: Provide technical guidance on the operation and maintenance of various types of equipment.
- Preparation of equipment maintenance plans: Prepare annual maintenance plans for equipment in line with plans for research, training and demonstrations.

#### (3) Project Cost Estimation

The total project cost is estimated at 772 million yen. And breakdown of costs item wise will be confirmed in the preparatory survey for the project.

**Table 3.4 Proposed Estimated Project Cost of CARD Grant Aid in Rwanda**

	Item	Amount (million JPY)
1)	Construction costs	-
2)	Cost for equipment	730
3)	Soft component	20
4)	Costs for detailed design and supervision	22
5)	Contingency	0
	Total	772

#### (4) Expected Outputs

Through the proposed Project, the following benefits are expected in the targeted areas.

- Through training and demonstration after confirming local adaptability, labour productivity in smallholder plots is increased and land productivity is improved as a result of timely operation of improved equipment operational capacity of youth, farmers' organisations and agricultural machinery service providers.

#### (5) Tentative Schedule

The overall schedule is shown in the figure below, and is expected to take approximately 18 months from the Exchange of Note (E/N) to the completion of the project.

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1. Preparatory Survey																										
Cabinet Meeting								▲																		
E/N, G/A									▲																	
2. Detailed Design																										
3. Procurement (Manufacture, transport, reception, adjustment, soft components)																										

**Figure 3.5 Tentative Overall Schedule (Rwanda)**

#### (6) Obligation of Recipient Country

- Dispatch of the responsible person in charge during project implementation
- Selection of target operators
- Establishment of agricultural machinery warehouses for the storing of provided machinery.

#### (7) Points to Note

The following are challenges and points to be considered in the future implementation of the preparatory survey for cooperation and the proposed cooperation program.

- A roadmap plan will be drawn up for activities related to agricultural mechanization in rice cultivation. The government prepares a roadmap with plans for promoting services such as hiring services and equipment rental services. Furthermore, the government confirms the feasibility of these services through trials and clarifies the roles of the government, private sector, farmer groups, etc., then contents of the proposed project plan will be reviewed based on it.
- To confirm in advance that the budget for the operation and maintenance of the equipment and materials provided by the project will be allocated appropriately by the host government.

## **Chapter 4 Uganda**

### **4.1 Outline of Uganda**

#### **4.1.1 Natural Conditions**

Uganda, which is bordered by Rwanda and Tanzania to the southwest, The Democratic Republic of the Congo to the west, South Sudan to the north, and Kenya to east, is located in eastern Africa. The country has warm tropical climate with average temperatures ranging between 25° and 29° C, while the temperature on the mountainous areas are colder as Mount Elgon is often covered with snow<sup>12</sup>. It is said that Uganda's climate is three-quarters tropical with two rainy seasons, March to June and October to December, while northern part has a mainly single rainy season from March to mid-October<sup>13</sup>. Semi-arid climate is found in the Northeast during the dry season. The rainfall level received ranges from 400mm in the eastern Karamoja region to up to 2,200mm over Lake Victoria and Mountain Elgon regions.

Recently, the country experiences various natural disasters such as mudslides, landslides and flooding, especially for the country's mountain regions and related districts such as Mbale district in the Mt Elgon region<sup>14</sup>. Over the past 30 years, disasters such as floods, droughts, and landslides have become more frequent. Especially, in low-lying area, it is estimated that nearly 50,000 people are affected by flooding, each year. Frequent flood is caused by heavy rainfall which can be attributed to the changing climate patterns and rapid loss of forest cover due to forest are cut down for fuel<sup>15</sup>. 2.6% of forest are lost annually, and the rate of forest cover loss in Uganda is one of the highest in the world. Therefore, with the support of the international donors, Uganda is adopting environmental-friendly policies at increasing rates while setting up a national Climate Budget Tagging system.

#### **4.1.2 Social Economic Condition**

Uganda has seen a remarkable turnaround in economic performance since the 1990s as real gross domestic product (GDP) steadily grew at an average of 7.7% annually during the period 1997–2007<sup>16</sup>, and average of 5.5% annually during the period 2015–2019<sup>17</sup>. In 2019, GDP growth rate recorded 6.7% which exceeded 6.1% of previous year, largely contributed by the expansion of services sector. The services sector grew more sharply averaged at 7.6% in 2019, and industrial growth at 6.2%, mainly contributed by construction and mining, while agriculture grew more slowly than the other sectors at just 3.8%.<sup>18</sup> As regards the distribution of GDP across economic sectors in 2019, agriculture account for around 21.92 % to the GDP, 27.07 % came from the industry, and 43.32 % from the services sector<sup>19</sup>. However, GDP per capita for 2019 was \$794.3<sup>20</sup> which is slightly higher than the previous year (GDP

---

<sup>12</sup> World Travel Guide, 'Uganda Weather, climate and geography'

<<https://www.worldtravelguide.net/guides/africa/uganda/weather-climate-geography/>>[accessed 28 January 2021]

<sup>13</sup> World Bank Group, 'Climate Change Knowledge Portal', 'Uganda'

<<https://climateknowledgeportal.worldbank.org/country/uganda/climate-data-historical>>[accessed 28 January 2021]

<sup>14</sup> Prevention Web, 'Climate risk country profile: Uganda,

<<https://www.preventionweb.net/publications/view/74338>>' [accessed 28 January 2021]

<sup>15</sup> World Bank, 'Ugandan Government Steps Up Efforts to Mitigate and Adapt to Climate Change'

<<https://www.worldbank.org/en/news/feature/2019/05/31/ugandan-government-steps-up-efforts-to-mitigate-and-adapt-to-climate-change>>[accessed 28 January 2021]

<sup>16</sup> World Bank, 'Chapter 2 Building on Growth in Uganda'

<[http://documents1.worldbank.org/curated/en/304221468001788072/930107812\\_2014082531000809/additional/634310PUB0Yes0061512B09780821387450.pdf](http://documents1.worldbank.org/curated/en/304221468001788072/930107812_2014082531000809/additional/634310PUB0Yes0061512B09780821387450.pdf)> [accessed 28 January 2021]

<sup>17</sup> Statista, 'Uganda: Growth rate of the real gross domestic product (GDP) from 2015 to 2025\*(compared to the previous year)'

<<https://www.statista.com/statistics/447758/gross-domestic-product-gdp-growth-rate-in-uganda/>> [accessed 29 January 2021]

<sup>18</sup> African Development Bank Group, 'Uganda Economic Outlook',

<<https://www.afdb.org/en/countries/east-africa/uganda/uganda-economic-outlook>>[accessed 29 January 2021]

<sup>19</sup> Statista, 'Uganda: Distribution of gross domestic product (GDP) across economic sectors from 2009 to 2019',

<<https://www.statista.com/statistics/447716/uganda-gdp-distribution-across-economic-sectors>>[accessed 29 January 2021]

<sup>20</sup> World Bank, 'GDP per capita (current US\$) - Uganda',

per capita for 2018 was \$658<sup>21</sup>) at just 3.1% of real growth.

Uganda has achieved impressive poverty reduction over the past decades, has mainly been associated with growth in the agriculture sector<sup>22</sup>. Though the percentage of Ugandan people living in extreme poverty has halved from 1992 to 2013, vulnerability to external shocks remains high. Moreover, progress on poverty reduction has been much slower in Northern and Eastern Uganda, and thus, in these two regions, the concentration of poverty is higher than any other regions<sup>23</sup>. The proportion of the total number of people under poverty in the Northern and Eastern regions increased from 68% to 84% during the period 2006 to 2013. It is identified that for every three Ugandans who lifted out of poverty, two fell back in.

### **4.1.3 Agricultural Condition**

Agriculture is one of the critical sectors in Uganda, as it employs 70% of Uganda's predominantly young population<sup>24</sup>, accounts for one-quarter of GDP, occupies half of all land area and generates half of all exports in Uganda<sup>25</sup>. Uganda's Vision 2040, National Development Plan (NDP) II, and the new Agriculture Sector Strategic Investment Plan (ASSP) identify agriculture as a driving force that will spur socio-economic transformation for becoming a middle-income country by 2040. Government of Uganda aims to advance the agricultural sector through governmental strategic investments in agriculture, and they are: (i) increase productivity on-farm by at least 50% at research station; (ii) transition from subsistence farming to commercial agriculture; (iii) achievement of food security and food availability through the country; (iv) Increasing the export of agricultural products; (v) reforming and streamlining agricultural service institutions such as research, extension and regulatory bodies to make them effective and efficient.

Although, Uganda is richly endowed with land, water and other natural resources which are suitable for agriculture, agricultural productivity in Uganda is below its potential, as national agricultural output has grown at only 2% per year over the past five years which is compared to agricultural annual output growth of 5% in East African Community countries<sup>26</sup>. Growth of agricultural productivity in Uganda is constrained by several factors, such as low market participation of most smallholders in the country, and a lack of adaptive capacity with respect to climate-related risks. Therefore, food security and nutrition are still remained as major issues, and the future agriculture is clouded by rapid population growth, high unemployment rate, climate change, and degradation of land and water.

## **4.2 Outline of Agricultural Sector**

### **4.2.1 Laws, Policies and Development Plan relating to the Agricultural Sector**

Third National Development Plan (NDP III: 2020/21 – 2024/25) which was developed in January 2020, is designed to propel Ugandan agriculture to industrial agriculture through realization of increased

---

<https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=UG> [accessed 29 January 2021]

<sup>21</sup> Country Economy.com, 'Uganda GDP'

<https://countryeconomy.com/gdp/uganda> [accessed 29 January 2021]

<sup>22</sup> World Bank, 'The World Bank in Uganda-Overview',

<https://www.worldbank.org/en/country/uganda/overview> [accessed 29 January 2021]

<sup>23</sup> World Bank, 'Uganda Poverty Assessment 2016: Fact Sheet',

<https://www.worldbank.org/en/country/uganda/brief/uganda-poverty-assessment-2016-fact-sheet> [accessed 29 January 2021]

<sup>24</sup> World Bank, 'Uganda's Economy Expected to Grow at 6% and Above',

<https://www.worldbank.org/en/news/press-release/2018/11/20/ugandas-economy-expected-to-grow-at-6-and-above> [accessed 29 January 2021]

<sup>25</sup> World Bank, 'Closing the Potential-Performance Divide in Ugandan Agriculture'

<http://documents1.worldbank.org/curated/en/996921529090717586/pdf/127252-WP-PUBLIC-UG-AgGAP-Final-Synthesis-Report-FINAL-lowres.pdf> [accessed 29 January 2021]

<sup>26</sup> World Bank Blogs, 'Agriculture is the 'green gold' that could transform the economy and the lives of Ugandan farmers', <https://blogs.worldbank.org/nasikiliza/agriculture-is-the-green-gold-that-could-transform-the-economy-and-the-lives-of-ugandan-farmers> [accessed 1 February 2021]

productivity and production in agriculture, in line with the aspiration of Uganda's Vision 2040.<sup>27</sup> Agro-Industrialization is among the 20 key development strategies that will be pursued in the NDPIII, and the key results to be achieved for realization of agro-industrialization are: (i) Increasing the export of processed agricultural commodities; coffee, tea, fish, dairy, meat, and maize from USD 1 Billion to USD 4 Billion; (ii) Reducing the import of cereals, vegetable fats and oils, and sugar from USD 931.1million to USD 500 million; (iii) Increasing the agricultural sector growth rate from 3.8 % to 6.0 %; (iv) Increasing labour productivity in the agro-industrial value chain from USD 616 to USD 850 per worker; (v) Increasing the jobs creation in agro-industry along the value chain by 500,000; (vi) Decreasing the percentage of households reliance on subsistence agriculture as a main source of livelihood from 68.9 % to 55 %; (vii) Increasing the percentage of households that are food secure from 60 % to 80 %. Moreover, the Agriculture Sector Strategic Plan (ASSP3: 2020/21 – 2024/25) which is developed in January 2020 as well for investment and development of the agricultural sector, in line with the National Development Plan, sets the 5 year mission for: promoting agro-industrialization for inclusive employment; increasing household incomes, food security and agricultural export earnings<sup>28</sup>.

#### **4.2.2 Implementation Status of the NRDS**

The first National Rice Development strategy (NRDS: 2008-2018) lays out Uganda's strategy for promotion of rice production with the aim of increasing household food security level and household income through increased high quality rice production<sup>29</sup>. As the governmental support has been carried out, the amount of rice harvested roughly tripled from 17,659 tons as of 2014 to 49,809 tons as of 2017, as well as the rise on the income of farmers<sup>30</sup>. The second National Rice Development strategy (NRDSII) is under preparation.

#### **4.2.3 Rice Food Value chain Analysis**

Uganda's rice marketing chain can be categorized into the primary stage, secondary stage, and tertiary stage<sup>31</sup>. The primary stage involves transactions of harvested rice between farmers and village traders and processors. At the secondary stage which involves transactions and negotiations between millers and urban traders, processing takes place. Rice mills are usually found in trading centers of the rice producing districts, and owned by private sector. The secondary stage consists of assembling of milled rice, storage, and sales to the urban traders. The tertiary stage consists of transactions between large-scale urban traders and importers, and these traders are mainly based in Kampala and other urban centers. The rice purchased by large-scale urban traders are cleaned, consolidated and bulked in sacks before passing to retailers for sale to consumers.

As regards processing, although the open-sun drying method causes increased amount of broken grains in milling stage, the method continues to be a major procedure for drying due to the fact that drying facilities cost much. The motorized commercial mills, which are preferred by many rice producers, remove husk and bran separately, thereby brown rice is produced as an intermediate product, and followed by white kernel with by products.

It is reported that, in highly efficient milling machine, the whole rice rate is only 39 %, and the broken rice may account for 26 %, while the bran and husks account for 11 %, and 24 %, respectively.

---

<sup>27</sup> National Planning Authority, 'Third National Development Plan (NDPIII) 2020/21 – 2024/25', January, 2020.

<sup>28</sup> Ministry of Agriculture, Animal Industry and Fisheries, 'Agriculture Sector Strategic Plan (ASSP:2020/21-2024/25)', January, 2020

<sup>29</sup> Ministry of Agriculture, Animal Industry and Fisheries, 'Uganda National Rice Development Strategy (NRDS) 2008-2018', 2008.

<sup>30</sup> JICA

<sup>31</sup> FAO, 'Monitoring African Food and Agricultural Policies', 'Analysis Of Incentives and Disincentives for Rice In Uganda', December, 2012,

<<http://www.fao.org/3/a-at588e.pdf>>[accessed 2 February 2021]

---

#### 4.2.4 Progress of Support to Rice Sector

Under the CARD initiative, JICA supported the formulation of the National Rice Development Strategy (NRDS), and has been supporting efforts by the Government of Uganda for development of a Roadmap for Rice Seed Value Chain Development<sup>32</sup>. From 2011, JICA has been supported to Ugandan rice sub-sector through the Promotion of Rice Development Project (PRiDe) which aimed to achieve increased rice production through capacity building for rice related researchers, in cooperation with the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), and subordinate organizations<sup>33</sup>. Moreover, from 2014 to 2016, as a part of the rice development program, Japan carried out a feasibility study on irrigation development. The project aimed to contribute to assurance of national food security through realization of improved farmer household income, and capacity building of farmers for irrigation and natural resource management, while widening irrigation coverage.

**Table 4.1 List of Project for Rice Sector in Uganda**

No.	Project	Agency	Period	Type
1	Policy Action for Sustainable Intensification of Crop Systems (PASIC)	Netherlands	2013-2017	Technical Cooperation
2	Agriculture Cluster Development Project (ACDP)	WB	2014-2018	Specific Investment Loan
3	Promotion of Rice Development (PRIDE)	JICA	2012-2016	Technical Cooperation
4	Promotion of Rice Development Project (PRiDe)	JICA	2011-2016	Technical Cooperation
5	Project on Irrigation Scheme Development for Central and Eastern Uganda	JICA	2014-2017	Technical Cooperation
6	Promotion of commercialization of agriculture among resettling populations in Gulu, Kileleshwa and Lira districts of Northern Uganda to restore livelihoods and reduce poverty (GTFS/UGA/022/ITA)	FAO/Govt. of Italy	2012-2015	Technical Assistance
7	South-South Cooperation	FAO/PRC (China)	2012-2014	Technical Cooperation
8	Rice Germplasm Project	AfricaRice/IRRI	2012-2015	Research grant
9	Eastern Africa Agriculture Productivity Program (EAAPP) - APLIA-Uganda	WB	2010-2017	Adaptable Program Loan
10	Agricultural Technology and Agribusiness Advisory Services (ATAAS) Project	Basket Fund	2010-2016	Specific Investment Loan
11	Integrated Seed Sector Development (ISSD)	Dutch Embassy; Bill & Melinda Gates Foundation	2013-2015	Grant
12	CATALIST-2	Netherlands	2012-2016	Grant
13	East African Rice Sector Development (Tanzania and Uganda)	Common Fund for Commodities (CFC)	2014-2016	Loan
14	SG-2000	Nippon Foundation, JICA, USAID, BMGF		Technical Cooperation
15	Farm Income Enhancement and Forest Conservation	African Development Bank	2016 - 2020	Loan, Grant

<sup>32</sup> JICA

<sup>33</sup> JICA

No.	Project	Agency	Period	Type
16	Partnership For Sustainable Rice Systems Development In Sub-Saharan Africa	FAO, Bolivarian Republic of Venezuela	2016 - 2017	Grant
17	Mitigating the impact of climate change on rice disease resistance in East Africa	GTZ, AfricaRice	2017-2020	Grant
18	Technical Assistance Support to Sustainable Irrigated Agricultural Development Project in Eastern Uganda (2008-11)	JICA	2008-2011	Technical Cooperation
19	Operation Wealth Creation	GoU	2013-	Agriculture Services
20	Project for Establishment of a Agro Processing and Marketing Strategy in Uganda	KOICA	2013-2018	Official Development Assistance
21	Stress tolerant rice for poor farmers in Africa and South Asia (STRASA)	Global Rice Science Partnership (GRiSP) - Govt. of Japan, Bill and Melinda Gates Foundation	2011-2017	Grant
22	Green Super Rice project	AfricaRice	2016-2018	Grant
23	The Farm Income Enhancement and Forest Conservation Project 2 (FIEFOC 2)	Nordic Development Fund, AfDB, GoU	2016-2021	Loan, Matching grant
24	Farm Income Enhancement and Forest Conservation (FIEFOC-2)	AfDB	2014-2020	
25	Project for the Restoration of Livelihoods in the Northern Region (PRELNOR)	IFAD	2014-2022	
26	Promotion of Rice Development (PRIDE II) Project II	JICA	2019 - 2024	Technical Cooperation
27	Project for the Establishment of Irrigation System in Atari Basin Area	JICA	2019 - 2022	Grant
28	Technical Cooperation on Sustainable Utilization, Operation and Management of Atari River Basin Irrigation Scheme	JICA	2020-2025	Technical Cooperation
29	Markets and Agricultural Trade Improvement Programme - 2	AfDB	2014 - 2020	Loan
30	Agricultural Value Chains Development Programme	AfDB	2017 - 2023	Loan
31	Establishment of Sustainable Model Villages	KOICA	2019 - 2023	Technical Cooperation
32	Supporting Agri-business growth and development through enhanced marketing systems	FAO	2016 - 2019	Technical Cooperation
33	Integrated Seed Sector Development (ISSD Plus)	Netherlands	2016 - 2020	Technical Cooperation
34	Resilient Efficient Agribusiness Chains (REACH)	Netherlands	2016 - 2020	Technical Cooperation
35	Enhancing National Food Security through Increased Rice Production Project	IDB	2017 - 2022	PPP/Loan

#### **4.2.5 Implementation Structure of Rice sector**

Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) is responsible agency for national rice development. Although rice was not a traditional staple crop in Uganda, the importance has been increased as both staple food and source of income, and the government of Uganda, established , the



Regional Rice Research and Training Centre at the National Crops Resources Research Institute (NaCRRI) for training farmers, extension agents and researchers and conduct various research on techniques in 2010<sup>34</sup>. Other associated agencies of MAAIF, National Agriculture Research Organization (NARO), National Agricultural Advisory Services (NAADS), National Semi-Arid Resources Research Institute (NaSARRI), Agricultural Engineering and Appropriate Technology Research Centre (AEATREC), and the Zonal Agricultural Research and Development Institute (ZARDI) are all serve farmers by developing appropriate rice farming technologies<sup>35</sup>. As regards rice seed production, National Seed Certification Service (NSCS) is responsible organization<sup>36</sup>.

### **4.3 Current Status and Issues in the Agricultural Sector**

#### **4.3.1 Irrigation Facilities**

In 2017, Ministry Of Agriculture, Animal Industry and Fisheries and Ministry of Water and Environment (MWE) published National Irrigation Policy (NIP), and the policy goal was set to realize sustainable availability of water for irrigation and efficient use of it to increase crop productivity and household income as well as assurance of food security. To achieve the policy goal, the policy target is set to irrigate an additional 1,500,000 ha (constituting 50% of irrigation potential) by 2040. According to the survey carried out by Nile Equatorial Lakes Subsidiary Action Program (NELSAP) in 2012, the Ugandan irrigation potential is identified as 3.03 million hectare, though MWE earlier determined 560,000ha as a potential area.

NIP prioritizes to ensure reliable water availability for irrigation, as well as intensify and diversify crop, livestock and fisheries production and increase productivity. To achieve assurance of reliable water for irrigation to optimize, NIP identifies the necessity of intervention in which rehabilitation, remodeling and upgrading of water storage facilities and irrigation schemes are carried out.

Ugandan irrigation schemes, such as Agoro, Olweny, Mubuku and Doho Irrigation Schemes have been rehabilitated by the financial support from the African Development Bank (AfDB), and already transferred to farmers to use and management. Among them, Mubuku and Doho Irrigation Schemes are important because they are key drivers for Ugandan rice development.

#### **4.3.2 Agricultural Machinery**

In Uganda, farmers have been accessed agricultural machineries through various schemes funded by Government of Uganda or donors. Normally, the agricultural machineries are provided to farmers with free of charge or at subsidized prices<sup>37</sup>. Although, agricultural mechanization has not sufficiently been introduced through the country, improvement in farmers' access to mechanization has been seen due to increased private sector investment in mechanization service provision as it is boosted by the government. As regards private sector investment, a private company, Bongomin and Mukusu Motors Ltd has been contributing to increasing farmer access to mechanization services, especially for land preparation, planting and harvesting stage in Eastern Uganda.

Moreover, as the Government of Uganda (GoU), through the MAAIF has been aimed to achieve commercialization in the agriculture sector by 2020 through agricultural mechanization, as well as

<sup>34</sup> Yusuke Haneishi, Graduate School of Horticulture Chiba University, 'Rice in Uganda: Production Structure and Contribution to Household Income Generation and Stability', January, 2014, <<https://core.ac.uk/download/pdf/97062918.pdf>>[accessed 2 February 2021]

<sup>35</sup> JICA

<sup>36</sup> CABI Africa, et al. 'Quality Rice Seed Production Manual', July, 2011 <<https://www.cabi.org/Uploads/projectsdb/documents/45948/Quality%20rice%20production%20manual.pdf>>[accessed 2 February 2021]

<sup>37</sup> Budget Monitoring and Accountability Unit (BMAU) Ministry of Finance, Planning and Economic Development (MFPED), 'BMAU Briefing Paper (19/17)', May, 2017, <<https://www.finance.go.ug/sites/default/files/Publications/BMAU%20Briefing%20Paper%2019-17-%20Access%20and%20Use%20of%20Agricultural%20Equipment%20in%20Uganda%20-%20What%20are%20the%20Hindering%20Factors.pdf>>[accessed 3 February 2021]

modernization at farm level, GoU is currently constructing 5 regional mechanization centres, and they are in Buwama (Central Region), Agwata (Northern Region), Kiryandongo district and Mbale district<sup>38</sup>. Each of the regional center owns agricultural machineries such as excavators, self-loading tracks, heavy earth-moving equipment, bulldozers, maintenance tools and mobile mechanization workshop trucks. The centres will also provide training for operators and senior agricultural engineers who are serving farmers by providing technical advisory, maintenance services as well as coordination with the farmer groups.

### 4.3.3 Agricultural Inputs

In Uganda, utilization of agricultural inputs such as modern rice varieties, packaging materials, fertilizer and other agro-chemicals by farmers are limited with low quality seed and fertilizers use are resulting in damaged quality of final product. However, GoU has been supported enhancement of rice production in partnership with various donor agencies by improving national seed production, multiplication and distribution. For example, there are currently 21 rice seed varieties, and 11 varieties out of 21 rice seeds were released between 2013 and 2018. Based on the research, GoU selected 7 varieties (NERICA 1, NERICA 4, NERICA 10, NAMCHE 1, NAMCHE 2, NAMCHE 3 and NAMCHE 4) as recommended varieties out of them and promote the cultivation under rain fed upland environments. The Delivery of technical research, varietal development, selection, production and commercialization activities were supported by the National Agricultural Research Organization (NARO), International Rice Research Institute (IRRI), Africa Rice Centre, International Institute of Tropical Agriculture (IITA), Sasakawa Global 2000, Japan International Cooperation Agency (JICA) under the Promotion of Rice Development (PRiDe) project, Alliance for a Green Revolution in Africa (AGRA) and the World Bank (under the ATAAS project).

Especially, agricultural machineries and equipment which are worth \$380,000 are procured and distributed by PRiDe project, and they are efficiently utilized for seed multiplication and distribution.

### 4.3.4 Status of Implementation of Grants to Assist Poor Farmers

The Japanese government has continuously offered grant aid through Second Kennedy Round Program (2KR) agreed and claimed by the Japanese and Uganda side from the period of 1980 to 1995. In 2005 and 2007, the assistance program for small-scale farmers aiming to disseminate and enhance the production of NERICA rice was implemented through FAO and procured rice seeds, fertiliser and agricultural machinery such as thresher. The following table indicates the past result of the 2KR grant aid.

**Table 4.2 The past result of 2KR grant aid for Uganda**

Year	1980~1993	1994	1995	2005	2007	Total
E/N basis (million yen)	4,050	450	450	147 (Through FAO)	150 (Through FAO)	5,247
Procured item	Fertiliser, Agrochemical, Agricultural machinery	Fertiliser, Agrochemical, Agricultural machinery	Fertiliser, Agrochemical, Agricultural machinery	Fertiliser, Seed, Agricultural machinery	Fertiliser, Seed, Agricultural machinery	—

Source: JICA Preparatory survey report for 2KR in Uganda, MOFA data book of Official Development Assistance by country

The country has a fair agricultural area with fertile soil and sufficient rainfall in the southern part of the country, where most of the population is engaged in agriculture. The southern area of the country plays a significant role in contributing to the national food production and act as the food supply base for neighbour countries also. However, yields per unit area have been stagnant due to pests, diseases and poor weather conditions. In the case of aid for increased food production, there was a tendency for using

<sup>38</sup> Kilimo News, 'Uganda building 5 regional mechanization centers', July 19,2020, <<https://kilimonews.co.ke/agriculture-policy/uganda-building-5-regional-mechanization-centers/>>[accessed 3 February 2021]

a relatively high proportion of agrichemicals rather than fertilizers and agricultural machinery as commodities.

The target crops for the grant aid were staple crops such as Maize, Sorghum, Millet, Cassava, Sweet potato, Pulse, Wheat, and Plantain. The main target area was nationwide but mainly focus on the major agricultural production areas spread from central to southeast areas in the country. The procured items were distributed to target farmers and farmer-based organizations in the main production area. The implementing agency of this program in the Uganda was the Ministry of Agriculture, Livestock and Fishery. The regional office under the ministry distributed the procured items to the target farmers.

#### **4.4 Proposed Project Plan: Project for the National Agricultural Innovations and Skills Enhancement centre**

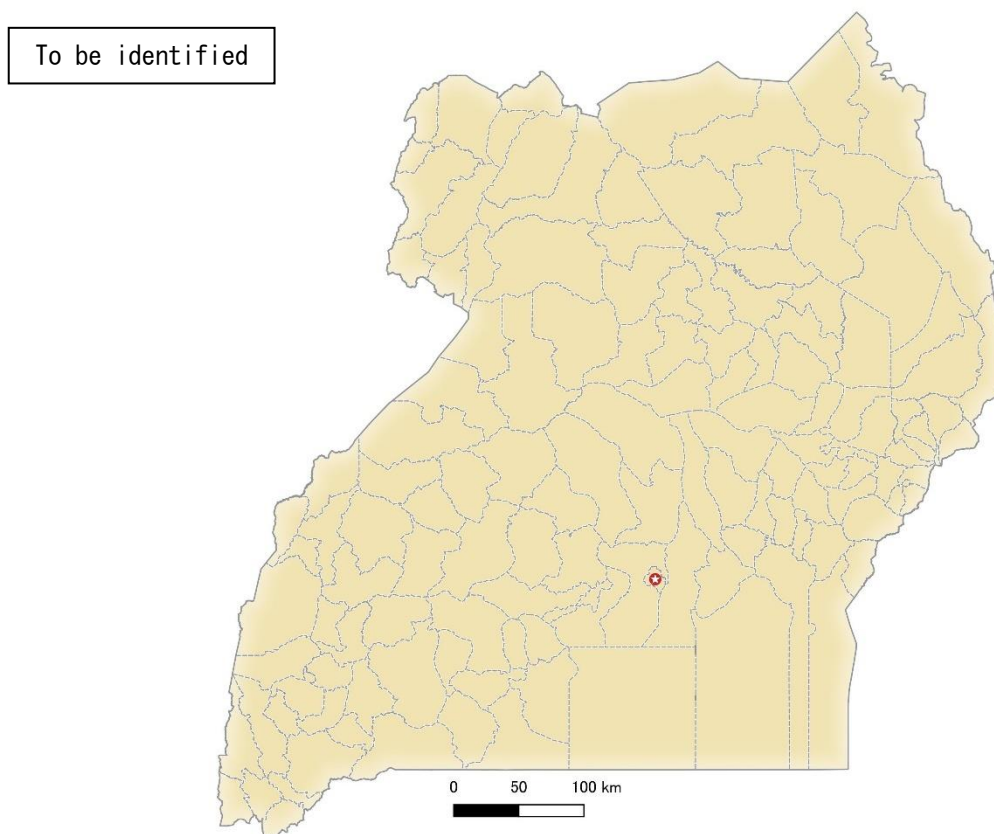
##### **4.4.1 Overview of the survey area**

###### **(1) Project Outline**

- Country Name : the Republic of Uganda
- Project Site : To be identified
- Project Title : The Project for the National Agricultural Innovations and Skills Enhancement center
- Project Summary : The objective is to continue to promote and establish the 'RICE model' based on research and extension collaboration, and to extend this model to other agricultural products as far as possible. In this context, central government, regional centres and local government will work together to provide appropriate training to extension service providers and farmers based on regional characteristics, and to develop a system to accumulate various types of information for central government.
- Background of Project Planning: The NRDS positions rice as an important grain for improving farmers' income and food security, and aimed to increase production and productivity, and it is assumed that NRDS2 will continue to aim for the same goals along with the higher level policies and strategies. Although JICA has supported the increase in rice production through the Promotion of Rice Development Project (PRiDe) by improving the research and development capacity of rice-related research institutions based at National Crops Resources Research Institute (NaCRRI) and disseminating technology to rice farmers, rice productivity still needs to be raised. In addition, the challenge was to strengthen the capacity to produce high-quality rice in order to further increase the distribution volume of domestically produced rice. From the above, PRiDe 2, Phase 2 of PRiDe, supports the development of research, training and extension systems to improve rice productivity and quality, and proactively develop rice farmers' human resources. Although the NaCRRI as a base was developed through the Rice Research and Training Centre construction programme, there is an urgent need to strengthen and expand the functions of the 11 Zonal Agricultural Research and Development Institutes (ZARDIs) in the country together with NaCRRI in order to promote cultivation methods adapted to the different climatic conditions and to develop rice farmers who can adapt to these methods, along with the progress of rice promotion in Uganda. In addition, there is a need to introduce a remote training system connecting the three rice-related experimental stations at the central and regional levels in order to further improvement of training quality and efficiency for human resource development, and the proposed project plan is designed to strengthen the functions of these PRiDe2.

###### **(2) Project Site**

To be identified. (Candidate sites are Kampala, Wakiso District in Central region, Bulambuli, Mayuge and Mbale District in Eastern region, Arua District in Northern region and, Kabarole District in the Western region)

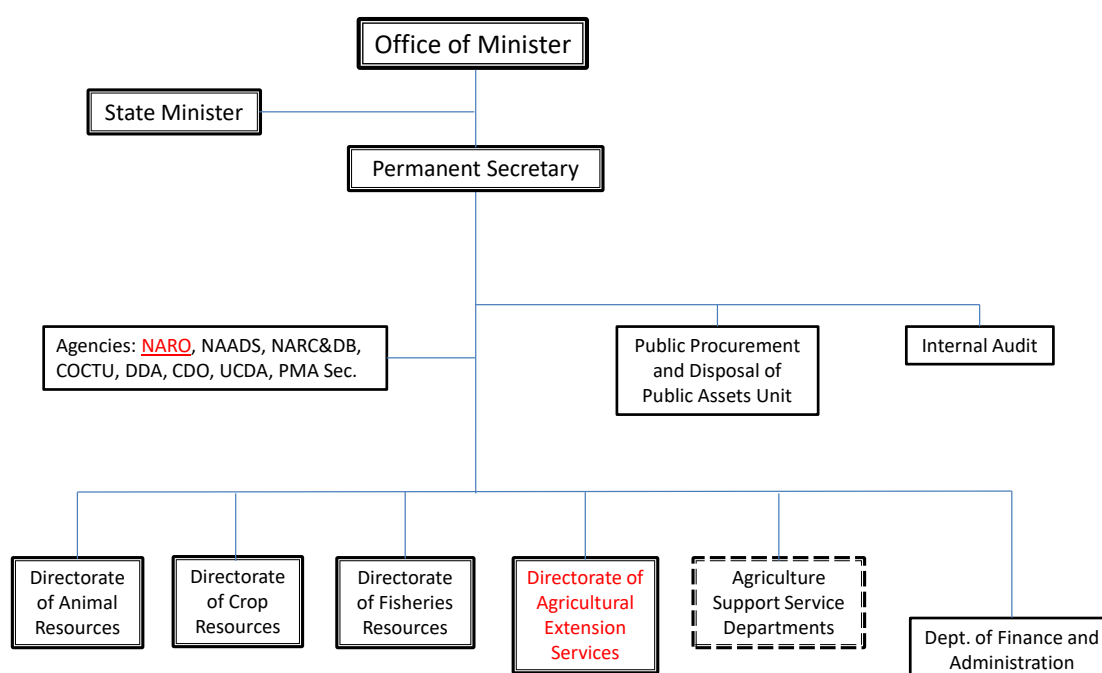


**Figure 4.1 Location of Project Sites (Uganda)**

### **(3) Implementation/Responsible Agency**

The project is designed to be managed directly by the MAAIF, Directorate of Agricultural Extension Services, and NARO will play the role of host. Activities will be carried out in broadly three (3) main components: (1) training implementation, (2) promotion of digital transformation (DX) in agriculture and (3) operation of regional centres. The role of the responsibility for regional centres is expected to be played by ZARDI under NARO, as the Directorate of Agricultural Extension Services does not have mandate/ function to manage regional units.

## 1) Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)



Source: Document provided by JICA Agricultural Planning Advisor, edited by the Survey team.

**Figure 4.1 Organization chart of MAAIF**

## 2) National Crops Resources Research Institute (NaCRRI)

NaCRRI is a research institute under NARO and is located in Wakiso District, Central Region, about 25 km north of the capital Kampala. The NaCRRI facility, which is now the centre of testing, research and extension of rice in Uganda, was more than 50 years old and its construction and the facilities were dilapidated with the time. It was also used as a research and laboratory for other crops such as maize and cassava, without facilities for research and training on rice. Therefore, basic design studies for the 'Rice Research and Training Centre Construction Plan' were conducted in 2008, and the construction was completed in November 2010, with facilities and equipment installed. JICA has also been utilized it as a hub for the technical cooperation projects "NERICA Rice Promotion Project in Uganda", "Promotion of Rice Development Project (PRiDe)" and 'Promotion of Rice Development Project Phase 2 (PRiDe2)', starting with the dispatch of long-term experts to NaCRRI since 2004.

## 3) Zonal Agricultural Research and Development Institute (ZARDI)

ZARDI is a research institute under NARO, with 10 centres across the country, as shown in the table herein below. These institutes conduct crop trials and research in accordance with the defined characteristics of each region.

**Table 4.3 List of ZARDI in Each Zone**

Zone	No.	ZARDI
Cattle corridor	1	Mbarara ZARDI
	2	Nabuin ZARDI
	3	Bulindi ZARDI
Lake Victoria Crescent	4	Mukono ZARDI
East & South Western Highland	5	Kachwekano ZARDI
	6	Rwebitaba ZARDI
Eastern Uganda	7	Nabuin ZARDI

Zone	No.	ZARDI
	8	Buginyanya ZARDI
Northern Uganda	9	Ngetta ZARDI
	10	Abi ZARDI

#### 4.4.2 Current Status and Issues

##### (1) MAAIF as a Central Function

The agricultural extension system in Uganda was reformed in 2014 with the dissolution of the extension department of NAARDS and the establishment of an Extension Directorate within MAAIF. Further, The Single Spine Extension System, led by MAAIF, was introduced. This system is designed to manage planning and implementation under a single line of direction from the MAAIF to the district government, and then to the sub-county and other terminal levels of government. However, the MAAIF Directorate of Agricultural Extension Services does not stock various types of information for extension and does not have the capacity to develop technologies and extension approaches, and hence, agricultural extension workers and farmers face a lack of opportunities to receive appropriate training for each agricultural commodity. There is also a lack of central government co-ordination and collaboration among service providers, and the MAAIF Directorate of Agricultural Extension Services does not possess accumulated knowledge on extension activities.

##### (2) Research Institutions (NaCRRI and ZARDIs)

Research and extension linkages are not functioning well and there is a large productivity gap between farmer plots and research plots. In addition, crop- and region-specific training materials and effective extension approaches have not been developed.

##### (3) Local Government

There is a lack of opportunities for both extension workers and farmers to attend appropriate training.

#### 4.4.3 Draft Project Plan

##### (1) Proposed Project Components

The target components are listed below.

##### 1) National Agricultural Innovations and skills Enhancement centre (NAISE Centre)

**Table 4.4 Purpose, Functions and Components (NAISE Centre)**

Purpose and functions	
The NAISE Centre will be established as a platform for training implementation, including the use of research and educational institution, and the Centre will comprehensively manage the various types of training that have been conducted by individual service providers, accumulate knowledge and develop an efficient and effective training implementation platform.	
Components	
【Facility】Office building / Training facility / Accommodation facility	
【Equipment】Solar power generation systems/ IT infrastructure / related equipment	
Contents	
Office building	<ul style="list-style-type: none"> <li>• Office</li> <li>• Board room</li> <li>• Recording room</li> <li>• Warehouse</li> <li>• Canteen / Office kitchenette</li> </ul>
Accommodation facility	<ul style="list-style-type: none"> <li>• More than 30 rooms</li> </ul>

	<ul style="list-style-type: none"> <li>• Kitchenette</li> <li>• Meeting room</li> <li>• Administrative room</li> <li>• Warehouse</li> </ul>
Training facility	<ul style="list-style-type: none"> <li>• Class room</li> <li>• ICT room</li> <li>• Maternity room</li> <li>• Pray room</li> </ul>
IT infrastructure	• Installation of fibre optic cable from the Kampala.
Solar power generation systems	• The scale of electricity generation is assumed to be large enough to supply the entire facility.

## 2) NaCRRI

**Table 4.5 Purpose, Functions and Components (NaCRRI)**

Purpose and functions	
<p>Establish a seed processing unit to enable the supply of quality seed to private seed companies, in addition to the supply of seed to service providers.</p> <p>Expand and rehabilitate training and demonstration plots through field development.</p> <p>Through the installation of research and training equipment and materials, it will be possible to strengthen collaboration in research and extension, and to enable for providing remote training.</p>	
Purpose and functions	
<p>【Facility】Farm land consolidation</p> <p>【Equipment】Seed processing Unit, Research and training equipment and materials</p>	
Contents	
Farm land consolidation	To be identified
Seed processing Unit,	To be identified
Research and training equipment and materials	To be identified

## 3) ZARDIs

**Table 4.6 Purpose, Functions and Components (ZARDIs)**

Purpose and functions	
<p>Provide research and training equipment and materials to develop training materials through enhanced collaboration on research and extension among NaCRRI, other central institutions and ZARDI, and to achieve to develop a framework that enables the remote training to be implemented.</p>	
Purpose and functions	
【Equipment】Research and training equipment and materials	
Contents	
Research and training equipment and materials	

## 4) MAAIF DAIMWAP

**Table 4.7 Purpose, Functions and Components (MAAIF DAIMWAP)**

Purpose and functions	
<p>The RICE model will be supplemented with an irrigated rice farming component and technical assistance will be provided to irrigated rice farming areas in the country through the NAISE centres. (Potential target areas: Atari Irrigation scheme, Mbuku Irrigation scheme, Olweny Irrigation scheme and others).</p>	
Purpose and functions	
【Equipment】 Equipment and Machinery for land consolidation and irrigation development	

<b>Contents</b>	
Equipment and Machinery for land consolidation and irrigation development	Construction equipment (bulldozers (including laser levelling equipment)) Backhoes, truck trailers Mobile repair vehicles, spare parts Agricultural machinery (tractors, spare parts)

## **(2) Soft Component**

The soft components required are yet to be determined.

## **(3) Cost estimation**

The estimated project cost and the breakdown of the costs are yet to be determined.

## **(4) Expected Output**

As the objective of the project is to establish a training platform, it is planned to strengthen the system by increasing the number of partners in a step-by-step manner. Therefore, the following outputs are expected from this project.

- To establish the 'RICE Model' as a system, promote extension activities in collaboration with the central government, regional centres and local governments, and develop an environment in which training-related information can be accumulated in the central government.
- Aim to develop the 'RICE model' for other agricultural products as far as possible.
- Build up a role as a hub, for example by presenting solutions to challenges identified at the farmer level and also facilitating research to arrange the finding of solutions to challenges for which no solutions have been found, through research promotion.
- To strengthen the packaging, other aspects besides farming techniques will be strengthened in collaboration with other institutions, such as universities.

In addition, the Directorate-General for Extension will establish a system to manage formal training in an integrated framework.

## **(5) Obligation of Recipient Country**

- Allocation of activity budgets and acquisition of project codes for this purpose
- Hiring and staffing of new permanent staff for the operation of NAISE centres

## **(6) Point to be considered**

- The effect of the rainy season needs to be taken into account when considering the schedule of civil works.



## **Chapter 5 Cote d'Ivoire**

### **5.1 Outline of Cote d'Ivoire**

#### **5.1.1 Natural Conditions**

The Republic of Cote d'Ivoire, with a land area of 322,500 km<sup>2</sup>, is topographically situated in the south central part of the West African Shield. The Gulf of Guinea extends to the south of the country, bordered by Ghana to the east, Guinea and Liberia to the west, and Burkina Faso and Mali to the north. The elevation of the country gradually increases from the coast of the Gulf of Guinea to the interior parts of the country. The southern part of the country is a coastal plain, while the central and northern parts are hilly. The southwest and west-central areas are mountainous, including the country's highest peak, Mount Nimba (1,752 m above sea level). The southern coastal area of the Gulf of Guinea has a tropical climate, while the northern area has a semi-arid climate. The elevation of Yamoussoukro, the capital city located in the central part of the country, is 182 meters above sea level, and the average annual precipitation is approximately 1,100 mm.

#### **5.1.2 Social Economic Condition**

Prior to the COVID-19 pandemic, Côte d'Ivoire had one of the strongest economic growth rates globally during the 2012-2019 period, averaging 8% of GDP annual growth. The recent spread of COVID-19 had a negative impact on the economy of Cote d'Ivoire, with growth slowing to 1.8% in 2020. However, strong domestic demand and stable exports have driven the country's economic recovery, with GDP growth projected at 6.9% in 2022. The current main challenges are to create better jobs, improve the business environment, provide financing to the small and micro enterprises, build capacity in the agricultural sector, develop human capital, and implement a reform agenda that promotes sustainable and inclusive growth by promoting the private sector.

According to JETRO's analysis, the country is expected to maintain high growth at around 7% in the medium term after 2023, and under the PND (National Development Plan) 2021-2025, large-scale infrastructure investment and public works projects are ongoing, along with increased public investment and government spending built up in large budgets, private investment and domestic demand is expected to expand and boost growth through the expansion of public investment and government spending, which have been built up in large budgets, as well as through the support of private investment and personal consumption. By industry, production activity is expected to be generally strong in the agriculture, manufacturing, construction, energy, mining, telecommunications, transportation, and retail distribution sectors, reflecting firm domestic demand. On the other hand, production of cocoa beans, the largest export product, is expected to decline as the government tightens controls to limit production to a level of 2 million tons per year as part of its sustainable cocoa industry policy. In the manufacturing sector, there are concerns about the instability of raw material procurement due to disruptions in the global supply chain, which has been affected by the situation in Ukraine, as well as soaring gas and electricity prices. Against this backdrop, the IMF noted that "Côte d'Ivoire's economy is showing signs of an extremely high degree of resilience to the pandemic and a strong recovery."<sup>39</sup>

#### **5.1.3 Agricultural Condition**

Although 75% of the country's land is arable, 23% is actually uncultivated, which means there is plenty of room for expansion. The agricultural sector accounts for 25% of GDP and 60% of export earnings. Moreover, two-thirds of the country's population is employed in agriculture and fisheries. Agriculture in the country has been intensive and efficient since time before to the independence, and it continues to drive the country's economy. Major cash crops are cocoa, coffee, oil palm, coconut, rubber, cotton, sugarcane, pineapple, mango, papaya, and cashew nuts. Major food crops include rice, maize, cassava,

---

<sup>39</sup> <https://www.jetro.go.jp/biznews/2022/06/9be36578a55fcc50.html>, June 27, 2022

yams, bananas, soybeans, peanuts, taro, millet, sorghum, and vegetables. Among these, cocoa, coffee, rubber, cotton, palm oil, cashew nuts, and bananas are the country's export products. On the other hand, the country is dependent on imports of rice, wheat, maize, and dairy products.<sup>40</sup>

## **5.2 Outline of Agricultural Sector**

### **5.2.1 Laws, Policies and Development Plan relating to the Agricultural Sector**

The National Program for Agricultural Development (Plan Directeur de Développement Agricole: PDDA 1992-2015), which served as the basis for the country's agricultural policy from 1992 to 2015, presents agricultural policies and expenditures over the past 25 years. The PDDA has following three (3) pillars: (1) improving the competitiveness of the agricultural sector, particularly in terms of productivity; (2) food security (increasing food self-sufficiency); and (3) rehabilitating forest resources. The rural poverty reduction strategy since the devaluation of the local currency in 1994 ("Programme National de Lutte contre la Pauvreté" of June 1997, "Document Intérimaire de Stratégie de January 2002 Réduction de la Pauvreté (DSRP-I)" of January 2002). These documents focus on: (1) modernization of the agricultural sector; (2) withdrawal of public institutions and liberalization of the agricultural sector; and (3) investments in building and renovating rural infrastructure. In addition, laws and strategies were adopted or revised under the PDDA, including the Cooperative Law (1997), the Agricultural Land Law (1998), the 1988-2015 Forestry Master Plan (1988), and the Cotton Development Strategy (2008). The privatization of public agribusinesses was implemented, and by 1999 almost all of them had been sold to the private sector. This eliminated market monopolies and oligopolies. Coffee and cocoa pricing mechanisms were liberalized by automatically linking them to international prices, and the same principles were applied to the majority of agricultural exports. In addition, several measures have been taken to facilitate the modernization of agriculture, the organization of farmers, and the introduction of more effective management practices. Specifically, the establishment of the Agence Nationale d'Appui au Développement Rural (ANADER) which is a centralized extension and extension agency, the Centre National de Recherche Agronomique (CNRA) which is a funding mechanism for innovative research and extension financed by a levy on major export crops, and the establishment of the Fonds Interprofessionnel pour la Recherche et le Conseil Agricoles (FIRCA), which is a funding mechanism for innovative research and extension financed by a levy on major export crops, and the promotion of cooperatives and producer associations.

Plan National de Développement (PND) is a national-level development plan developed at the initiative of President Watala, who took office in 2011, and to date, PND2012-2015 and PND2016-2020 have been developed and implemented. Recently, PND2021-2025 was formulated, which outlines the following "six strategic pillars": (1) Accelerate economic structural transformation through industrialization and development of industrial clusters; (2) Promote human resource development and employment; (3) Private sector development and investment; (4) Strengthen inclusion, national solidarity, and social action; (5) Balanced regional development, environmental protection, and climate change action; and (6) Strengthen governance, national modernization, and cultural transformation. With regard to the first pillar, "Accelerating Economic Structural Transformation through Industrialization and Development of Industrial Clusters," the importance of strengthening public-private partnerships is stated, and the agricultural sector is selected as one of the target sectors and areas, with the goals of making the country's agriculture sustainable and competitive, equitable distribution of wealth, and Achieving self-sufficiency in rice is emphasized. Agro-industry is one of the "seven priority industrial clusters" selected in terms of economic potential, and rice is one of the targeted crops. The basic strategy for economic restructuring in the agricultural sector refers in particular to agro-poles and value chains. The three (3) policies for agricultural value chain development are: (1) implementation of policies for production and processing of agricultural products through the creation of nine agropoles; (2) establishment of rice poles and intensification of sugar production; and (3) improvement of processing rates of commodity crops such as cocoa, coffee, cashew nuts, cotton, mango, pineapple, desert banana, rubber, palm oil, and others. In addition, the Economic Structural Transformation

---

<sup>40</sup> <https://www.selectusa.gov/article?id=Cote-d-Ivoire-Agricultural-Sectors>, Mar 26, 2019

Strategy for the Agriculture and Rural Development Sector includes the following eight items: (1) Increase productivity of food and cash crops; (2) Rapid development of aquaculture to reduce fish imports and become an exporter; (3) Formalization of agricultural professionals; (4) Achieve self-sufficiency in high quality rice; (5) Increase mechanization rate in the rice sector; (6) Establish an agricultural statistics information collection system; (7) Implement 9 agropoles (agricultural product production and processing centres); (8) Establish an agricultural insurance system.

Programme National d'Investissement Agricole (PNIA2), approved in 2016, is a coherent framework for planning public and private investment in the agricultural sector, covering the agriculture, livestock, fisheries, aquaculture and environmental management sectors. The overall goal of the investment plan is to reduce poverty and eradicate hunger through growth in each sector. In formulating this plan, continuity with the following frameworks developed at the international and national levels is indicated: (1) the Comprehensive Africa Agriculture Development Program (CAADP); (2) ECOWAP which is an agricultural policy for West African states formulated by ECOWAS; (3) the Malabo Declaration which is adopted at the African Union Summit 2014; (4) the Sustainable Development Goals (SDGs); (5) ECOWAP+10; and (6) the PND 2016-2020. PNIA2 emphasizes the achievement of the following three strategic goals: (1) creating added value in agriculture, forestry, livestock, and fisheries; (2) strengthening environmentally friendly agriculture, forestry, livestock, and fisheries; and (3) guaranteeing inclusive rural development and the well-being of the population. In order to achieve these goals, the following five implementation principles are also outlined:

(1) Strengthen governance structures for policy and investment planning, program formulation, and monitoring and evaluation in the agricultural sector; (2) Integration of private sector participation and entrepreneurship development through integration of business needs; (3) Vertical integration to improve synergies among research, production, and processing activities; (4) Strengthening the ability to coordinate the agricultural sector with related sectors, especially the environmental and social sectors, through horizontal integration; and (5) Regional integration, taking into account the characteristics of each region of the country. PNIA2 consists of the following six investment programs, with a planned investment in the agricultural sector of 4,325.4 billion FCFA for the period 2018-2025: (1) productivity improvement and sustainable development of agriculture, forestry, livestock, and fisheries; and (2) value addition and market performance improvement; and (3) Sustainable management of environmental resources and climate resilience; (4) Improvement of living conditions of people involved in agriculture, forestry, livestock, and fisheries and promotion of the sector; (5) Improvement of the access to finance and private investment; and (6) Strengthening of the institutional framework, improved governance of the agricultural sector, and enhancement of the business environment. PNIA2 also describes the vision for the concept of Agropole development, as well as the characteristics and plans for the nine (9) target zones of the Agropole. Under the vision of "investing in environmentally friendly agriculture, forestry, livestock, and fisheries that benefit all stakeholders based on local needs and potential," 31 regions in the country are divided into 9 zones in terms of agro-ecological, administrative, social, and economic perspectives, and each of the 9 zones is targeted for investment in terms of both food security and value-added creation. For each of the nine zones, priority sectors are selected for investment from the perspective of both food security and value-added creation (for each zone, (1) target food crops, (2) target cash crops, and (3) target livestock, poultry, and fishes).

In 2015, with the support of JICA, the Ministry of State and Agriculture and Rural Development (MEMINADER) developed a Stratégie Nationale de Développement de la Mécanisation Agricole (SNDMA) in line with the above mentioned PND and PNIA. The SNDMA outlines the current status and challenges of agricultural mechanization in the country, and presents strategic objectives and three strategic axes. The SNDMA emphasizes the use of the private sector and presents the following five objectives: (1) Creation of a favourable environment for the development of agricultural mechanization; (2) Promotion of agricultural mechanization that takes into account the needs of farmers and the agro-ecological conditions of farmland; (3) Diffusion of mechanized agriculture in the targeted farmlands, (4) Reduce farmers' workload and increase their income; and (5) Promotion of private sector participation in the agricultural machinery sector. The three strategic axes are also as follows: (1) Improving farmers' access to agricultural mechanization services; (2) Providing training for those

involved in the agricultural machinery sector; and (3) Improving related institutional and regulatory frameworks. SNDMA stated the promotion of the provision of wage cultivation services to farmers by Petites et Moyennes Entreprises Agricoles (PMEAs) and showed the specific activity proposals for axe (1) and axe (2) in particular: supporting for PMEAs seeking loans and provision of training for PMEAs. As of June 2022, based on the SNDMA, the agricultural machineries for leasing to PMEAs procured by ADERIZ under the Programme d'Urgence Riz 2020 (PUR 2020) and JICA technical cooperation project (PRORIL2).

### 5.2.2 Implementation Status of the NRDS

The NRDS, which represents the country's rice promotion plan under the CARD framework, was released in 2011 as the "Revised SNDR 2012-2020" (hereinafter referred as the "Ex-NRDS").

The Ex-NRDS presented a vision of "meeting domestic rice demand with domestic rice that is higher quality and more competitive than imported rice, securing rice reserves, and exporting surplus rice. It also set a goal of domestic self-sufficiency in rice from 2016 onward through domestic production of 1.9 million tons of polished white rice. However, the self-sufficiency rate was only about 50%, as production was only 1.3 million tons compared to the higher-than-expected domestic rice consumption (2.65 million tons). Based on the lessons learned from the Ex-NRDS, finalizing work of the NRDS 2022-2030 (hereinafter referred to as the "revised NRDS") is currently underway. According to the document prepared for stakeholders in September 2021, the four specific goals of the revised NRDS are as follows: (1) Increase the area of modern irrigated paddy fields; (2) Increase rice productivity; (3) Improve rice quality; and (4) Strengthen monitoring, financing, and governance capacity in the rice sector.

In addition, the following key planning indicators indicate the future outlook for the production of domestically produced rice, and show the achievement of 100% self-sufficiency in rice by 2025.

**Table 5.1 Major planned indicators for domestic rice production**

Items / Year	2023	2025	2030
Cultivated Area (ha)	853,057	937,188	987,931
Paddy Production (t)	2,989,837	3,855,425	4,786,737
Milled Rice Production (t)	1,937,863	2,534,200	3,212,700
Rice Consumption (t)	2,388,784	2,512,166	2,849,224
Rice Consumption / Milled Rice Production (%)	81	100	113

Source: Survey Team (based on internal documents prepared by ADERIZ)

There are 15 projects related to CARD that have been identified (see Table 5.3 List of Rice-related Projects in Cote d'Ivoire), 6 of which are private sector investment projects. Progress has been made in the areas of seed production and post-harvesting as a result of the implementation of these projects. For the seed production subsector, policies have been developed with the support of CARD to improve seed supply by increasing the coverage of certified seed from 5% to 10% of the total area under cultivation. Further improvements are expected with the seed coordination centre project currently underway in Yamoussoukro. In addition, increased investment by the private sector is slowly but surely improving post-harvest processing capacity and rice quality. On the other hand, access to credit and finance at the farm level has not improved much, and banks are still reluctant to extend loans.<sup>41</sup>

### 5.2.3 Rice Food Value chain Analysis

During the 2008 world food crisis, the price of rice tripled in a matter of months, prompting the government of Cote d'Ivoire to formulate the NRDS. The NRDS indicates that the government aims to achieve self-sufficiency in rice by overcoming its dependence on imports for more than half of the

<sup>41</sup> Coalition for African Rice Development (CARD) Final Review Assessment, Mar 2018

country's rice needs. It also lays out a private sector-led value chain development approach with rice mills as the entry point to enable a large supply of high quality white rice to meet urban rice demand, with emphasis on enhancing market development as well as improving productivity and processing quality for rice farmers. While rice is grown throughout the country, including by the poorest farmers, the production pattern remains labour-intensive, and there is significant room for productivity improvement given the large differences in yield per hectare depending on the type of field (see 5.3.1 Irrigation Facilities (2) Rice).

**Table 5.2 Average unit yield of different field type**

<b>Type of Production Fields</b>	<b>Average Unit Yield / ha</b>
Perimeter	5 t / ha
Bas-fond	3.5 t / ha
Dry Paddy Field	1.5 t / ha

Currently, about 80% of paddy rice in Cote d'Ivoire is milled by small-medium sized rice millers (milling capacity: ~1.5t/h) in regional cities and rural villages as a service business for rice farmers and rice distributors. The rice milling units used by these local rice millers vary in specifications and maintenance conditions of the milling machines. The quality control system for milled rice also varies widely from mill to mill. In order to compete with imported rice from Vietnam and other countries sold in supermarkets in urban areas, it is necessary to significantly improve the processing quality of domestic milled white rice while keeping the selling price low. An important challenge facing many rice millers in Côte d'Ivoire is the payment of rice farmers when rice paddy is procured.

Many small and medium rice mills run their mills based on demand for milled rice from rice distributors. In some cases, rice distributors do not pay rice millers for milled rice until the milled rice they procured is sold in the market. This form of payment between each actor (rice farmers, rice millers, and rice distributors) makes it difficult for rice millers with insufficient working capital to purchase sufficient quantities of paddy to meet urban rice demand.

It is a widespread practice for rice farmers to purchase production inputs such as seeds and fertilizers in kind from rice mills on a deferred payment basis and settle the payment at the time of paddy sales. For rice mills in rural areas, their competition when purchasing paddy rice is not only rice millers in the same area, but also rice distributors in other areas. Rice distributors tend to have large amounts of cash and will offer prices well below what small-medium rice millers want them to pay for their paddy. Smallholder rice farmers who need immediate cash for their livelihoods often unwillingly sell paddy to these rice distributors, making it impossible for them to repay the rice millers for inputs such as fertilizer and seeds received from the millers, leading to a decline in smallholder rice farmers' motivation for continuing rice production.

Most rice distributors in Cote d'Ivoire procure milled rice for selling in the local market, and their quality requirements are generally limited. As a result, distributors are less motivated to provide rice farmers with the inputs they need to improve quality (e.g., technical advice, and credit for high-quality seeds and fertilizers). In addition, rice millers located in rural rice farmers' associations tend to mill only the rice produced by the members of their association, and the utilization rate of the rice milling units is lower than that of the millers located in urban areas.<sup>42</sup>

#### **5.2.4 Progress of Support to Rice Sector**

The projects being implemented in line with the NRDS are listed in the table below; 6 of the 15 projects are privately funded.

<sup>42</sup> <https://blogs.worldbank.org/jobs/rice-cote-divoire-big-business-depends-small-firms>, NOV 14, 2019

**Table 5.3 List of Rice-related Projects in Cote d'Ivoire**

No.	Name of Project	Donor / Organization	Duration	Modality	Budget (billion FCFA)	Target Area	Activity / Output
1	Rice Emergency Program	Government	2008-	Subsidy	1.2 in 2015	Whole country	Irrigation scheme development; acquisition of inputs; processing equipment and seed conditioning units; promoting mechanization
2	Agricultural Rehabilitation and Poverty Reduction Project (PRAREP)	IFAD / BOAD / Government	2009 - 2014	Grant	17.0 (25.63 Million USD)	Bandama Valley district, Savanes district, Zanzan district	Restoration and construction of rural infrastructure, distribution of agricultural machinery and seeds (including installation of small rice milling machines)
3	Agricultural Infrastructure Support Project of the Indenie-Duablin Region (PAIA-ID)	AfDB	2012-	Subsidy	18.34	Comoe district(Abengourou, Agnibilekro, Betie)	Development of 923 ha irrigated area; acquisition of processing and mechanization equipment
4	Rice Development Program	Singapore Gaelic Lions	2013-	Private Investment	2	Comoe district ( Bondoukou , Agnibilekro , Abengourou ) Zanzan district (Tanda)	Installing a hulling mill and supporting 7,500 rice farmers
5	Local Rice Production Project	OLAM/ IG8	2013-	Private Investment	25	Bandama Valley district (Gbeke) , Lacs district (Iffou)	Process started but is currently suspended
6	Rice Development Project	Louis Dreyfus Commodities	2013-	Private Investment	22	Savane district (Tchologo, Poro, and Bagoue)	Establishment of a pilot farm; establishment of a pilot farm input distribution; purchase of paddy and rice processing; marketing
7	Local Rice Production and Marketing Project	YANO VEL	2013-	Private Investment	63	Belier	Creating a farm for mechanization and a seed centre; rehabilitation and extension of the irrigated perimeters on 15,000 ha; establishment of a complete processing rice unit and implementation of storage units
8	Rice	AMC	2013-	Private	N/A	Bas-Sassandra	Processing capacity:

No.	Name of Project	Donor / Organization	Duration	Modality	Budget (billion FCFA)	Target Area	Activity / Output
	Development Project			Investment		district (Nawa, Gbokle)	60,000 tons/year
9	Project for the Promotion and Marketing of Local Rice	GAN LOGIS	2013-	Private Investment	N/A	Lacs District (Moronou), Lagune district (Lame), Come district (South Comoe)	Development of 560 ha of irrigated area; purchase of paddy processing and marketing
10	Local Rice Promotion Project (PRORIL)	JICA	2014 - 2019	Technical Cooperation	2.4 (500 million JPY)	Abidjan, Yamoussoukro, Belier, Gbeke	1. Stakeholder engagement is increased; 2. Knowledge / technology acquired through trainings are utilized by target group; 3. Capacity of selected producers, processors and distributors is strengthened, 4. Rice promotion by stakeholders is accelerated
11	Partnership for Sustainable Rice Systems Development in Sub-Saharan Africa (Cote d'Ivoire)	Venezuela / FAO	2016 - 2018	Grant	0.23 (0.35 million USD)	Abidjan, Gagnoa, Daloa, Sinfra, Yamoussoukro	Intensification of rice production in rainfed cultivation areas
12	Project to Set Up a Platform for Rice Stakeholders	NEPAD /GROW AFRICA	2017-	Subsidy	N/A	Whole country	Implementation of a platform of all
13	2 PAI-Belier	AfDB / AfDF / Government	2018 -	Loan, Grant, Government Budget	6.45 (9.7 million USD)	Belier	The project includes the renovation of three reservoirs, irrigated paddy fields and bas-fonds (total 1,835 ha), and farm roads.
14	programme d'Urgence Riz (PUR) 2020	Government	2020	Government Budget	16.2	Whole country	Support for Agropoles, purchase of agricultural equipment to be leased by ADERIZ to PME, etc.
15	Local Rice Promotion Project (PRORIL 2)	JICA	2021-	Technical Cooperation	3.84 (800 million JPY)	Abidjan, Yamoussoukro, Belier, Gbeke	Expansion of financial services for rice millers and dealers; and Improved seed production and post-harvest handling; and Improvement of appropriate agricultural machinery installation and maintenance

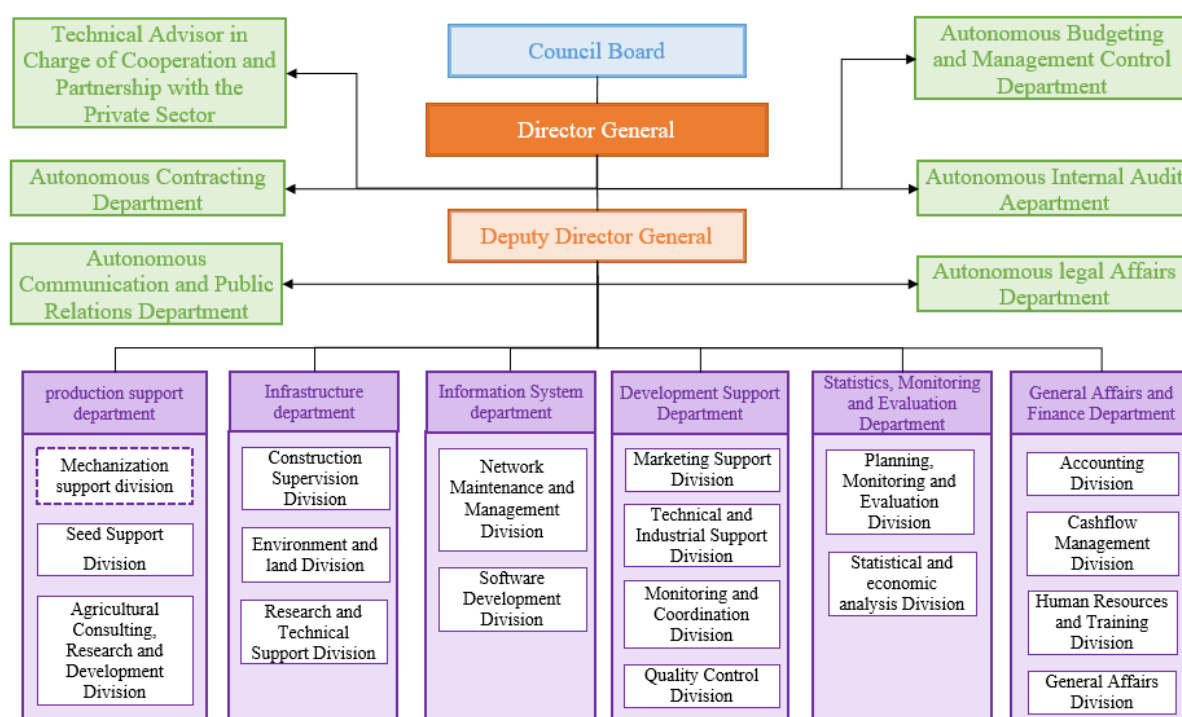
No.	Name of Project	Donor / Organization	Duration	Modality	Budget (billion FCFA)	Target Area	Activity / Output
							techniques; and Development of agricultural machinery services

Source: Coalition for African Rice Development (CARD) Final Review Assessment, Mar 2018 / Information from ADERIZ

### 5.2.5 Implementation Structure of Rice sector

Agence pour le Développement de Filière Riz (ADERIZ) was established by the Decree No. 2018-10, published in January 2018, taking over the overall operations of the Office National de Développement de la Riziculture (ONDR) which was established in 2010. ADERIZ has a working agreement with the Ministère d'Etat, Ministère de l'Agriculture et du Développement Rural (MEMINADER) and has been given the role of implementing agency for the NRDS. ADERIZ is under the technical supervision of the MEMINADER and the financial supervision of the Ministry of Budget. ADERIZ is the central organization for rice sector development in Côte d'Ivoire. Although ADERIZ inherited most of its human resources from its predecessor, ONDR, it has been reorganized to be more like a private organization in terms of administrative and budgetary procedures. ADERIZ is now more flexible in its operations than its predecessor ONDR, while retaining its independence as a specialized agency.

As shown in the figure herein below, the organization is headed by the Director General, under the supervision of the Audit Advisor, and consists of six departments: the Production Support Department, the Agricultural Development Department, the Information System Department, the Development Support Department, the Statistical Monitoring and Evaluation Department, and the General Affairs and Finance Department.



Source: ADERIZ

Figure 5.1 Organization chart of ADERIZ



## 5.3 Current Status and Issues in the Agricultural Sector

### 5.3.1 Irrigation Facilities

#### (1) General

Ninety-eight percent (89 %) of the crops are grown with rainwater, and irrigation is mainly applied to horticultural and cash crops. Of the total irrigable area of 475,000 ha, only 73,000 ha (15%) have irrigation systems in place, and only 45% of these fields are actually irrigated.<sup>43</sup> The irrigation potential of Cote d'Ivoire was studied in detail by MINADER in 2005, and a national irrigation plan was developed. The plan stated that approximately 3,000 hectares of irrigated areas would be rehabilitated and 139,000 hectares of new irrigated areas would be developed. The total investment required for development is \$1.657 billion, with an average investment of \$11,600 per hectare.<sup>44</sup>

#### (2) Rice

Rice cultivation in Cote d'Ivoire can be classified into three types in terms of fields: (1) bas-fonds (small paddy fields developed by farmers in consideration of the natural topography); (2) perimeters (modern irrigated paddy fields developed based on design); and (3) dry paddy fields (upland). The word "bas-fonds" is generally translated as "lowland" in French, but locally it is understood to mean "small inland lowland". On the other hand, "bas-fonds" as agricultural land refers to fields formed in the riverbeds and outer edges of small inland lowlands that have been modified through the efforts of rice farmers to allow irrigated rice cultivation in the rainy season. Bas-fonds are basically a small inland lowland riverbed and outer edge area with relatively little elevation difference and gentle slope that has been cultivated as irrigated rice fields through repeated trial and error without major modification to the natural terrain. As a result, the watering of each paddy field plot tends to be irregular. "Perimeters", on the other hand, refer to the modern irrigated rice fields in bas-fonds where reservoirs, water intake facilities, canals, drainage channels (using natural rivers in general), paddy fields, and farm roads have been constructed to enable irrigated rice cultivation in the dry season. Perimeters are characterized by the availability of a stable and abundant water source and the possibility of two-season cropping. "Dry paddy fields" are plots for the cultivation of upland rice, and such rice cultivation relies solely on natural rainfall. The table below shows the area of plots by type in Cote d'Ivoire as of 2021. Nationally, dry paddy fields account for nearly half of the total area, and perimeters account for only about 4% of the total.

**Table 5.4 Area of rice plots by field type throughout Cote d'Ivoire, 2021**

	Perimeters	Bas-fonds	Dry paddy fields	Total
<b>Area of rice plots (ha)</b>	27,235	327,949	318,009	673,193
<b>Percentage (%)</b>	4%	49%	47%	100%

Source: the survey team based on the data from ADERIZ

### 5.3.2 Agricultural Machinery

According to SNDMA, as of 2015, there were 3,247 pieces of agricultural machinery in the country, of which 1,624 (50%) were tractors, 1,070 (33%) were tillers, and 553 (17%) were others machineries (mowers, harvesters, grass cutters, etc.). As for attachments for tractors, trailers for transport accounted as the largest number (47%), sprayers (21%), and seeders (13%). Tractors and tillers accounted for 68% of the machines actually in operation, meaning thereby that 1/3 of them are out of service or under repair. Tractors are mostly used for cotton, cashew nuts, sugarcane, etc. in the Northern provinces, followed by coffee, cocoa, etc. in the Southern provinces, with limited use in rice-growing areas in the Central provinces. On the other hand, tillers are mainly used for rice cultivation, and in contrast to tractors, there are more than 100 tillers in the Gbeke, Belier, and Ifu provinces, about 50 in the surrounding provinces of Haut-Sassandra, Marahoué, and Hambol, followed by the Northern provinces, and almost none in the

<sup>43</sup> Climate-Smart Agriculture Investment Plan, COTE D'IVOIRE, 2019

<sup>44</sup> Climate-Smart Agriculture Investment Plan, COTE D'IVOIRE, 2019

south. This is thought to be because tillers are used mainly in rice-growing areas. Although the use of tractors is ideal in terms of efficiency of field plowing operations, tillers are still needed in fields where the area of one plot is too small to use a tractor. The number of both tractors and tillers is quite inadequate, and human-powered cultivation is still in practice to a large extent. As a challenge, with the exception of craft and cash crops for export such as cacao, coffee, palm oil, and cashew nuts, there is little use of agricultural machinery, and many machines are out of service due to breakdowns. There are also few entities that can provide plowing and harvesting services utilizing agricultural machinery to farmers. The reason is that farmers and small-scale agricultural machinery service providers do not possess sufficient funds to purchase machinery and have limited access to long-term financing from the bank. In addition, small agricultural machinery is often made in China, and after-sales service systems are not well established.

Government and donor agencies effort to mechanize rice cultivation in the country include the provision of agricultural machinery through government agencies such as ADERIZ and donor projects, as well as value-added tax exemptions. ADERIZ is in charge of implementing projects in the rice sector and is the implementing agency for donor assistance in the rice sector. Until now, tillers, threshers, combine harvesters, harvesters, and drying sheets, mainly made in China with low prices, have been procured by the project and distributed free of charge to producer associations, but there have been many issues with the designing systems, the quality of the agricultural machinery itself, and after-sales service. In recent years, there has been a trend to avoid procuring low-priced but poor quality Chinese-made agricultural machinery such as tillers, tractors, and combines. PROPACOM, which is the project implemented by IFAD, procured 66 Brazilian-made tillers (former Brazilian Yanmar, now Agri-Tech) recently. In 2020, ADERIZ procured tractors, combines, mini-combines, harvesters, threshers, and tillers to be leased to PMEAs under the COVID-19 related emergency program (Programme d'urgence Riz 2020: PUR2020), and the leasing of these machines from ADERIZ to PMEAs is now being implemented. In addition, mini-combine harvesters, tillers and threshers are also procured under the JICA's technical cooperation project PRORIL2, and are now being leased to several PMEAs in line with ADERIZ's lending system. It is worthwhile to note that the majority of these agricultural machinery procured after 2020 are products of European and Japanese manufacturers made in Indonesia, Thailand, and India.

### **5.3.3 Agricultural Inputs**

#### **(1) Fertilizer**

Although Cote d'Ivoire tends to consume higher amounts of fertilizers per unit area than other sub-Saharan African countries, the fertilizers are mainly used in plantation farms such as cacao, and the use by small and medium-sized rice farmers is limited. Even when they do use fertilizers, in the majority of cases, the amount of fertilizer applied is less than the recommended amount. Recommended fertilizer amounts are 150 kg of NPK (10-24-18) and 100 kg of urea per hectare. In some irrigated areas supported by donors and private companies, the recommended fertilizer amounts are provided in the form of credits, but for many rice farmers, securing the necessary funds to use fertilizers and other agricultural inputs is a challenge. Farmers are concerned about the cost of inputs due to the low selling price of rice. As part of the emergency program for COVID-19, agricultural inputs are being provided to rice farmers. The program covers 120,000 ha, and 20,000 ha are irrigated paddy fields. Through this program, 3,000 tons of NPK fertilizer and 2,000 tons of urea fertilizer were distributed. Moreover, 6,000 tons of fertilizer, 15,000 liters of herbicide, and 4,400 tons of seeds were distributed for 100,000 ha of bas-fonds. Based on the calculation that rice farmers cultivate 0.5 ha/person, it is estimated that 200,000 - 300,000 rice farmers benefited from this program.

#### **(2) Seeds**

Certified rice seed production in the country is led by ADERIZ. It consigns the cultivation of certified seeds to contract farmers with fertilizers and purchases rice seeds from the farmers. The rice seed is bagged, and temporarily stored at the rice seed conditioning centre before being sold to the rice farmers. The seed conditioning centre is located in Yamoussoukro and it supplies only a few percent of the

country's needs. There are plans to add six more conditioning centres throughout the country to expand the supply system of certified rice seeds. While many farmers in the irrigated rice-growing areas around the seed conditioning centres in Yamoussoukro use certified seed, farmers in the bas-fonds and upland rice-growing areas use home-grown seed or seed purchased from local rice seed farmers. It could be said that the access to quality certified rice seed among rice farmers in this country remains limited.

### 5.3.4 Status of Implementation of Grants to Assist Poor Farmers

In Cote d'Ivoire, 2KR program was implemented continuously from 1986 to 1999 as food increase aid. Since then, 2KR has not been implemented due to political instability caused by the civil war. The table below shows the results of 2KR implemented to date.

Table 5.5 2KR program for Cote d'Ivoire

Year	1986~1995	1996	1997	1998	1999	Total
E/N (100 million Yen)	32.50	5.00	4.50	4.70	4.50	51.20
Procurement Items	- Fertilizers - Agrochemicals - Agricultural Machinery	- Fertilizers - Agrochemicals - Agricultural Machinery	- Fertilizers - Agrochemicals - Agricultural Machinery	- Fertilizers - Agrochemicals - Agricultural Machinery	- Fertilizers - Agrochemicals - Agricultural Machinery	—

Source : Report on the Preparatory Survey for the Assistance to Poor Farmers in the Ivory Coast Republic (2KR)", ODA Country Data Book, Ministry of Foreign Affairs of Japan.

The procurement items in 2KR included fertilizers and pesticides for intensive farming and their application equipment, agricultural machineries such as tillers for paddy fields, and irrigation equipment. Cote d'Ivoire's major cash crops are coffee and cocoa, and staple crops are yams, plantain, cassava, rice, and maize, etc. When the 2KR program was implemented, the country's food production policy gave top priority to increasing rice production, and the promotion of irrigation, dissemination of quality rice seeds, mechanization, and intensification were the mainstays of the policy. The main beneficiaries of the program were small scale rice farmers, who were responsible for local rice production. Procured equipment and materials were distributed to rice farmers on a priority basis, particularly for mechanization and intensification. The target areas of the program cover the entire country.

The 2KR program was administered by the Ministère de l'Agriculture et des Ressources Animales (MINAGRA, now MEMINADER). Since 1996, the 2KR management office has been established in the Projet National Riz (PNR) to manage equipment and materials on a self-financing basis.

## 5.4 Proposed Project Plan: Project for Strengthening of Rice Value Chain

### 5.4.1 Overview of the survey area

#### (1) Project Outline

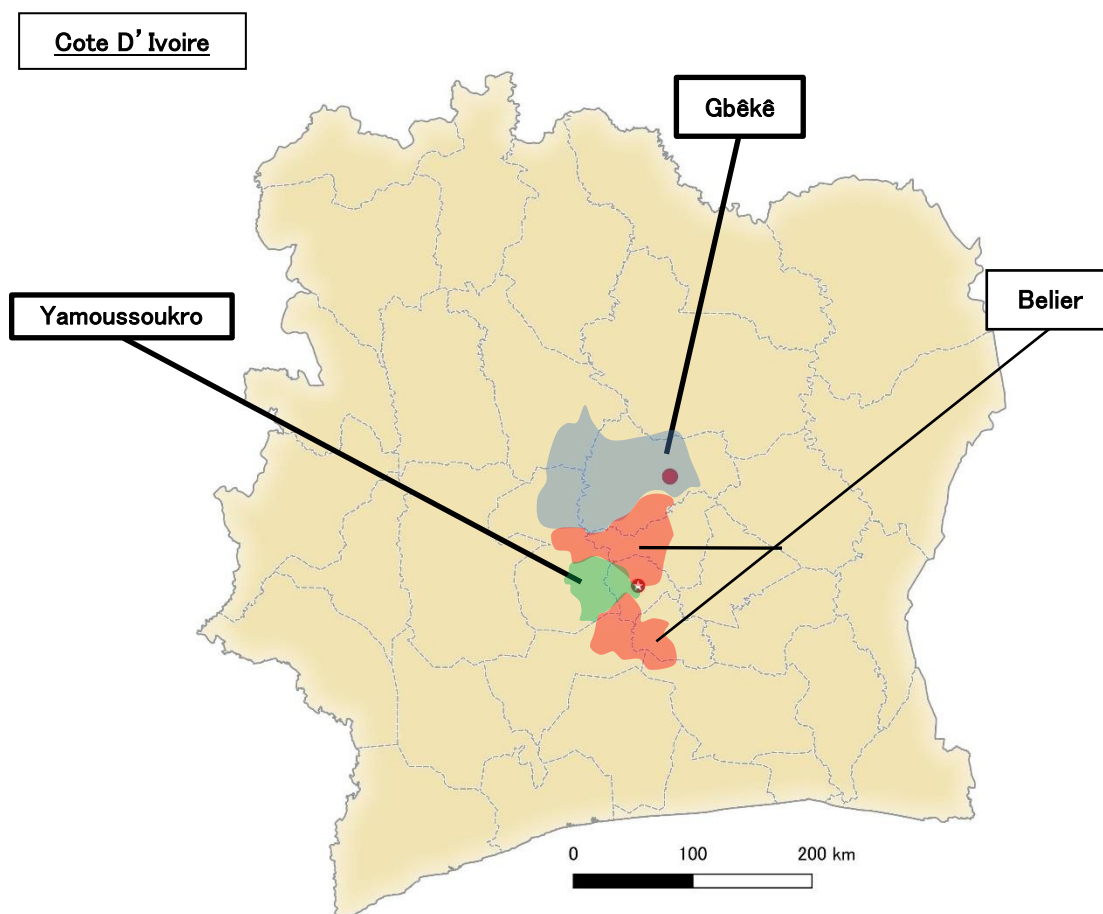
- Country Name: Republic of Cote d'Ivoire ("Cote d'Ivoire")
- Name of Target Areas: Yamoussoukro / Gbêkê / Berrié
- Project Name: The Project for Strengthening of Rice Value Chain
- Project Summary: The project aims to increase local rice production that can compete with imported rice by producing superior rice seeds, improving rice productivity, and improving harvesting and post-harvest processing techniques. The total estimated project cost is approximately 825 million yen.
- Background of Project Planning: The revised SNDR sets targets to achieve self-sufficiency through high-quality domestic rice by 2025 and to become a rice exporter to other African countries by 2030. The SNDMA, a sectoral strategy document on mechanisation, emphasises the use of the private sector, in particular improving farmers' access to agricultural mechanisation services, providing training to actors in the agricultural machinery sector, improving relevant regulations,

and proposes support to PMEAs working as service providers. JICA implemented PRORIL to improve rice production and milling practices, improve access to inputs such as quality seeds and credits, strengthen collaboration among value chain actors, and increase rice production and sales through domestic rice marketing promotion activities. As a result, the project has achieved a 50% increase in the production and sales volume of target farmers compared to the before the project, promoted the involvement of financial institutions in the rice sector, and strengthened collaboration among value chain actors. PRORIL2, which was launched based on these results, aims to improve the quality of domestic rice to competitive with rice imports from Asia and further promote domestic rice value chain, and continues efforts through technical guidance and institution building for the PMEAs that form the core of the project. It is expected that increasing number of experienced companies and machinery owners will be able to further promote mechanisation based on the continuation of the Government's programme promotion activities and capacity development activities by PRORIL2, although the number of PMEAs providing agricultural mechanisation services in the rice sector remains at 13 companies. The draft project plan is associated with this government policy and expectations and the project activity of PRORIL2, which is well timed and will accelerate it.

## (2) Project Site

Target areas are PRORIL2 target regions and surrounding areas

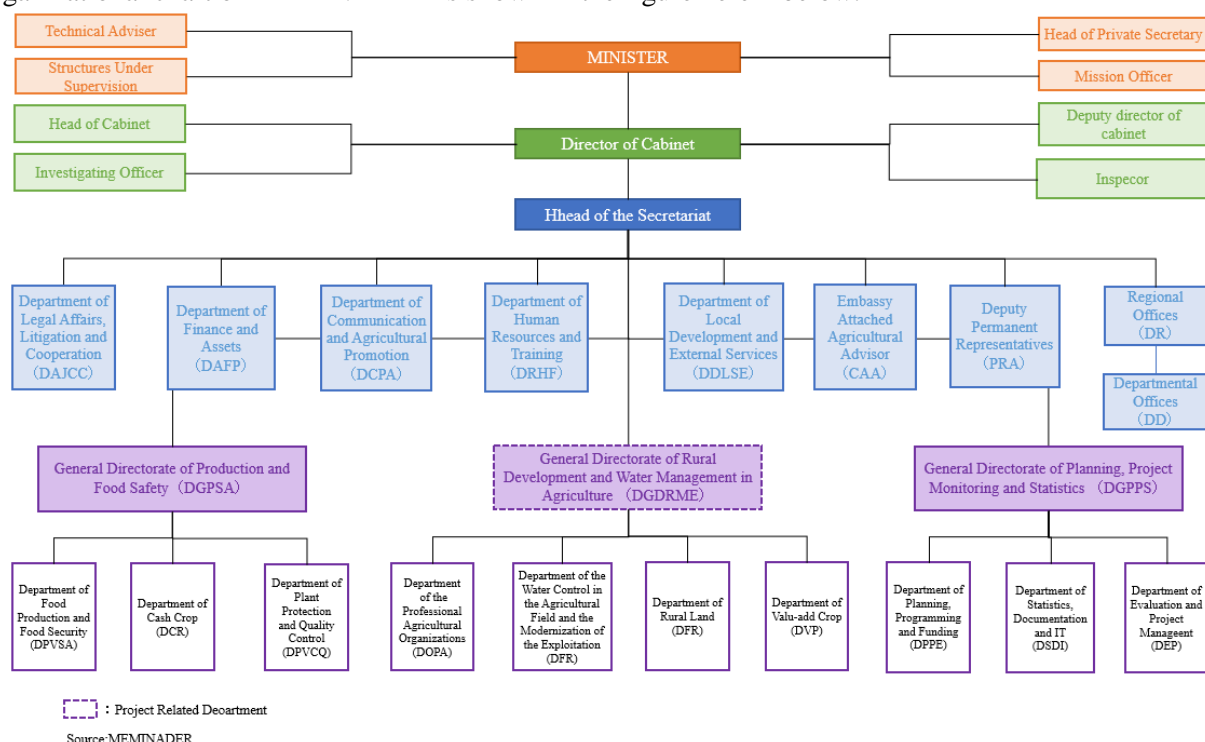
- PRORIL 2 target regions: Yamoussoukro / Gbêkê / Berrié
- Major rice producing areas around the above target regions



**Figure 5.2 Target Areas (Cote D'Ivoire)**

### (3) Implementation/Responsible Agency

The project implementing agency is the Ministry of State and Agriculture and Rural Development (Ministre d'Etat, Ministre de l'Agriculture et du Développement Rural: MEMINADER). The organizational chart of MEMINADER is shown in the figure herein below.



**Figure 5.3 The organizational chart of MEMINADER**

The main offices of the Ministry are the Directorate General of Production and Food Security (DGPSA), the Directorate General of Rural Development and Agricultural Water Use (DGDRME), and the Directorate General of Planning, Statistics, and Business Management (DGPPS). In addition, there are regional agricultural bureaus at the provincial level and agricultural bureaus at the district level. The total number of employees was 336 as of 2016.

#### 5.4.2 Current Status and Issues

##### (1) Rice Superior Seeds

In NRDS-1, it was noted that certified rice seeds are used in only 7% of rainfed rice production areas, which account for about 95% of the total rice production area (about 600,000 ha). In response to this, PRORIL2 aims to improve the quality of domestically produced rice and strengthen its competitiveness against imported rice. With regard to the production of quality seed, which is the upstream of the rice value chain, the plan is to develop seed production plots and strengthen the capacity of seed producers to support farmers to produce and renew quality seed on their own. These measures will make it possible to produce high-quality domestic rice. It is also expected that the production of high-quality rice seeds will improve the germination rate and productivity (NRDS-1 is expected to improve productivity by 30%). On the other hand, there is a lack of equipment necessary for threshing, drying, conditioning (milling, sorting and so on), and storing after harvest, which is an issue that needs to be resolved.

##### (2) Agricultural mechanization in rice cultivation

In Cote d'Ivoire, the shortage of labour for agricultural work related to rice cultivation during the busy farming season is becoming a serious problem. Insufficient labour is causing farmers to miss the optimum time for plowing and harvesting, resulting in reduced yields and other problems. In addition,

labour costs are on the rise, putting pressure on rice farmers' profits. Therefore, agricultural mechanization of field operations is indispensable for improving labour productivity and land productivity. On the other hand, it is difficult for individual rice farmers to purchase agricultural machinery on their own due to the increased technical and economic burdens. Given this situation, the government of Cote d'Ivoire plans to solve these problems by increasing the number of service providers of agricultural machinery services to the local farmers.

The NRDS-1 includes the promotion of “Small and Medium Agricultural Enterprises” (Petites et Moyens Entrepreneurs Agricoles: PMEAs). One of the main strategies of the Rice Agricultural Mechanization Strategy (Stratégie Nationale de Développement de la Mécanisation Agricole: SNDMA) is to promote access to agricultural machinery for small local rice farmers. Highlighted in the description of its implementation approach is the partnership between PMEAs and ADERIZ. ADERIZ started preparing an agricultural machinery service project with PMEA in 2018. This preparation included the development of selection criteria for PMEAs that can borrow agricultural equipment from ADERIZ. Subsequently, agricultural equipment for leasing was procured using funds from the Emergency Program for Rice Cultivation in 2020 (PUR2020), which is part of the COVID-19 measures, and the equipment leasing project to registered PMEAs began in 2021.

Although small in number, there have been mechanization service providers before start of PMEA program. The operators providing agricultural machinery services range from small local companies, which have been providing wage cultivation services for many years in response to rice farmers' requests, to some newly established organizations in recent years as the agricultural business department of large corporations. The current number of PMEAs registered with the government is limited to 15, but is on the rise, with some organizations awaiting registration certification. The agricultural mechanization support currently being implemented by PRORIL2 is also taking an approach in line with the government strategy described as above, with plans to continue strengthening the capacity of agricultural machinery service providers in the region including PMEA. It is expected that the government's ongoing activities to promote this program and PRORIL2's activities will increase the number of experienced PMEAs with registration.

### **(3) Post-harvest processing equipment and technology**

Cote d'Ivoire is aiming to increase domestic rice production to compete with imported rice, and improving milling quality and productivity are major issues. In particular, there is a great need to improve the drying method, which affects the incidence of crushed rice during milling. In this country, the drying method of paddy rice after harvest is generally sun-drying. Because sun-drying dries the raw paddy under unstable weather conditions, it is difficult to delicately adjust the moisture content of the paddy, and this is considered to be the cause of the occurrence of broken rice due to over-drying. ADERIZ has been experimenting with different dryers, but due to budget shortfalls, full-scale introduction has not yet been achieved.

In small and medium scale rice milling factories, Chinese-made rice milling units are widely used. In recent years, the quality of Chinese rice milling machines has been gradually improving, and the quality of milled rice is also improving. On the other hand, the service life of each machine that makes up the rice milling unit tends to be short. In addition, a colour sorter, which is necessary to produce higher quality milled rice, has not been installed. For these reasons, crushed and coloured grains are still mixed in milled rice.





Source: JICA Detailed Planning Study for Agricultural Mechanization Promotion Project (2017)

**Figure 5.4 Current conditions of agricultural mechanization in Cote d'Ivoire**

#### **(4) Current Status and Issues of Agricultural Mechanization**

Despite the high need for agricultural mechanization, it is economically and technically difficult for rice farmers and rice farmer groups to purchase and operate agricultural machinery individually. For such reason, the government has formulated the SNDMA to improve small-scale farmers' access to agricultural machinery by working with private companies that provide agricultural machinery services.

One of the obstacles for the private companies to enter into the agricultural machinery service business is the required initial investment capital to purchase the necessary agricultural machinery at the start of service provision. In particular, it is very difficult for small private companies to obtain financing from private financial institutions when they enter the market. Given this situation, the government has introduced a system to encourage private companies to enter the market by using donor funds to procure agricultural machinery and lease these machines to agricultural machinery service providers, thereby reducing the initial investment burden on private firms. However, the sufficient number of machines have not been procured, and the number of service providers is still limited.

The situation is similar for the post-harvest treatment process. In order to improve rice quality, the government is considering lending dryers to farmers' groups, medium scale rice millers, and rice millers' associations, and stoners and colour sorters to medium-scale rice millers, but it is unable to procure enough rice milling-related equipment to supply them.

### 5.4.3 Draft Project Plan

#### (1) Project Components

The suggested project components are shown herein below.

**Table 5.6 Objectives and Components of CARD Grant Aid Project in Cote d'Ivoire**

Objectives
In the target areas of PRORIL2 and surrounding areas, equipment will be installed to achieve the following objectives: - Improve labour and land productivity in rice fields - Improvement of rice milling quality in small and medium scale local rice millers
Components
<b>【Equipment】</b> (1) Equipment for improving rice productivity Medium size tractor + Related attachments <30 units> Large size tractor + Related attachments <10 units> Small size combine harvester <10 units> (2) Equipment for improving milled rice quality Paddy dryer <20 units> Destoner <30 units> Colour sorters <5 units>
Contents
Equipment for improving rice productivity Equipment for improving milled rice quality Maintenance tools / Replacement parts

The table herein below shows the details of the equipment.

**Table 5.7 Details of the equipment of CARD Grant Aid Project in Cote d'Ivoire**

Items	Purpose	General Specification
<b>【Equipment】</b>		
Medium size tractor + Related attachments <30 units>	Improving rice productivity	Tractor: 30-40 hp Attachments: Cage wheels / Disc plow / Rotary tiller / Trailers
Large size tractor + Related attachments <10 units>	Improving rice productivity	Tractor: 70-80 hp Attachments: Cage wheels / Disc plow / Disc Harrow / Trailers
Tiller + Related attachments <40 units>	Improving rice productivity	Tiller: 12-14 hp Attachments: Cage wheels / Disc plow / Rotary tiller / Trailers
Medium size combine harvester <10 units>	Improving rice productivity	Combine harvester: 70 hp Harvesting width: 2m – 2.5m
Paddy dryer <30 units>	Improving milled rice quality	Capacity: 5 tons Fuel: Diesel or Kerosene
Destoner <20 units>	Improving milled rice quality	For white rice (milled rice) Capacity: 1 ton/h
Colour sorters <5 units>	Improving milled rice quality	For white rice (milled rice) Capacity: 1 ton/h Others: including air compressor with built-in air dryer
Replacement parts <1 set>	All	

#### (2) Soft Component

The soft component is expected to include the following content related to the agricultural machineries



to be installed.

Technical guidance on operation and maintenance of equipment: Provide guidance on the basic knowledge and techniques required to operate and maintain various types of agricultural machinery and post-harvest processing machinery.

### (3) Estimated Project Cost

Although the estimated project cost and breakdown of costs for each item shall be confirmed in the preparatory survey, the approximate total project cost is estimated at 847 million yen.

**Table 5.8 Estimated project cost for CARD Grant Aid Project in Côte d'Ivoire**

	Items	Million Yen
1)	Construction Cost	0
2)	Equipment Procurement Costs	787
3)	Soft Component Cost	10
4)	Detailed design and design supervision costs	25
5)	Preliminary expenses	25
	<b>Total</b>	<b>847</b>

### (4) Expected Results

The implementation of the Project is expected to produce the following results in the target areas

- A. Improvement of labour productivity of small-scale rice farmers through the improved equipment operation capacity of agricultural machinery service providers and improvement of land productivity through timely field work
- B. Improvement of milled rice quality in small and middle scale rice milling factories

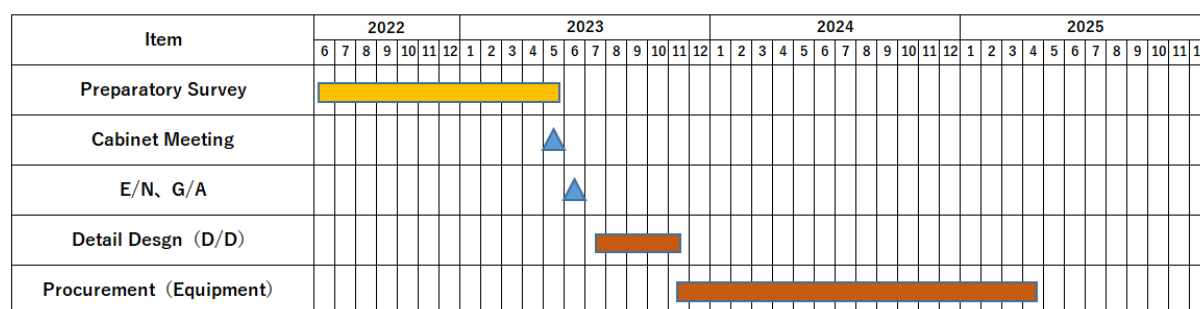
The following are proposed indicators in terms of quantitative outputs of the project.

**Table 5.9 Proposed indicators of the quantitative outputs of the project in Côte d'Ivoire**

Indicators	Standard Value (Year 2019)	Target Value (Year 202X) (3 years after project completion)	Remarks
Improvement of rice milling quality	Not available	To be confirmed in the cooperative preparatory survey	<ul style="list-style-type: none"> <li>➤ Percentage of broken rice</li> <li>➤ Percentage of stone</li> <li>➤ Percentage of coloured grains</li> </ul>
Decrease in rice production costs	Not available	To be confirmed in the cooperative preparatory survey	<ul style="list-style-type: none"> <li>➤ Cost of field preparation</li> <li>➤ Cost of harvest</li> </ul>

### (5) Proposed Schedule

The proposed overall schedule is shown in the figure below. It is expected to take approximately 23 months from E/N to procurement completion.



**Figure 5.5 Overall Schedule (Cote D'Ivoire)**

## (6) Obligation of Recipient Country

- Assignment of a person in charge of the project at the time of implementation
- Selection of target business operators

## (7) Point to be considered

Issues and points to be considered for the preparatory survey are described below.

- Confirm the current leasing system of agricultural machinery operated by ADERIZ, and propose modifications of the leasing system in case.

Selection criteria for target PMEAs and rice millers: Experience and capabilities necessary for business operations / Realistic business plan / Sufficient funds for business operations / Ability to secure customers (rice farmers) to provide service / Access to human resources especially in experienced machine operators

Consider an equipment leasing program: Lease period of equipment / lease rates / maintenance and repair of equipment / Contract violation

## **Chapter 6 Ghana**

### **6.1 Outline of Ghana**

#### **6.1.1 Natural Conditions**

Ghana, located in Western Africa, has a tropical climate under strong influence of the West African Monsoon<sup>45</sup>. It has two (2) main climatic seasons: the wet and the dry seasons. The country is situated at the intersection of three hydro-climatic zones: the Volta basin system, the South-Western system, and the Coastal basin system<sup>45</sup>. 70% of the total area of Ghana is covered by the Volta basin system, 22% by the South-Western system, and 8% by the Coastal basin system, respectively<sup>46</sup>. The climate of the Volta basin system which covers the northern part of the country is semi-arid and sub-humid, with mean annual rainfall of about 1,000mm in the savanna area and about 1,500mm to 2,000mm in the forest area<sup>45</sup>. The climate of the South-Western system is humid, with mean annual rainfall between 1,500mm and 2,000mm. On the other hand, the Coastal basin system is relatively the driest part of the country with annual rainfall less than 1,000mm<sup>45</sup>.

#### **6.1.2 Social Economic Condition**

Ghana, which is the second-biggest economy in West Africa, recorded a 6.7% GDP's growth in the year 2019 and placed as a one of the countries at the top of the GDP growth tables<sup>47</sup>. Services sector account for 44.14% of GDP, followed by industry (31.99%), and agriculture (17.31%)<sup>48</sup>. In 2011, Ghana became a lower middle-income country, in light of the highest GDP growth of 14.4% in the year<sup>49</sup>. The country's major growth driver is oil which had been produced in commercial quantities since 2011<sup>50</sup>. Ghana's main export commodities are gold, cocoa beans and timber product, and the exports increased by 4.6% to \$15.6billion in 2019<sup>51</sup>. These have given Ghana one of the highest GDP per capita (GDP per capita for 2019 was \$2,202) in West Africa<sup>52</sup>. Though recent substantial economic growth has benefitted poverty alleviation, still 56.90% of Ghana population are living below poverty line<sup>53</sup>. Moreover, the poverty rate in rural areas remained higher on average than elsewhere<sup>54</sup>.

#### **6.1.3 Agricultural Condition**

In 2019, agriculture accounts for 17.3% of GDP in Ghana. Ghana's agricultural sector's contribution to GDP has been declining from 29.8% in 2010 to the current value<sup>55</sup>. In contrast, the extractive sector has

---

<sup>45</sup> World Bank Group, Climate Change Knowledge Portal, 'Ghana'.

<<https://climateknowledgeportal.worldbank.org/country/ghana/climate-data-historical>>[accessed 21 January 2021]

<sup>46</sup> International Water Association (IWA), 'Establishment of Basin Boards to restore water quality in the Densu River, Ghana'.

<<https://iwa-network.org/densu-basin-board-story/>>[accessed 21 January 2021]

<sup>47</sup> The World Bank, The World Bank in Ghana, 'Overview'

<<https://www.worldbank.org/en/country/ghana/overview>>[accessed 21 January 2021]

<sup>48</sup> Statista, 'Ghana: Share of economic sectors in the gross domestic product (GDP) from 2009 to 2019'

<<https://www.statista.com/statistics/447524/share-of-economic-sectors-in-the-gdp-in-ghana>>[accessed 21 January 2021]

<sup>49</sup> The World Bank, 'Ghana Looks to Retool Its Economy as it Reaches Middle-Income Status'

<<https://www.worldbank.org/en/news/feature/2011/07/18/ghana-looks-to-retool-its-economy-as-it-reaches-middle-income-status>>[accessed 21 January 2021]

<sup>50</sup> World Economic Forum, 'Ghana will grow faster than any other economy this year, the IMF says why'

<<https://www.weforum.org/agenda/2019/05/ghana-is-set-to-be-the-worlds-fastest-growing-economy-this-year-according-to-the-imf/>>[accessed 21 January 2021]

<sup>51</sup> Ghana Web, 'Gold, Cocoa push Ghana's exports to US\$15.6 billion in 2019 – BoG'

<<https://www.ghanaweb.com/GhanaHomePage/business/Gold-Cocoa-push-Ghana-s-exports-to-US-15-6-billion-in-2019-BoG-1078168>>[accessed 21 January 2021]

<sup>52</sup> Macro trends, 'Ghana GDP Per Capita 1960-2021'

<<https://www.macrotrends.net/countries/GHA/ghana/gdp-per-capita>>[accessed 21 January 2021]

<sup>53</sup> Macro trends, 'Ghana Poverty Rate 1987-2021'

<<https://www.macrotrends.net/countries/GHA/ghana/poverty-rate>>[accessed 21 January 2021]

<sup>54</sup> The Borgen Project, 'Ghana's poverty rate and inequality'

<<https://borgenproject.org/ghana-poverty-rate/>>[accessed 21 January 2021]

<sup>55</sup> World Bank Group, '3rd Ghana Economic Update: Agriculture as an Engine of Growth'

shown continuous progress. 28.46% of Ghana's population works in the agricultural sector in 2019, though this number has declined in the past five years, from 40.42% in 2014, and Ghana's food imports are on the rise<sup>56</sup>. Despite the 2003 Maputo Declaration, in which signatories committed to allocate at least 10% of their budget to agriculture by 2008, the agriculture sector has benefitted from just 5.2% of total government spending between 2001 and 2014, resulted in the sharp decline in the agricultural growth. Nevertheless, the agriculture sector remains an important contributor to Ghana's export earnings, due to the fact that cocoa has been a source of public revenue, with 25% of total foreign exchange earnings.

## **6.2 Outline of Agricultural Sector**

### **6.2.1 Laws, Policies and Development Plan relating to the Agricultural Sector**

Ministry of Food and Agriculture (MoFA), which is the lead agency and focal point of the Government of Ghana, responsible for developing and executing policies and strategies for the agriculture sector, facilitated the preparation of the Food and Agriculture Sector Development Policy (FASDEP II) and Medium Term Agriculture Sector Investment Plan (METASIP: 2010-2015). The present FASDEP II, which is a fundamental policy for Ghana's agricultural sector, is developed in 2007 to increase agricultural growth thereby creating employment, increasing income, reducing poverty and achieving food security for its people<sup>57</sup>. As a specific objective, food security and emergency preparedness is listed among six policy objectives, and rice is regarded as one of the priority five staple crops that can immensely contribute towards ensuring food security. FASDEP II also states that it is necessary to increase quantity and quality of rice production to ensure that there are enough amounts of rice for domestic market needs, and do not have to import rice from other countries to fill the gap, though currently, 50% or more of the rice consumed in the country is covered by foreign rice. To complement FASDEP II with a strategic framework which specify that how the policy strategies in the FASDEP II will be implemented, Medium Term Agriculture Sector Investment Plan (METASIP: 2010-2015) was developed. METASIP also recognizes the importance of rice production, and aims to increase the rice production by 50% and reduce dependence on imports, through provision of improved technology for smallholder farmers<sup>58</sup>.

### **6.2.2 Implementation Status of the NRDS**

First National Rice Development Strategy (NRDS1:2008-2018) was developed in 2009, and the vision was to contribute to national food security, increased income and reduced poverty to become fully self-sufficient in rice by 2018 from sustainable rice production<sup>59</sup>. However, achieving self-sufficiency in rice production by 2018 was not realized<sup>60</sup>. Moreover, in review of NRDS1, which was carried out April, 2019, gaps were identified along the value chain, and the gaps include quality seeds, mechanization, poor infrastructures, and human capital development. Therefore, NRDS2 (2019-2024) was formulated to address the identified gaps, based on following important thematic areas, i) seed system, ii) fertilizer marketing and distribution strategy, iii) community mobilization, farmer-based organization and credit management, iv) irrigation and water control investment strategy, v) equipment access and maintenance

---

and Jobs Creation', February 2018,

<<http://documents1.worldbank.org/curated/en/113921519661644757/pdf/123707-REVISED-Ghana-Economic-Update-3-13-18-web.pdf>>[accessed 21 January 2021]

<sup>56</sup> The World Bank, 'Employment in agriculture (% of total employment) (modeled ILO estimate) - Ghana'

<<https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=GH>>[accessed 21 January 2021]

<sup>57</sup> Ministry of Food and Agriculture, 'Food and Agriculture Sector Development Policy (FASDEP II)', August, 2007

<<http://extwprlegs1.fao.org/docs/pdf/gha144957.pdf>>[accessed 22 January 2021]

<sup>58</sup> Ministry of Food and Agriculture, 'Medium Term Agriculture Sector Investment Plan (METASIP: 2010-2015)', September, 2010

<<http://extwprlegs1.fao.org/docs/pdf/gha144958.pdf>>[accessed 22 January 2021]

<sup>59</sup> Ministry of Food and Agriculture, 'National Rice Development Strategy (NRDS1: 2008-2018)', February, 2009

<[https://riceforafrica.net/downloads/NRDS/ghana\\_en.pdf](https://riceforafrica.net/downloads/NRDS/ghana_en.pdf)>[accessed 22 January 2021]

<sup>60</sup> COALITION for African Rice Development, 'Ghana'

<<https://riceforafrica.net/card-countries/group-1-countries/ghana/ghana,-april-2019>>[accessed 22 January 2021]

---

strategy, vi) research and technology dissemination strategy, and vii) harvesting, post-harvest and marketing strategy, as well as achieving unmet goal. In NRDS2, 2024 is set as a year to achieve self-sufficiency in rice production.

### **6.2.3 Rice Food Value Chain Analysis**

In Ghana, rice is regarded as an important strategic crop with its consumption on rise due to population growth, urbanization and change in consumer habit<sup>61</sup>. In 2018, rice was grown in an area alone totalled 260,000ha or four% of total cultivated agricultural land in 2017<sup>61</sup>. Ghana's rice production has more than doubled from 302MT in 2008 to 754MT in 2018. In Ghana, per capita rice consumption has increased for the last two decades<sup>61</sup>. For example, per capita rice consumption increased from 17.5kg in 1999 to 26kg in 2008, which increased to 37.6kg in 2017<sup>61</sup>. Although Ghana has been continuously increasing rice production, the country still depends largely on imported rice to make up for the deficit in domestic rice supply, with the average annual rice import is about 500MT<sup>61</sup>. It is revealed that farmers face various constraints such as access to land, credit and seed, gender inequality among rice producers, low yield and poor quality, poor operation of the Research-Extension Linkage Committees (RELCs), inadequate number of technicians and extension staff<sup>61</sup>.

#### **(1) Input supply**

In Ghana, informal and formal seed systems coexist, however, the approach is to move towards the formal seed system, as various seed regulation laws support<sup>61</sup>. Though private sector's involvement has been encouraged, there are limited participation of the private sector in breeder and foundation seed production<sup>61</sup>. The government of Ghana is projecting that, by the end of 2023, about 30% (6,075MT) of the projected 20,250MT of seed will be certified<sup>61</sup>. To achieve the target, Ghanaian government proposes actions such as capacity building for rice seed inspection and certification, expansion of storage facilities, and promotion of women and youth's involvement in certified seed production<sup>61</sup>.

As regards fertilizer, in Ghana, only about 35% of fertilizer requirement is met by local producers.<sup>61</sup> Fertilizer use by smallholders is often financially constrained and resulted in low rice yields<sup>61</sup>. Ghanaian government is currently encouraging efficient and sustainable use of fertilizer in NRDS2 by promoting timely access to fertilizer through the provision of efficient credit systems<sup>61</sup>.

#### **(2) Production**

As regards research and extension, linkage between them remains weak, therefore, Ghanaian government tries to provide research and extension with adequate equipment and infrastructure to make them more effective by proposing action plans such as provision of infrastructures (laboratories, cold rooms and screen houses for rice research), establishment of an institute dedicated to research and development of agricultural machinery, and development of a specific policy that support funding for rice research<sup>61</sup>.

#### **(3) Post-harvest**

To minimize current harvest and post-harvest losses, the use of improved drying and storage methods, appropriate harvesting and threshing facilities, and small scale and improved rice mills are encouraged in NRDS2<sup>61</sup>. Moreover, NRDS2 also encourages proper education of all stakeholders along the post-harvest chain, thereby the stakeholders will be able to properly handle and operate the mills and other machinery<sup>61</sup>.

#### **(4) Marketing**

To promote market competitiveness of locally produced rice, branding and promotion, packaging,

---

<sup>61</sup> Ministry of Food and Agriculture, 'National Rice Development Strategy (NRDS2: 2019-2024)', July, 2018

retailing in supermarkets, development of local rice software application where consumers can easily purchase are encouraged<sup>61</sup>. Moreover, establishment of warehoused (through government policies) for milled rice at central locations of major producing and consumption areas, sustainment of rice marketing credit lines, building of capacity of marketers and processors to add value to rice and improvement of accessibility to producing areas and marketing centres are also encouraged<sup>61</sup>.

#### **6.2.4 Progress of Support to Rice Sector**

Ghana became one of the participating countries in the Coalition for African Rice Development (CARD) as one of the First group countries in 2008. CARD is an initiative led by Japan to help African countries double its rice production. During first phase of NRDS (2008-2018), although significant progress has been made in increasing rice production, the target which aimed to achieve self-sufficiency in rice production by 2018 was not realized. Therefore, to break the constraints, NRDS2 (2020-2030) was developed by taskforce organized by the government with technical assistance from CARD.

JICA has been strategically supporting Ghanaian rice sector through implementation of various agricultural development projects such as recent “Food Security and Rice Producers Organization Project (2009-2015)”, “Special Programme for food security in Ghana (2002-2007)” and “Project for promotion of farmers' participation in irrigation management (FAPIM) (2004-2006)”<sup>62</sup>.

**Table 6.1 List of rice projects conducted by various partners in Ghana**

<b>No.</b>	<b>Project</b>	<b>Partners</b>
1	Food Security and Rice Producers Organization Project	JICA
2	Special Programme for food security in Ghana	JICA
3	Project for promotion of farmers' participation in irrigation management (FAPIM)	JICA
4	The Study on the promotion of domestic rice in the republic of Ghana	JICA
5	Improvement of drought tolerance of rice through Within-Species Gene transfer	AGRA
6	NERICA rice dissemination project	AfDB
7	Inland valleys rice development project	AfDB
8	Small scale irrigation development project	AfDB
9	Small farms irrigation project	AFD/BADEA
10	Rice sector support project	AFD
11	Ghana rice inter-professional body	AFD
12	Rice seed production	AGRA
13	Project for sustainable development of rain-fed lowland rice production	JICA
14	Development of low-input rice cultivation system in wetland in Africa	JIRCAS
15	Development of Rice Varieties with Enhanced Nitrogen-Use Efficiency and Salt Tolerance (NUE-EST-AATF)	USAID
16	Improving Yield, Quality and Adaptability of Upland and Rainfed Lowland Rice Varieties in Ghana to Reduce	AGRA
17	GCSP/GHA/028/UNO – Dissemination of Improved Rice Production Systems with Emphasis on Nerica to Reduce Food Deficit and Improve Farmers Income in Ghana (UN-FAO/UNIDO-JAPAN GOV'T)	UN Human Security Fund
18	Expanded Rice Programme	Government of Ghana (GoG)
19	Kpong Irrigation Project	World Bank
20	An Emergency Initiative to Boost Rice Production (USAID – SARI)	USAID
21	Improving Organic Matter content of soil for increased yield of NERICA	FARA
22	Budget Support for the Agriculture Sector	World Bank

<sup>62</sup> COALITION for African Rice Development, ‘Ghana’  
<https://riceforafrica.net/card-countries/group-1-countries/ghana> [accessed 22 January 2021]

No.	Project	Partners
23	Famine Fund Project	Africa Rice
24	Stress-tolerant rice for poor farmers in Africa and South Asia	Africa Rice
25	Developing the next generation of new rice varieties for sub-Saharan Africa and Southeast Asia	Africa Rice
26	Interspecific Hybridization Project	Africa Rice
27	Physiological and genetic investigation of agronomic characteristics in rice	Africa Rice
28	Development of sustainable rice farming systems in low activity clay soils in W African lowlands	Africa Rice

Source: COALITION for African Rice Development

### 6.2.5 Implementation Structure of Rice sector

Ministry of Food and Agriculture (MoFA) is responsible agency for national rice development. Crop Services Directorate (CSD) is a technical Directorate of the MoFA, and under the directorate, collaborating agencies such as Crop Research Institute (CRI), Soil Research Institute, Food Research Institute, Plant Protection and Regulatory Services, Women in Agricultural Development (WIAD), and Directorate of Agricultural Extension Services are working together to promote sustainable rice production<sup>63</sup>. Savanna Agriculture Research Institute (SARI), one of the 13 institutes under the Council for Scientific and Industrial Research (CSIR), also cooperates in this regard.

## 6.3 Current Status and Issues in the Agricultural Sector

### 6.3.1 Irrigation Facilities

In Ghana, rice is grown in three main rice farming systems; lowland rain fed (78% of production), upland rain fed (six% of production) and irrigated (16% of production)<sup>64</sup>. Average yields is rain fed paddy is 1.0-2.4tons per hectare, and 4.5tons per hectare of irrigated. There are 22government-funded irrigation schemes, and these 22schemes have a potential area of 12,528ha. Though there are 1.9million irrigation potential area, of which 8,700ha are currently developed, which is equivalent to only one% of total potential area<sup>65</sup>. Moreover, currently, rice is grown in 5,200ha which is account for 60% of developed area (8,700ha)<sup>65</sup>.

### 6.3.2 Agricultural Machinery

In Ghana, there has been increased demand for mechanization in recent years. In 2007, Ghanaian Government created Agricultural Mechanization Services Enterprise Centres (AMSEC) program for promoting mechanization, as the government believes that without the state support and subsidy, private-led mechanization supply would not be developed and cannot meet the demand from smallholders<sup>66</sup>. To avoid direct government engagement in mechanization supply, AMSECs are designed to be private entities, though their selection was done by the government<sup>66</sup>. In the first place, 12 AMSECs were established during 2007 to 2008, and further 77 AMSEC was established from 2009 to 2010<sup>66</sup>. Each centre was given a package of seven tractors with basic attachments by the government<sup>66</sup>. Moreover, each centre are paid 20% of the subsidized prices with the outstanding payment to be paid off over the subsequent four years without interest<sup>66</sup>. AMSEC has been providing tractor-hire services

<sup>63</sup> WAAPP-Ghana, 'Ministry of Food and Agriculture (MoFA)' <<https://waapp.org.gh/agencies/mofa>>[accessed 22 January 2021]

<sup>64</sup> World Bank, 'Open knowledge', 'Growing Africa: Unlocking the Potential of Agribusiness' <<https://openknowledge.worldbank.org/bitstream/handle/10986/26082/756630annex1.pdf?sequence=4&isAllowed=y>>[accessed 22 January 2021]

<sup>65</sup> JICA

<sup>66</sup> Xinshen Diao, et al. 'Mechanization in Ghana: Emerging demand, and the search for alternative supply models', Food Policy, 'Food Policy', Volume 48, October 2014, Pages 168-181 <<https://www.sciencedirect.com/science/article/pii/S0306919214000876>>[accessed 22 January 2021]

to small-scale farmers across the country, especially for land preparation services, namely, plowing<sup>67</sup>. However, it is said that the low operational scale of AMSEC program have a bad effect for profitability of investment in specialized agricultural mechanization service provision. Therefore, to transform AMSEC model a viable business model, it is suggested that introduction of low-cost, small tractors and used tractor, these are suited to the current farming scale in the country are options to be available to policymakers in Ghana.

### 6.3.3 Agricultural Inputs

There is a gap between the production and supply of quality rice seed, and the current rice seed system is weak. To scale up rice seed production to meet increased rice production, it is suggested that, introduction and testing of new rice varieties, realization of nationwide seed production and distribution, and expansion and improvement of seed storage infrastructure should be done. Currently, foundation seed is produced by research institutes and centres under the Council for Scientific and Industrial Research and the University of Ghana. As regards certified rice seed, licensed private seed growers are producing under management by the Plant Protection and Regulatory Services Directorate of MoFA and the Grains and Legumes Development Board. However, this current system cannot provide the right quantity and quality of rice seed to implement the government's strategy.

As regards fertilizer, to encourage nationwide appropriate fertilizer application, the government has been providing subsidy since 2007. According to the subsidized prices announced by the government, in the 2011 farming season, from 37.5% to 44% of the purchase price of NPK fertilizer, urea, and ammonium sulfate are subsidized by the government. However, the fertilizer subsidy has also led to some problems such as inadequate distribution of coupon, unavailability at key production points, and few farmers actually benefited from the subsidy program.

### 6.3.4 Status of Implementation of Grants to Assist Poor Farmers

From 1981 to 2000, 2KR grant aid was continuously implemented under the scheme of Grand Aid for the Increase of Food Production<sup>68</sup>. The following table indicates the result of the 2KR grant aid.

**Table 6.2 The past result of 2KR grant aid for Ghana**

Year	1981~2002	2005	2007	2009	2012	Total
E/N basis (million yen)	66,000	3,600	3,700	4,600	3,200	81,100
Procured item	Fertiliser, Agrochemical, Agricultural machinery	Agricultural machinery	Agricultural machinery	Agricultural machinery	Agricultural machinery	—

Source: JICA Preparatory survey report for 2KR in Ghana, MOFA data book of Official Development Assistance by country

Since 2005, the 2KR aid in Ghana has been focusing on agricultural machinery to modernise farming activities. The target crops are mainly rice and maize, Ghanaian major staple crops in the country. Therefore the target groups of the scheme were farmers and farmers-based organisations in the main cultivation areas of rice and maize. From 2005 to 2009, procurement item was limited to agricultural machinery, including a four-wheel tractor, power tiller, reaper, thresher, and rice miller.

The implementing agency of the 2KR scheme was Agricultural Engineering Service Directorate under the Ministry of Food and Agriculture.

<sup>67</sup> IFPRI, 'Agricultural Mechanization in Ghana', January, 2013

<<http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/127384/filename/127595.pdf>>[accessed 22 January 2021]

<sup>68</sup> Ministry of Foreign Affairs in Japan, 'ODA for Ghana',

<[https://www.mofa.go.jp/mofaj/gaiko/oda/data/gaiyou/odaproject/africa/ghana/contents\\_01.html#2803](https://www.mofa.go.jp/mofaj/gaiko/oda/data/gaiyou/odaproject/africa/ghana/contents_01.html#2803)>[accessed 22 January 2021]



## **6.4 Proposed Project Plan: Project for Enhancement of Rice Seed Multiplication System**

### **6.4.1 Overview of the Survey Area**

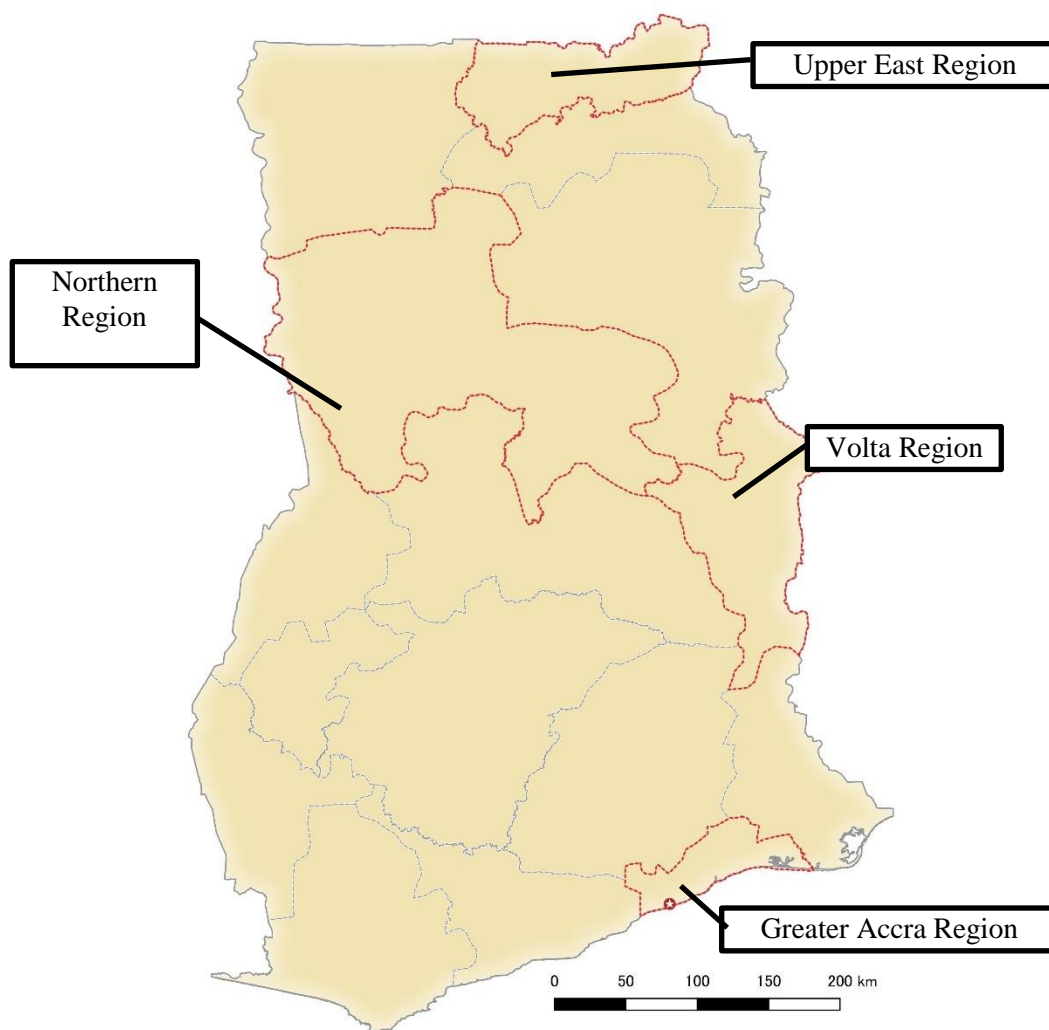
#### **(1) Project Outline**

- Country Name: the Republic of Ghana
- Project Site: Greater Accra Region, Upper East Region, Northern Region, Volta Region
- Project Title: The Project for Enhancement of Rice Seed Multiplication System
- Project Summary: This project will procure the necessary equipment and seed storage facilities to increase the production and to improve the quality of seed in the four irrigation districts under the jurisdiction of the Ghana Irrigation Development Authority (GIDA), which supplies seeds (breeder seeds, original seeds, and certified seeds) necessary for increasing rice production. The project aims to increase the production of quality seeds (mainly certified seeds) and improve rice productivity by procuring necessary equipment and seed storage equipment in four irrigation districts under the jurisdiction of the Ghana Irrigation Development Authority (GIDA). The total estimated project cost is approximately 528 million yen.
- Background of Project Planning: NRDS1 has been prepared in line with Food and Agriculture Sector Development Policy (FASDEP), the top-level policy for the agricultural sector, and Medium Term Agriculture Sector Investment Plan (METASIP), the policy's action plan. Issues such as quality seeds were identified in the review of NRDS 1 results in 2019, and a seed strategy was expected to be proposed in NRDS 2. JICA implemented the Sustainable Development of Rain-fed Lowland Rice Production Project (TENSUI) to increase rice production by increasing the yield and area under cultivation, and in TENSUI and its successor, TENSUI2, JICA carried out technology development and dissemination of rainfed rice cultivation. Furthermore, the capacity development of Ghana Irrigation Development Authority (GIDA) in facility operation and management, establishment and operation of water users' associations and dissemination of improved technologies for irrigated rice cultivation were carried out in Project for Enhancing Market-Based Agriculture by Smallholders and Private Sector Linkages in Kpong Irrigation Scheme (MASAPS-KIS). Ghana Rice Production Improvement Project (GRIP) was planned to be launched as a successor to the two technical cooperation projects TENSUI2 and KIS. In addition to activities such as the establishment and operation of water users' associations and the dissemination of improved methods of irrigated rice cultivation, the GRIP was also planned to strengthen quality seed production and management systems to increase rice yield, and the proposed project plan proposed to supplement the GRIP as a means of procuring equipment to increase the effectiveness of these activities.

#### **(2) Target Area**

The target area are four irrigation districts in rural areas supervised by GIDA.

- Kpong irrigation scheme : Greater Accra Region, Tono irrigation scheme : Upper East Region, Bontanga irrigation scheme : Northern Region, Weta irrigation scheme : Volta Region



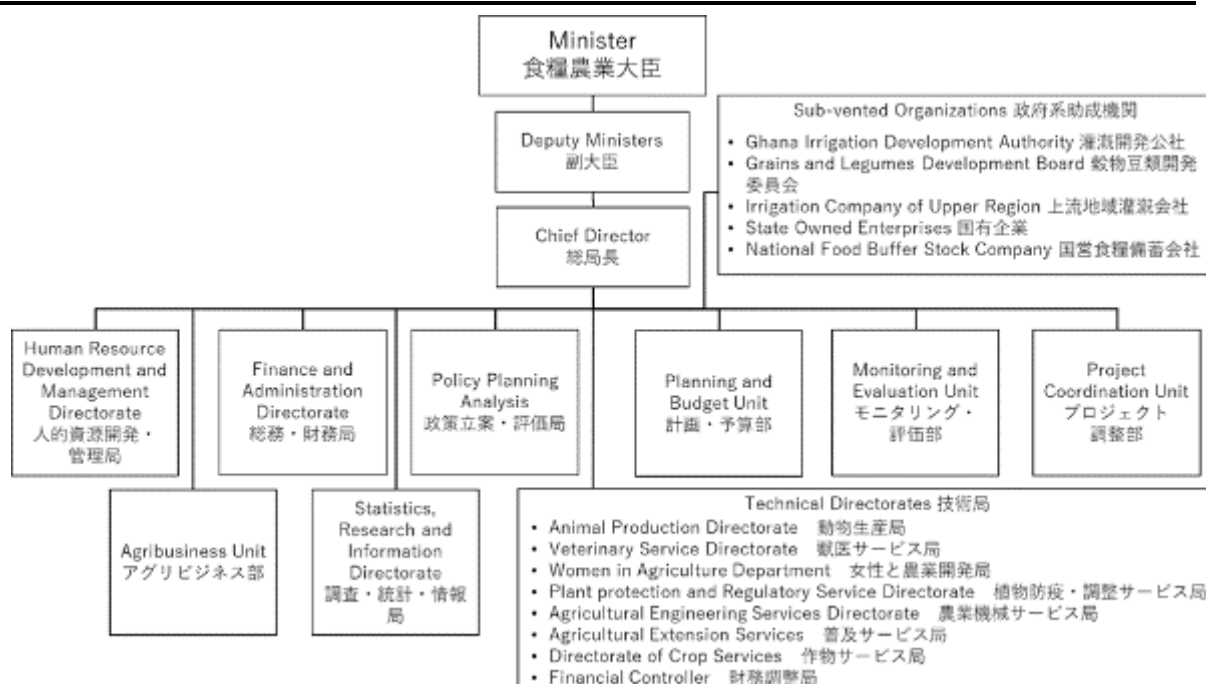
**Figure 6.1 Target Areas (Ghana)**

### **(3) Project Implementation Agency**

The project implementing agencies are expected to be MoFA, GIDA, and SARI. The same institutions are also expected to be in charge of operation and maintenance function after the project implementation.

#### **1)- MoFA**

The organizational structure of MoFA is shown in the figure on the next page.



**Figure 6.2 The organizational structure of MoFA**

The MoFA is the government agency responsible for the development and implementation of agricultural sector policies and strategies to address the country's socio-economic growth and development challenges, and promotes FASDEP II and METASIP as key policies. The organizational structure includes a Minister, a Deputy Minister, and a Director General, followed by technical service bureaus such as the Extension Service Bureau and the Crop Service Bureau, and specialized departments responsible for policy and administrative management. The total number of staff was 2,161 at the end of 2014.

## 2) GIDA

GIDA is an agency under the MoFA with the authority to promote the development of land and water resources for sustainable and environmentally sound agricultural use. The agency is responsible for the formation, development, and implementation of irrigation and drainage plans for year-round agricultural production. It provides technical and business management services for effective and sustainable operation and maintenance.

## 3) SARI

SARI is one of the 13 institutes under the jurisdiction of the Council for Scientific and Industrial Research (CSIR), and was formerly known as the Nyankpala Agricultural Experimental Station, a branch of CRI. The institute was originally the Nyankpala Agricultural Experimental Station, a branch of CRI, and was reorganized into its current structure in 1994. The institute is responsible for providing sustainable and appropriate technologies for increasing yields to the farmers in the Northern, Upper East, and Upper West Provinces.

### 6.4.2 Current Condition and Challenge

#### (1) Project Site

##### 1) Kpong Irrigation Scheme

The Kpong Irrigation Scheme is the largest irrigation scheme in the Greater Accra Region, located approximately 80 km northeast of the capital Accra, in the Shaiosdok District. An overview of the

Kpong Irrigation Scheme is given in the table herein below.

**Table 6.3 Kpong Irrigation Scheme**

Item	Content
Potential Area (ha)	3,452
Developed Area (ha)	3,028
Potential Irrigated Area (ha)	2,786
Crop Area (ha) 2016	Major season: 1,143 Minor season: 1,800
Irrigation System Type	Gravity irrigation, pump irrigation
Water Source	-
Crop Area	0.8 ha per farmer

## 2) Bontanga Irrigation Scheme

Bontanga Irrigation scheme is the largest irrigation scheme in Northern Province, located in Kumbungu County, about 32 km from Tamale, the capital of Northern Province. Two (2) rehabilitation works have been undertaken since its construction in 1986. It provides irrigation water to about 600+ farmers and has over 20 beneficiary communities within its catchment area. These farmers are organized into nine (9) water user associations. The cropping season is divided into major and minor seasons, and rice, onion, pepper, okra, sweet potato, cabbage, and leafy vegetables are planted, although rice is the major crop due to marketing and soil-related issues. Rice paddy yield is estimated to be 2.5 to 5.0 tons per hectare.

The irrigated area provides employment for youth in the catchment area and is an important source of household income, as it provides an environment that allows for year-round farming. There are no combine harvesters, tractors, tillers, or other machinery owned by the irrigation district office in Bontanga. A summary of the Bontanga Irrigation scheme is shown in the table herein below

**Table 6.4 Bontanga Irrigation Scheme**

Item	Content
Potential Area (ha)	800
Developed Area (ha)	570
Potential Irrigated Area (ha)	495
Crop Area (ha) 2020	Major season: 449 Minor season: 396
Irrigation System Type	Gravity irrigation
Water Source	Bontanga River (tributary of the White Volta River)
Crop Area	0.8 ha per farmer

Rice BS and FS seed in the Bontanga Irrigation Scheme is produced by seed producers commissioned by SARI and sold back only to SARI. Seed production farmers plant in strips, while about 75% of the general farmers plant randomly and about 25% direct sow (sow in bulk).



Bontanga Irrigation Scheme trunk canal



Seed farmers producing BS



Source: Photographed by JICA KIS Project Nara Department Expert (April 2021)

**Figure 6.3 Current situation in Bontanga Irrigation Scheme**

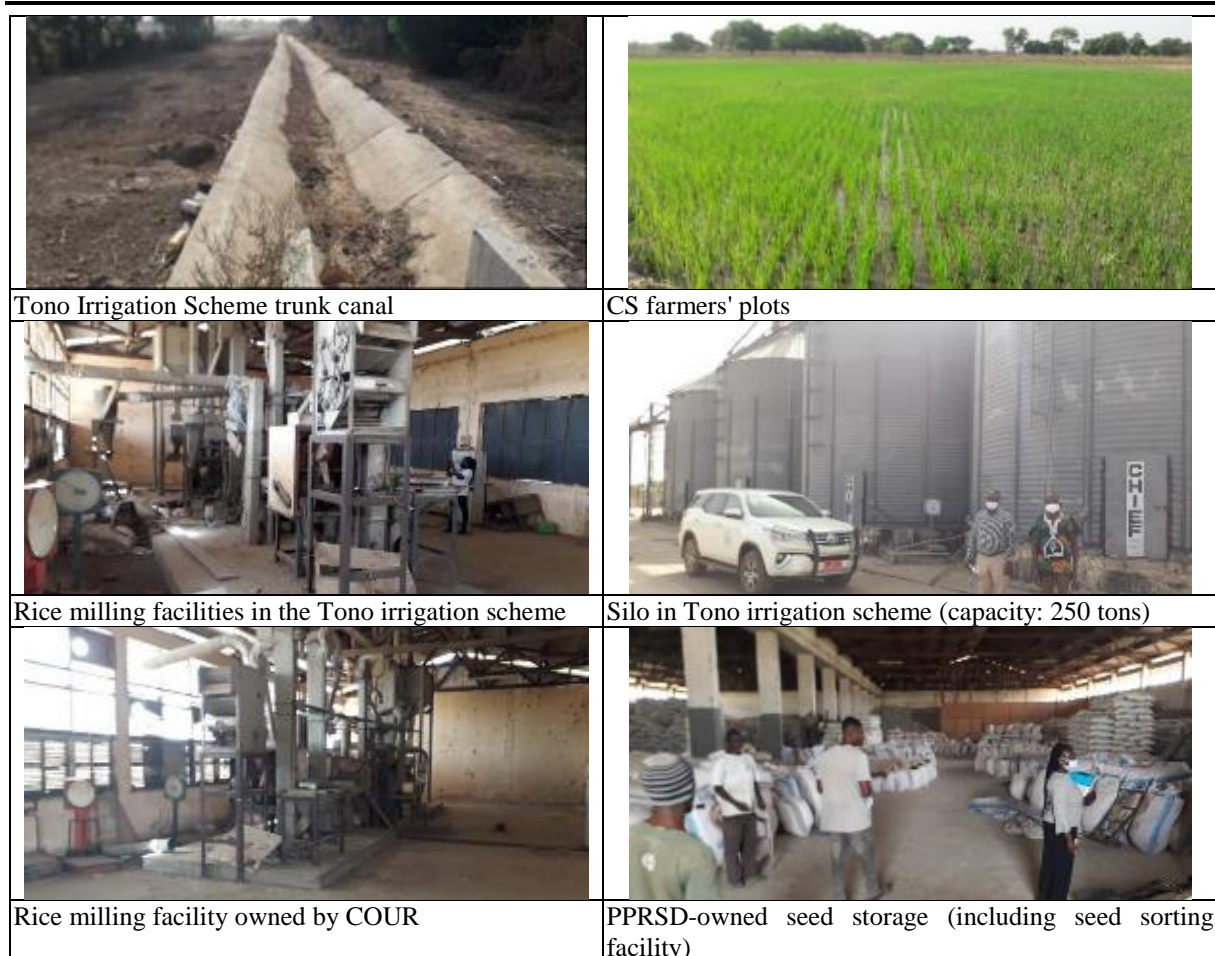
### 3) Tono Irrigation Scheme

The Tono Irrigation Scheme is the largest irrigation scheme in the Upper East Province, located in Cassena-Nancana County, about 30 km northwest of Bolgatanga, the capital of the Upper East Province. It provides irrigation water to more than approximately 600 farmers and has more than 20 beneficiary communities within its catchment area. These farmers are organized into 15 water users' associations. The cropping season is divided into major and minor seasons, and rice and vegetables are planted, but rice is the main crop. The rice paddy yield is estimated to be 4-5 tons per hectare in the rainy season and 3.5-4 tons per hectare in the dry season for the AGRA variety, the main variety of rice. The following table shows an overview of the Tono Irrigation Scheme.

**Table 6.5 Tono Irrigation Scheme**

Item	Content
Potential Area (ha)	3,860
Developed Area (ha)	2,490
Potential Irrigated Area (ha)	2,490
Crop Area (ha) 2016	Major season: 1,550 Minor season: 1,409
Irrigation System Type	Gravity irrigation
Water Source	-
Crop Area	-





Source: Photographed by JICA KIS Project Nara Department expert, April 2021.

**Figure 6.4 Current situation in Tono Irrigation Scheme**

#### 4) Weta irrigation scheme

Weta Irrigation Scheme is the largest irrigation scheme in the Volta Region, established in 1978 and located in Ketunose District, about 100 km southeast of Ho, the capital of the Volta Region, and 150 km northeast of Accra, the capital. It provides irrigation water to more than about 600 farmers and has more than 20 beneficiary communities within its catchment area. These farmers are organized into 15 water users' associations. The cropping season is divided into major and minor seasons, and rice is the main crop, although okra and other vegetables are planted on a small scale in addition to rice. The main rice varieties are AGRA and Legon rice1, and about 95% of the rice is directly sown in dry rice paddies. The yield per hectare of AGRA rice, the main rice variety, is estimated to be 4-5 tons in the rainy season and 3.5-4 tons in the dry season. The table herein below shows an overview of the Weta Irrigation Scheme.

**Table 6.6 Weta Irrigation Scheme**

Item	Content
Potential Area (ha)	950
Developed Area (ha)	880
Potential Irrigated Area (ha)	880
Crop Area(ha) 2016	Major season: 890 Minor season: 880
Irrigation System Type	Gravity irrigation, pump pumping
Water Source	Agali Dam, Kplikpa Dam
Crop Area	-



Source: Photographed by JICA KIS Project Nara Department Expert, April 2021.

**Figure 6.5 Current situation in Weta Irrigation Scheme**

## **(2) Superior Seeds**

In Ghana, the rice seed system is largely owned by the informal sector, with farmers generally exchanging seed to each other and self-production of seeds. Although the importance of private sector production of upstream seeds (Breeder Seed (BS) and Foundation Seed (FS)) is mentioned, currently universities and public institutions such as the Council for Science and Industrial Research (CSIR) and the Grains and Legumes Development Board (GLDB) are still responsible for production, and in the short term these institutions are the centre of upstream seed production. However, the current situation of the universities and Council for Science and Technology is not good enough for seed production.

It is also emphasized that infrastructure (existing and new, both ) such as irrigated paddy fields, storage facilities, equipment related to production and processing, and market infrastructure to strengthen the domestic market are needed to improve the seed system. In addition to infrastructure development, the importance of human resource development for breeding, seed production, seed testing, seed certification, and marketing is also mentioned.

In the NRDS, only 1,300 MT out of 10,805 MT of rice seed used in 2013 was certified seed (CS) i.e. 12% of the total, and the goal is to increase this percentage to 30% (6,075 MT) by 2023. To achieve this goal, the following measures are needed: (1) ensure adequate quality seed (BS, FS, and CS) production, (2) strengthen the capacity of the rice seed certification and auditing system, (3) renovate and expand existing seed storage facilities, (4) develop an efficient BS, FS, and CS distribution system, (5) develop strategies to foster the rice seed business, and (6) develop a rice (6) educate farmer groups on the use of CS to maintain seed purity, (7) develop an efficient irrigation system for upstream seed production, and

(8) involve women and youth groups in CS production schemes.

The Ghana Rice Productivity Improvement Project, the successor to the Rainfed Rice Sustainable Development Project and the 'Project to Support Smallholder Market-Oriented Agriculture and Strengthen Private Sector Linkages in Pong Irrigated Areas', includes the provision of technical assistance to improve seed quality for farmers producing guaranteed seeds in the target irrigated areas. The project is expected to strengthen the capacity of human resources for rice seed production in the project's target areas.

### **(3) Agricultural Mechanization in Rice Production**

The mechanization strategy in the NRDS emphasizes the need to strengthen the role of the private sector in the area of quality seeds as a long-term strategy, while strengthening the supply of agricultural machinery and access to post-harvest handling and processing equipment as a short-term strategy.

To encourage private sector mechanization of agriculture, the government is promoting the establishment and expansion of AMSECs, which provide farmers with agricultural machinery services to improve access to the machinery at the right time. The government is promoting mechanization strategies by encouraging the private sector to intervene by providing incentives such as subsidies to AMSECs and the provision of agricultural machinery from donor agencies. On the other hand, as mentioned in the NRDS, it is essential not only to provide adequate equipment but also to strengthen the human capacity of AMSECs in administrative (business and financial) and technical (maintenance and operation of machinery) aspects.

Although it is the government's basic policy to promote agricultural mechanization by the intervention of private sector, the production of quality rice seeds is currently being carried out mainly by the public sector, and the shortage of labour and concentration of machinery service needs in rice cultivation in irrigated areas are causing the need of timely access to machinery for high quality rice seed production. Therefore, agricultural mechanization of these public institutions and seed farmers is also required to produce high quality rice seeds with timely access to machinery.

#### **1) Kpong Irrigation Scheme**

Agricultural mechanization in the Kpong irrigation scheme is dominated by farmers' use of machinery through machinery services such as hired plowing by machinery service providers, which does not fully cover farmers' demand due to the concentration of needs during the right season. Companies and NPOs in the private sector, including an Indian-owned leasing company to be established in 2019, provide large and medium-sized tractors for machinery service, the absolute number of machines is insufficient. In the harvesting process, the lack of combine harvesters has resulted in over-drying and over-sowing of the crop due to missed harvesting periods. In addition, the left bank of the irrigated area is a newly developed area, and machinery services are inadequate, especially in this area.

#### **2) Bontanga Irrigation Scheme**

The Bontanga Irrigation Office does not own agricultural machinery such as tractors and combine harvesters, and does not have engineers to perform maintenance and repairs. Therefore, when the equipment malfunctions, private service providers are requested to perform maintenance and repair. Private service providers in the district own only two tractors, two combines, and one tiller, resulting in a severe shortage of machinery service supply relative to local demand.

Regarding facilities, the office has an office, workshop, wooden warehouse, grain warehouses scattered throughout the scheme, and a dry floor (drying area), but these are deteriorating, and if equipment is to be provided, either a new building will have to be constructed to function hangar for it or rehabilitation work on existing facilities will be essential.



### 3) Tono Irrigation Scheme

The Tono Irrigation Office does not have an engineer to maintain and repair agricultural machinery. Agricultural machinery such as tractors and combine harvesters have been sold as recommended by the Ghana Commercial Agriculture Project (GCAP), and the workshop to store and maintain them is not in use pending the entry of private service providers. The workshop where the rice is stored and maintained is not in use pending the entry of private service providers. The rice milling workshop is equipped with a sorting machine, a stone removing machine, a sorting machine, a hulling machine, and a rice milling machine, but these are also not in use as they are awaiting management by the private sector in accordance with the recommendation of the GCAP.

### 4) Weta Irrigation Scheme

The Weta Irrigation Office does not own any agricultural machinery such as tractors and combines and does not have an engineer to perform maintenance and repairs, but the office has a large number of staff and has the capacity to train staff to operate and maintain the equipment.

With regard to facilities, the irrigation office owns a warehouse, which is in a desirable condition when it can be repaired, but can be used as a hangar to store agricultural machinery.

### (4) Post-harvest processing equipment and technology

In Ghana's NRDS, the importance of minimizing harvest and post-harvest losses, reducing processing and marketing costs, and improving rice quality is emphasized for sustainable and profitable rice production. To this end, the NRDS states that appropriate harvesters and threshers should be used for harvesting, and small rice milling plants (including rice hullers, stone cutters, hullers, polishers, rice grinders, rice hull sorters, rice hull vacuum cleaners, and sorting machines) should be used for post-harvest processing, along with capacity building for those who use and manage these machines.

### 6.4.3 Proposed Project Components

#### (1) Target Components

**Table 6.7 Objectives, Functions and Components of CARD Grant Aid in Ghana**

<b>Purpose and Function</b>
To introduce necessary agricultural machinery and seed storage equipment to each of the four irrigation districts under the jurisdiction of the Ghana Irrigation Development Corporation in order to improve the production and quality of quality seed in the four irrigation districts.
<b>Component</b>
<b>Equipment</b> (1) Equipment for seed cultivation (1) Equipment for seed cultivation: One medium-sized (40-50 hp) tractor + various work equipment (disk plow, rotary, paddy wheels, trailer), one combine harvester (2m wide), and one combine harvester (2m wide). 1 combine harvester (cutting width: 2 m), 1 tiller (12 hp) 1 tiller (12 hp) + various work equipment (cage wheels, trailer) (2) Equipment for post-harvest processing of seeds 1 stationary dryer (3 tons) with coarse sorter, 1 seed sorting plant (2 tons) One set of seed sorting plant (2 tons), one set of low-temperature humidity-controlled storage (upstream) Low-temperature humidity-controlled storage (for upstream seed storage) Rice milling and seed inspection equipment Maintenance equipment, etc.
<b>Content</b>
Seed cultivation equipment Equipment for seed cultivation and post-harvest processing Equipment for rice milling and seed inspection

Details of facilities and equipment are shown in the table herein below.

**Table 6.8 Details of facilities for CARD grant aid and equipment in Ghana**

Facility Name	Type	Specifications/Standards
Equipment		
Kpong irrigation scheme in Greater Accra Region	Agricultural machinery	Three 40-50 HP tractors (with rotary, sprayer, paddy wheels, disk plow, and trailer), three combine harvesters, one dryer, complete seed sorting plant, complete maintenance equipment, complete replacement parts
	Inspection equipment	Rice milling and seed inspection equipment complete set
	Storage	1 low-temperature humidity-controlled storage (2 tons)
Bontanga irrigation scheme in Northern Region	Agricultural Machinery	1 40-50 HP tractor (with rotary, sprayer, paddy wheel, disk plow, trailer), 1 combine harvester, 1 dryer, seed sorting plant, complete set of maintenance equipment, complete set of replacement parts
	Inspection equipment	Rice milling and seed inspection equipment complete set
	Storage	2 units of low-temperature humidity-controlled storage (2 tons)
Tono irrigation scheme in Upper East Region and Weta irrigation scheme in Volta Region	Agricultural Machinery	1 40-50 HP tractor (with rotary, sprayer, paddy wheel, disk plow and trailer), 1 combine harvester, 1 dryer, 1 seed sorting plant, complete set of maintenance equipment, complete set of replacement parts
	Inspection equipment	Rice milling and seed inspection equipment complete set
	Storage	1 low-temperature humidity-controlled storage (2 tons)

## (2) Operation/Maintenance Management System

The irrigation scheme facilities and agricultural machinery and seed storage facilities are under the jurisdiction of GIDA, which will be responsible for the maintenance system. For the seed drying and sorting plant, the MoFA Plant Protection and Regulatory Services Department (PPRSD) will be responsible for the maintenance of the two Bontanga-Tono sites attached to the irrigation scheme. In addition, only one seed storage unit is expected to be supported by SARI, and the institute will be responsible for the operation of this equipment, along with its maintenance.

## (3) Soft Component

The soft component envisages the following cooperation related to the agricultural machinery to be installed

- Preparation of seed production plan: A new seed production plan will be prepared for the expansion of seed cultivation and post-harvest processing facilities.
- Guidance on seed production: To ensure efficient production of high quality seeds, the project will provide practical guidance on how to properly operate the facilities and equipment to be introduced. In addition, guidance on seed cultivation techniques will also be provided.
- Technical guidance on the operation and maintenance of equipment: Provide guidance on the knowledge and techniques required for the operation and maintenance of various agricultural machinery and post-harvest processing equipment.

## (4) Estimated Project Cost

The total project cost is estimated at 528 million yen.

**Table 6.9 Estimated project cost for CARD grant aid in Ghana**

	Item	Total(million yen)
1)	Construction cost	0

	Item	Total(million yen)
2)	Equipment Procurement Costs	480
3)	Soft Component	23
4)	Implementation Design and Design Supervision Costs	25
5)	Preliminary expenses	0
	Total	528

## (5) Expected Outputs

This cooperation is expected to stabilize the production base of quality seeds and increase production. The quantitative outputs will be measured in terms of seed production and rice production as shown in the table below.

**Table 6.10 Proposed quantitative outputs of the CARD grant aid project in Ghana**

Indicator	Reference value (Actual result in 2019)	Target value(202X) (3 years after the project completion)	Remarks
Certified seed (CS) production in the target irrigated areas (tons/year)	To be confirmed		
Rice (fresh rice) yield (tons/ha) in the target irrigated area	Central Research Institute: XX tons		

Qualitative outputs: Improvement of rice quality and productivity, livelihood of small farmers.

## (6) Tentative Schedule

The overall schedule (draft) is shown in the figure herein below, and is expected to take about 18 months from E/N to completion of construction.

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1. Preparatory Survey																										
Cabinet Meeting								▲																		
E/N, G/A									▲																	
2. Detailed Design (D/D)																										
3. Procurement (Manufacture, transport, reception, adjustment, soft components)																										

**Figure 6.6 Tentative Overall Schedule (Ghana)**

## (7) Obligation of Recipient Country

The following items shows obligation of recipient country.

- Assignment of a person in charge at the time of project implementation
- Installation of commercial power supply to the facility
- Maintenance of equipment after construction

## (8) Points to Note

Issues and points to be considered in the future implementation of the preparatory survey for cooperation and this proposed cooperation menu are described below.

- Regarding field machinery, since each irrigation office does not have its own service business with its own equipment and does not conduct rice cultivation on its own, it is assumed that facilities

related to garages of equipment and tools for operation and maintenance, and human resources such as operators and maintenance personnel have not been secured. Therefore, it is necessary to fully consider the possibility of human resource development through the soft component and the linkage with technical cooperation projects in the long term.

- For field machinery and post-harvest processing equipment for seeds, since operation and maintenance will require labour costs, parts procurement/inspection and repair, and fuel and utility costs, it is necessary to provide an estimate of the budget required and confirm that the government can allocate the budget.

## **Chapter 7 Liberia**

### **7.1 Outline of Liberia**

#### **7.1.1 Natural Conditions**

##### **(1) Weather Conditions**

Liberia's climate is classified as tropical with sustained hot, humid conditions all-year round. It has dry winters with hot days and cool to cold nights and wet, cloudy summers with frequent heavy showers<sup>69</sup>.

The mean annual temperatures range from 21°C to 27 °C. The mean monthly maxima decline from the low 32s to the mean 27s during the rainy season. The mean monthly minima range from the low 16s in the northwestern highlands to the low 21s at Monrovia and along the coast. Inland temperatures are warmer than those along the coast, with diurnal ranges also being greater inland<sup>70</sup>. Relative humidity is high throughout the county, averaging from 70 to 90 %<sup>71</sup>.

With annual rainfall ranging from 3,937 mm to 4,445 mm in the west, and with almost 2,540 mm of rain in the southeast, the coastal region receives the heaviest rainfall. Monrovia receives annual rainfalls of almost 4,572 mm. Rainfall decreases going to north and inland, but the rainfall increases again in the highlands and the northernmost parts of the country. The “driest” area in the country is along a strip of the eastward flowing Cavalla River, but even there, the land receives over 1,778 mm of rain per year.

The Liberian rainy season begins in April or May, peaking in July through September, and tapering off in October. Monrovia and Buchanan, on the coastal plains, receive a heavy rain earlier in the season, and then experience a period of reduced rainfall called the “middle dries” before the return of the August heavy rains. In the southeastern reaches of the country, the rainy season begins in April, lasting for two or three months, and is then followed by a drier period of two or three months. Then a second rainy season begins in September and lasts until November. The “middle dries” are not dry enough to be called a true dry season<sup>72</sup>.

##### **(2) Topography and River System (Drainage System)**

The main physiographic regions of Liberia are the coastal plains, the rolling hills, and the highlands, parallel the coast. The Forest Zone covers all parts of Liberia<sup>73</sup>.

The coastal plains, which are about 563 km long, extend up to 40 km inland. They are low and sandy, with miles of beaches interspersed with bar-enclosed lagoons, mangrove swamps, and a few rocky promontories. The highest promontory is Cape Mount (about 305 m in elevation) in the northwest, with Cape Mesurado in Monrovia, and Cape Palmas in the southeast. Its deepest extensions lie along the watercourses. The shore is broken by river estuaries, tidal creeks, swamps, and a few rocky capes and promontories that appear as landmarks from the sea. Except for those promontories and capes and an occasional small hill, the altitude of the coastal region usually rises no higher than 9 to 18 m. The mouths of the rivers are so obstructed by shifting sandbars and submerged rocks that there are no natural harbors. The surf is normally heavy all along the coast but is worse at the height of the rainy season<sup>74</sup>.

Parallel to the coastal plains is a region of rolling hills some 32 km wide with an average maximum

---

<sup>69</sup> CIA (Central Intelligence Agency), ‘Africa :: Liberia’ <[https://www.cia.gov/library/publications/resources/the-world-factbook/geos/print\\_li.html](https://www.cia.gov/library/publications/resources/the-world-factbook/geos/print_li.html)> [accessed 29 July 2020].

<sup>70</sup> R Lee Hadden, ‘The Geology of Liberia : A Selected Bibliography of Liberian Geology , Geography and Earth Science’, *Distribution*, May, 2006, 1998–99.

<sup>71</sup> Hadden.

<sup>72</sup> Hadden.

<sup>73</sup> Hadden.

<sup>74</sup> Hadden.

elevation of about 91 m, although a few hills rise as high as 152 m. It is a region suitable for agriculture and forestry. Further inland, the country consists of rolling plateaus and low-lying hills rising to the higher elevations of 183 to 305 m that constitute almost half of Liberia's terrain. In the far northwest and north central portions of the territory are the outliers of the Guinea Highlands. This land is well watered, and a number of narrow, roughly parallel river basins run to the sea at right angles to the northwest-southwest trend of the belts of relief<sup>75</sup>.

The highlands are behind the rolling hills, most of the country's interior is a dissected plateau with scattered low mountains ranging from 183 to 305 m in elevation. The long ridges and dome shaped hills that constitute the northern highlands are part of the Guinea Highlands and occupy those sections of Lofa and Nimba counties that thrust much farther north than the rest of Liberia's boundary with Guinea and Ivory Coast. These mountains, mainly the Wologizi Range in Lofa County and the Nimba Range north of the town of Sanniquellie, rise to altitudes above 1,219 m. Mount Wutivi, the highest peak in the Wologizi Range, reaches about 1,356 m, and the Nimba Range's Guest House Hill is, at 1,384 m, the highest point in Liberia<sup>76</sup>.

In West Africa, the forest zone refers to the southern part of the region once largely covered by tropical rainforest. The forest zone of West Africa, in the strict sense, covers all of Liberia and Sierra Leone, most of Guinea, the southern halves of Côte d'Ivoire and Nigeria, and parts of Ghana, Togo and Guinea-Bissau. In the eastern part of the forest zone, because of the influence of Mount Cameroon, soils are often fertile and there are large areas of subsistence farming. Major crops include millet, yams and rice, whilst plantation agriculture is extensive on the best soils, producing chiefly cocoa. Further west, due to the ancient geology of the region, soils are much less fertile and farming becomes chiefly confined to the raising of perennial crops, with cocoa remaining preeminent. Forestry has devastated much of the natural rainforest in countries such as Côte d'Ivoire and Liberia. Farmers without land have been pushed onto land with marginal soil for agriculture by population growth, which, despite frequent warfare, continues to be among the highest in the world<sup>77</sup>.

The major rivers of Liberia are the Cavalla, the Cestos, the Lofa, the Mano, the Morro, the Saint John and the Saint Paul. The Mano and Morro rivers in the northwest and the Cavalla River in the southeast form boundary lines for part of the country. Most of the rivers of Liberia flow from the mountains inland in the northeast to the coast in the southeast, and parallel each other. Among the low mountains and hills, the river beds are steep and irregular, with frequent falls or rapids. Many rocks, waterfalls, rapids and sandbanks reduce navigation of these rivers very far inland. Closer to the coast, the river grade becomes less, and tidal current prevent the rivers from removing sand bars and accumulations. However, most streams burst their banks regularly, and during the rainy seasons there is often severe flooding along the coastal plains. Many rivers flow long the coast for miles before they enter the Atlantic Ocean<sup>78</sup>.

### **(3) Geology and Soil**

Liberia sits on the West African Shield, a rock formation from 2.7 to 3.4 billion years old, composed of granite, schist, and gneiss. In Liberia, this shield has undergone intense folding and faulting and is peppered with iron-bearing formations called itabirite. The coast is lined with beds of sandstone and the occasional crystalline rock outcrops. Monrovia rests on such an outcropping, a ridge of diabase (a dark-coloured, fine-grained rock). Most of the crystalline rocks date back to the Precambrian age. The western half of country is typically of Archean age. In the eastern half of the country, lenses of Proterozoic greenstone belts occur surrounded by rocks of probable Archean age. Rocks of Pan African age extend northwesterly along most of the Liberian coastline from the Cestos shear zone. The Liberian coastline is characterized by lagoons, mangrove swamps, and river-deposited sandbars. Inland, the grassy plateau,

---

<sup>75</sup> Hadden.

<sup>76</sup> Hadden.

<sup>77</sup> Hadden.

<sup>78</sup> Hadden.

supports limited agriculture<sup>79</sup>.

More than 80 % of Liberia's soils can be used for agriculture. Liberia has four soil types, i.e., latosols, lithosols, regosols and alluvial soils. Latosols are of low to medium fertility and occur in the rolling hill country, covering about 75 % of the total land surface in Liberia.

Shallow and coarse lithosols, in the hilly and rugged terrain, cover about 16 to 17 % of the land in Liberia. Lithosols are a thin soil consisting of rock fragments, and is a soil with poorly defined layer horizons that consists mainly of partially weathered rock fragments. These are soils that are characterized by imperfect weathering and have low humus and mineral nutrient content. These soils have little value for agriculture.

Infertile regosols, or sandy soils, are found along Liberia's coastal plains. Regosols are a type of soil consisting of unconsolidated material from freshly deposited alluvium or sand. It cover about 2 % of Liberia, and although infertile, support large numbers of coconut trees, as well as oil palms.

Highly fertile alluvial soils represent only about 3 % of the land area of Liberia. Naturally, these soils are largely used for agriculture. Alluvial soils can be found in the river bottoms, and in swamps. Swamp soils, especially those known as half bog soils, are naturally rich in humus, and when drained they provide excellent conditions for swamp rice and similar crops<sup>80</sup>.

#### **(4) Land Use**

Agricultural land: 28.1% – arable land: 5.2 % / permanent crops: 2.1 % / permanent pasture: 20.8 %; forest: 44.6 %; others: 27.3 %<sup>81</sup>. As of 2012, Liberia had 30 km<sup>2</sup> of irrigated land.

### **7.1.2 Social Economic Condition**

#### **(1) Population**

Liberia has a population of 5,073,296 (July 2020 est.), with more than half of the population living in urban areas, and approximately one-third living within an 80 km radius of the capital, Monrovia<sup>82</sup>.

#### **(2) Socioeconomic Indicators**

GDP (purchasing power parity) is US\$ 6.112 billion; GDP (official exchange rate) is US\$3.285 billion; GDP – per capita (PPP) is US\$ 1,300<sup>83</sup>; Gross National saving was – (minus) 21.9% of GDP (2016 est.) and 1.9 % of GDP (2016 est.). 54.1 % (2014 est.) of Liberia's population lives below the poverty line<sup>84</sup>. In 2016, 19.8 % of the population has access to electricity - 4 million people did not have electricity in 2017<sup>85</sup>.

There are 3,117,002 total subscriptions to mobile/cellular phone: 66 mobile/cellular subscriptions per 100 inhabitants; 8,000 subscription to fixed telephone line: less than 1 per 100 inhabitants. 7.3 % of population uses the internet, and less than 1 % (8,000 people) are subscribed to broadband fixed network<sup>86 87</sup>.

The maternal mortality rate stands at 661 deaths per 100,000 live births (2017 est.), while infant

---

<sup>79</sup> Hadden.

<sup>80</sup> Hadden.

<sup>81</sup> 2011 est.

<sup>82</sup> Hadden.

<sup>83</sup> 2017 est.

<sup>84</sup> Hadden.

<sup>85</sup> Hadden.

<sup>86</sup> July 2016 est.

<sup>87</sup> Hadden.

mortality rate is 47.4 deaths per 100,000 live births (2020 est.), life expectancy at birth for the total population is 64.7 years (62.5 for male and 67 years for female) (2020 est.), and prevalence rate of contraceptives 31.2 % (2016)<sup>88</sup>.

81 % of Liberians can access an improved drinking water source, with the rest only able to access unimproved drinking water sources (2017 est.)<sup>89</sup>. In 2017, health expenditure stood at 8.2 %, and in 2015, there were 0.04 physicians per 1,000 population, with a hospital bed density of 0.8 beds/1,000 population in 2010. Only 16.9 % of total population has access to improved sanitation facilities, with the remaining 83.1 % of population only able to access unimproved sanitation facilities.

2018 estimates put the HIV prevalence rate at 1.3 %, with an estimated 1,800 HIV-related deaths in 2018<sup>90</sup>. 2013 saw 15.3 % of children under the age of five being underweight<sup>91</sup>. Total youth unemployment stands at 2.3 %<sup>92</sup>.

### **(3) Education**

In 2017, 3.8% of GDP was spent on education, and 48.3 % of the population was reported to be literate (62.7 % of males, 34.1 % of females)<sup>93</sup>.

### **(4) Economic Activities**

Liberia is a low-income country that is heavily reliant on foreign aid and remittances from the diaspora. The republic is well endowed with water, mineral resources and a climate favourable to agriculture. The primary exports are iron ore, rubber, diamonds, and gold, with palm oil and cocoa emerging as new products. There was a government attempt to revive raw timber extraction and promote oil exploration. Agriculture, trade and services are the economic activities. Agricultural products include rubber, coffee, cocoa, rice, cassava (manioc, tapioca), palm oil, sugarcane, bananas; sheep, goats; timber. The industries include: mining (iron ore and gold), rubber processing, palm oil processing, and diamonds. In a 2000 estimate, 70 % of Liberians were employed in agriculture, 8 % in industry and 22 % in services<sup>94</sup>.

#### **7.1.3 Agricultural Condition**

Agriculture, including forestry, is the primary livelihood for more than 60 percent of Liberia's population and accounted for 31 percent of Liberia's 2021 real gross domestic product (GDP). It provides income for many households engaging in cassava, rubber, rice, oil palm, cocoa, or sugarcane production. Cassava and rice are the primary staple food crops. More households engage in cassava production than any other food crop. However, most agriculture is small scale, and overall agricultural productivity is low (due in large part to low-technology practices and a lack of quality agricultural inputs). As a result, Liberia imports more than 80 percent of its staple food, rice, making the country vulnerable to global food price volatility. Poorly integrated, the agricultural sector lacks basic infrastructure such as machines, farming equipment and tools, farm-to-market roads, fertilizers and pesticides, and food storage capacity. The main cash crops and foreign exchange earners are rubber, oil palm, cocoa, and timber.

Rubber is a dominant revenue generator, accounting for 12.5 percent of total export receipts in 2021. Various estimates put the number of people employed by commercial rubber farms at 20,000 and the number of smallholder households involved in growing rubber trees at 35,000. The Firestone Natural Rubber concession, covering almost 200 square miles, is the largest contiguous natural rubber operation

---

<sup>88</sup> Hadden.

<sup>89</sup> Hadden.

<sup>90</sup> Hadden.

<sup>91</sup> Hadden.

<sup>92</sup> Hadden.

<sup>93</sup> Hadden.

<sup>94</sup> Hadden.



in the world and the biggest private sector employer in Liberia.

Palm oil is another significant cash crop. Traditionally it is domestically consumed but there has been some export development with smallholders and large investors expressing interest in expanding cash crop production. The CBL's 2021 report showed a 12.4 percent increase in palm oil production (from a revised 22,286 metric tons to 25,041 metric tons) due to greater labor mobility from the relaxation of COVID-19 restrictions. Access to markets is a concern to most smallholder farmers and large concessions alike. Stakeholders in the palm oil sector include smallholder farmer cooperatives, individual farmers, large multinational-owned corporations, and concessionaires such as Golden Veroleum Limited. The Ministry of Agriculture is the government ministry responsible for the governance, management, and promotion of the agriculture sector in Liberia.

Land rights is a critical issue for concessionaires in Liberia. The Land Rights Act clarifies land tenure as well as land governance, administration, and management. Only the comprehensive implementation of the law, however, will resolve uncertainty around land ownership. Concessionaires frequently report conflicting deeds and land use rights associated with government granted concessions. Other obstacles to investment in agriculture include the lack of capital and professional expertise to increase farm productivity, and a government approach to the sector that is inconsistent and politically driven rather than strategic.

Liberia has a favorable climate and fertile soil for cocoa production. There has been substantial investment in the rehabilitation of cooperative and smallholder cocoa farms. The country's international partners, such as the International Fund for Agricultural Development (IFAD), continue to invest in cocoa smallholder producers to improve livelihoods and raise incomes by modernizing cocoa farming, increasing production, and developing market access. Small scale cocoa production will likely increase as farmers continue to reclaim and rehabilitate their farms. As with the agriculture sector in general, smallholder cocoa farmers and local cooperatives suffer inadequate farm-to-market roads, lack of familiarity with measurement and quality standards, lack of storage facilities, and limited access to updated price and market information.<sup>95</sup>

## **7.2 Outline of Agricultural Sector**

### **7.2.1 Contribution of Agriculture and Agribusiness to the economy**

From estimates in, 70 % of Liberians are employed in agriculture, 8 % in industry and 22 % in services. Agriculture contributed to over 90% of total exports and represented 76.9% of the national GDP in 2011. This makes agriculture the main tool in economic development and poverty reduction in Liberia.

### **7.2.2 Laws, Policies and Development Plans for the Agricultural Sector**

#### **(1) Legislation/Laws:**

##### **Constitution of Liberia (Date of text: 1986):**

The constitution was approved and adopted by a National Referendum on 3 July 1984. Article 8 of the constitution states: "The Republic shall direct its policy towards ensuring for all citizens, without discrimination, opportunities for employment and livelihood under just and humane conditions, and towards promoting safety, health and welfare facilities in employment". The constitution has no specific provisions for agriculture and rural development.<sup>96</sup>

---

<sup>95</sup> Official Website of the International Trade Administration

<sup>96</sup> FAO, 'FAOLEX Database' <<http://www.fao.org/faolex/country-profiles/en/>> [accessed 3 August 2020].

### **Agricultural Law (Title 3 of the Revised Liberian Code of Laws) (15 Feb 1973):**

The law is divided into 4 Chapters, i.e., Plant and animal quarantine (1); Animal husbandry (2); Protection and development of agricultural products (3); Miscellaneous (4).<sup>97</sup>

### **Liberia Agricultural Commodity Regulatory Authority Act of 2014 (10 Oct 2014):**

The act established the Agricultural Commodities Regulatory Authority as a body corporate and defines its functions and powers. The functions of the authority are, among others: to administer and to promote Liberia's agriculture export trade; to increase agriculture productivity, competitiveness, value chain development, and environmental sustainability, especially for smallholders, including women and youth; and to promote a robust, competitive and modernized agriculture sector support of sustainable economic growth and development. It also, among other things, licenses exporters and serves as an advisory and dispute resolution body.<sup>98</sup>

### **(2) Policies:**

#### **Strategic Plan 2015-2018 (22 June 2015):**

The vision of the present Strategic Plan is: "To be a dynamic and efficiently managed institution of public finance, economic management and development planning to achieve sustainable economic growth and transformation". The mission of the plan is to promote inclusive sustainable growth and development through efficient resource allocation, equitable wealth distribution, prudent financial management, integrated development planning, coordinated economic management, and well-formulated and implemented policies.<sup>99</sup>

#### **Poverty Reduction Strategy (PRS):**

The PRS sets out a framework for rapid, equitable, and inclusive growth, poverty reduction and progress towards achieving the United Nations Millennium Development Goals (MDGs). The PRS recognizes the role and contributions to be made by the agriculture sector towards achieving its objectives. The agriculture sector is strategically important for poverty reduction in Liberia. It accounts for employment of nearly 70% of the economically active population, and over 90% of total exports. Agriculture has contributed 76.9% of the national Gross Domestic Production (GDP) in 2011.<sup>100</sup>

#### **Food and Agriculture Policy and Strategy (FAPS) (2008):**

It was developed within the context of the framework of the Poverty Reduction Strategy (PRS). FAPS buttresses pro-poor policies and related strategies so as to realize the potential of the majority smallholders in the agriculture sector.<sup>101</sup>

#### **Liberia Agriculture Sector Investment Program (LASIP) (20 Sep 2010):**

LASIP identifies priority areas from which investment projects aligning national objectives and the CAADP (Comprehensive Africa Agriculture Development Programme) will be developed. It is a framework for progressively increasing the GoL's annual budgetary allocation to the agricultural sector to a minimum of 10%, to secure an annual sustainable 6 % growth in compliance with the Maputo

---

<sup>97</sup> FAO, 'FAOLEX Database'.

<sup>98</sup> FAO, 'FAOLEX Database'.

<sup>99</sup> FAO, 'FAOLEX Database'.

<sup>100</sup> Ministry of Agriculture Monrovia Liberia, *National Rice Development Strategy of Liberia: Doubling Rice Production by 2018, 2012* <[riceforafrica.net/downloads/NRDS/LNRDS.pdf](http://riceforafrica.net/downloads/NRDS/LNRDS.pdf)>.

Explore:

1. The World Fact book, Liberia – CIA (2012); <https://www.cia.gov/library/publications/the-worldfactbook/geos/li.html>

2. Census (2008) LISGIS; Liberia Institute of Statistics & Geo-Information Services

<sup>101</sup> Ministry of Agriculture Monrovia Liberia.

---

Declaration of 2003. The program is meant to be a public-private partnership, in which investment growth for the export sectors will be spearheaded by the private sector, while the public sector will concentrate on the promotion of small-scale farmer growth and development.<sup>102 103</sup>

#### **National Export Strategy Cocoa Export Strategy (2014):**

It is aimed at transforming the Liberian cocoa sector such that it will be an engine of inclusive growth, a vehicle for greater regional integration and a promoter of the “Made in Liberia” brand in markets.<sup>104</sup>

#### **National Export Strategy Oil and Palm Export Strategy:**

It was developed to achieve the export potential and export competitiveness of the Liberian oil palm sector. At its basis the vision: "To establish the Liberian oil palm sector as a leading contributor to the national economic transformation agenda through exports development in an inclusive and sustainable manner".<sup>105</sup>

#### **Land Rights Policy (May21, 2013):**

This is a national sectoral policy that provides the Land Commission’s policy recommendations for land rights in Liberia. The policy development was guided by the following principles: secure land rights, economic growth, equitable benefits, equal access, equal protection, environmental protection, clarity, participation, and evidence-based. The policy also seeks to bridge the equality gap between men and women.<sup>106</sup>

#### **National Policy and Response Strategy on Climate Change (Liberia 2018):**

It sets the basic analysis, mitigation and prevention issues and principles as regards the adverse climate change impact and consequences on Liberia.<sup>107</sup>

#### **National Biodiversity Strategy and Action Plan (NBSAP)-II 2017-2025 (01 March 2017):**

The NBSAP-II recognizes the dependence of agriculture and food security on biodiversity (“Food production and nutrition depend on essential ecosystem functions such as nutrient cycling, decomposition of organic matter, soil formation and rehabilitation, pest and disease regulation, and pollination that benefit crop and livestock production”). NBSAP-II is implemented by the Environment Protection Agency of Liberia.<sup>108</sup>

#### **National Integrated Water Resources Management Policy (01 Nov 2007):**

It is aimed at ensuring sustainable management of water resources, following the principle of Integrated Water Resources Management (IWRM). For the agriculture sector, the end goal is to ensure the availability of sufficient quality and quantity of water for food security. The policy prioritizes water demands in the following order: 1) drinking water; 2) water for urban and rural sanitation; 3) water for food security; 4) water for other uses (industries, hydro-power, firefighting, etc.).<sup>109</sup>

#### **National Environment Policy 2002:**

The overall goal of the policy is to promote long-term sustainable development and conservation of the environment. In regards to agriculture, the policy underlines the link between long-term food security

---

<sup>102</sup> FAO, ‘FAOLEX Database’.

<sup>103</sup> Ministry of Agriculture Monrovia Liberia.

<sup>104</sup> FAO, ‘FAOLEX Database’.

<sup>105</sup> FAO, ‘FAOLEX Database’.

<sup>106</sup> FAO, ‘FAOLEX Database’.

<sup>107</sup> FAO, ‘FAOLEX Database’.

<sup>108</sup> FAO, ‘FAOLEX Database’.

<sup>109</sup> FAO, ‘FAOLEX Database’.

and sustainable development, addressing issues like chemicals in agriculture, land use planning and assessment, with soil conservation in mind, etc.<sup>110</sup>

### Liberian National Rice Development Strategy (LNRDS), 2012:

The LNRDS is a deliberate initiative by the Government of Liberia (GoL) to develop appropriate interventions in the rice sub-sector to enhance rice production and productivity and thereby ensure food security. The strategic components of LNRDS are drawn within the context of the Poverty Reduction Strategy (PRS). Under the framework of CAADP, the LNRDS is fully aligned with LASIP.<sup>111</sup>

### 7.2.3 Implementation of NRDS

The NRDS was developed in 2012 but was neither approved nor has launched and very little been done in implementing it.<sup>112</sup> In 2010, Liberia's rice production was 296,090 tons with a yield of 1.18 t/ha.<sup>113</sup> The target was to double rice production in 2018, under a single crop of rice, achieving self-sufficiency in the process.<sup>114</sup> But the actual rice production in 2018 was 257,995 tons, at a yield of 1.08 t/ha, with targets for production and yield missed.<sup>115</sup> Specifically, as part the strategy to increase production, a target was set to increase yield and cultivated area from the 2010 value of 1.18 t/ha to 2.00 t/ha and 251,230 ha to 300,000 ha respectively in 2018.<sup>116</sup> In actuality, yield was 1.08 t/ha – a target achievement rate of 54.0 % - and the cultivated land was 238,090 ha- a target achievement rate of 79.4 %.<sup>117</sup>

		Status	Support by CARD
A	A-1 Formulation and launch	In progress	<ul style="list-style-type: none"> <li>The NRDS was developed in 2012, but not approved or launched, and very little has been done in terms of implementation of the NRDS as anticipated.</li> </ul>
	A-2 Gap analysis& prioritization and concept note formulation	Done	<ul style="list-style-type: none"> <li>5 concept notes were developed.</li> </ul>
	A-3 Lobbying for funding and project formulation	Not started	<ul style="list-style-type: none"> <li>Liberia most of the NRDS concept notes were never turn in to full proposal.</li> </ul>
	A-4 Implementation	Not started	-
B	Rice seed strategy	In progress	<ul style="list-style-type: none"> <li>Developed a draft seed strategy in 2016.</li> <li>Developed concept notes.</li> <li>Drafted but not approved yet.</li> </ul>
C	Mechanization strategy	Not started	-

Figure 7.1 Status of NRDS Process in Liberia <sup>118</sup>

### 7.2.4 Rice Food Value Chain Analysis

Rice is the primary staple food of Liberians, representing over 33 % of food consumed and

<sup>110</sup> FAO, 'FAOLEX Database'.

<sup>111</sup> Ministry of Agriculture Monrovia Liberia.

<sup>112</sup> JICA, 'Coalition for African Rice Development (CARD) Final Review Assessment Final Report', March, 2018.

<sup>113</sup> Ministry of Agriculture Monrovia, Liberia, *National Rice Development Strategy of Liberia: Doubling Rice Production by 2018, 2012* <[riceforafrica.net/downloads/NRDS/LNRDS.pdf](http://riceforafrica.net/downloads/NRDS/LNRDS.pdf)>.

<sup>114</sup> Ministry of Agriculture Monrovia, Liberia.

<sup>115</sup> FAO, 'FAOSTAT' <<http://www.fao.org/faostat/en/#data>> [accessed 11 May 2020].

<sup>116</sup> Ministry of Agriculture Monrovia Liberia.

<sup>117</sup> FAO, 'FAOSTAT'.

<sup>118</sup> JICA.

approximately 50 % of adult caloric intake. While 71 % of the estimated 404,000 farm families produce rice, the country is still heavily reliant on imports.<sup>119</sup>

A value chain is the set of market actors in the flow of a particular product (or service) from the raw material stages through production, processing and distribution and on to an end market. The application of a value chain lens is meant to ascertain the context for the market actors.<sup>120</sup> The Liberian rice value chain is simple, but inefficient. Poor relationships in the value chain have resulted in a high percentage of subsistence-based production, limiting any improvements. Of the numerous operational challenges, the most pressing is the high cost of production due to weaknesses throughout the chain. Specifically, efficiency gains are needed in the areas of the inputs and seed industries, production, transportation and aggregation, post-harvest handling, finance and ICT.<sup>121</sup>

For the domestic rice industry to be able to compete favourably with imported rice, there needs to be a transition to a commercialized rice value chain, right from input supply to retailing and branding of the local product. The short-term vision for rice in Liberia is a system where smallholders consistently produce enough rice to fulfil household needs and commercial production is substantially increased. Private investment will build post-harvest milling, storage and processing capacity. The inputs industry will grow and develop distribution networks directly into rural communities, and support markets will emerge in support of key growth segments.<sup>122</sup>

The value chain for rice in Liberia is not overly complex and is dominated by importers and their distribution channels. The main actors in the value chain are importers, wholesalers, traders, local farmers and retailers. The main functions of the value chain for domestic rice are production, harvesting, storage, milling, wholesaling and retailing.<sup>123</sup>

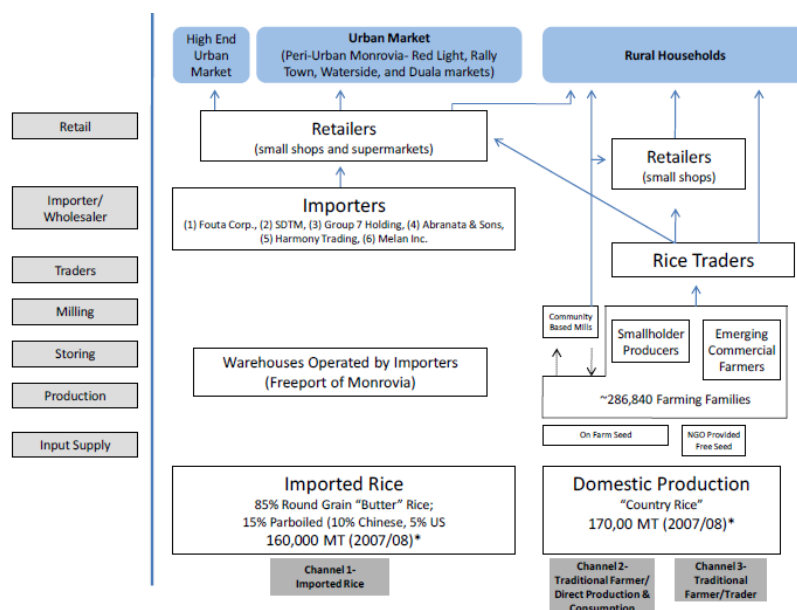


Figure 7.2 Rice value chain map of Liberia<sup>124</sup>

<sup>119</sup> USAID, 'Attachment IV to the Global Food Security Response West Africa Rice Value Chain Analysis: Global Food Security Response Nigeria Rice Study', 2009, 1–52

<[https://www.marketlinks.org/sites/marketlinks.org/files/resource/files/GFSR\\_Liberia\\_Rice\\_VC\\_Analysis.pdf](https://www.marketlinks.org/sites/marketlinks.org/files/resource/files/GFSR_Liberia_Rice_VC_Analysis.pdf)>.

<sup>120</sup> Ministry of Agriculture Republic of Liberia, *Comprehensive Assessment of the Agriculture Sector (CAAS-Lib): Volume 1 - Synthesis Report*, 2007.

<sup>121</sup> USAID.

<sup>122</sup> USAID.

<sup>123</sup> USAID.

<sup>124</sup> USAID.

## **(1) Importers, Wholesalers and Distribution:**

Most of the rice in the chain is imported, primarily flowing through the Freeport of Monrovia en route to warehouses run by importers/distributors. From then on, it is sold to licensed retailers for national distribution. The importers are also the principal wholesalers of rice, who are required to sell only to retailers that can prove they have received a rice dealership license from the GoL.<sup>125</sup>

## **(2) Production:**

Domestic production of rice is subsistence in nature, with smallholders often producing for domestic consumption and only selling the excess in the local market. Anecdotal evidence from commercial input firms, backed up by farmers, indicates an emerging segmentation of farmers into: emerging commercial, entrepreneurial and subsistence farmers. Full-scale commercial production of rice has not yet been realized in Liberia, although there are current investments underway to achieve this goal. The most notable is the African Development Aid (ADA) project in Lofa County, partially funded by the Government of Libya. The newly registered “Liberian Rice Development Corporation” is also looking for opportunities in commercial rice production, as are a couple of the current importers of rice in Liberia, but they are waiting to see incentives from the GoL, e.g., duty-free agricultural machinery, input supplies and tax holidays, as well as signals from the government that the enabling environment will be supportive of a private, commercial operation in Liberia.<sup>126</sup>

### **Millers:**

There is minimal milling of rice in Liberia, with virtually all domestic production being milled either by hand or with portable mills which have been randomly distributed throughout the countryside by donors. There are plans to rehabilitate state-owned mills through a WFP “Purchase for Progress” program.<sup>127</sup>

### **Wholesalers:**

The principal wholesalers of rice are also the importers, who sell directly to retailers or have their own distribution networks to the counties outside of Monrovia. Some traders, dealing primarily in domestic and not imported rice, also function as wholesalers who in turn retail rice in the local informal markets.<sup>128</sup>

### **Traders:**

Traders serve a key role in supplying domestic rice to regional markets within Liberia. They typically purchase domestic “country rice” (milled or paddy) directly from local farmers in remote growing regions and supply it to the regional markets of Zwedru, Ganta, Sanniquelle, Gbanga, Tubmanburg, Buchanan, Voinjama and Kakata. The wholesalers of imported rice sell directly to retailers, who will either contract transportation services or utilize their own means of transportation.<sup>129</sup>

### **Input Supply:**

Seed rice has predominately been distributed freely by donors and NGOs, and this has discouraged the commercialization of seed supply. There are three seed companies in Monrovia, i.e., T.R Enterprises, Inc., Green Farming Inc., and Anarco Trading Enterprises. The seed companies primarily sell vegetable seed, which are more profitable. In addition, farmers have been hesitant to pay for new varieties of rice seed given the bad experiences with some donated seed. Retail prices in May 2009

---

<sup>125</sup> USAID.

<sup>126</sup> USAID.

<sup>127</sup> USAID.

<sup>128</sup> USAID.

<sup>129</sup> USAID.

for rice seed varieties LAC 23 and Suakoko 8 were approximately \$18 per 25 kg bag. Fertilizer is scarce in the capital, and is not available outside of Monrovia due to its high cost, scarcity and a lack of technical knowledge on its application. Urea, Triple Super Phosphate (TSP) and 15-15-15 were the only fertilizers observed in Monrovia, with a cost of \$60 per 50 kg bag, regardless of the type of fertilizer. The commercial 50 kg sacks have also been broken down and repackaged in to smaller sizes of 25 kg, 5 kg and 1 kg. While the duties on the import of seeds and tools were removed in April 2009, they still exist for fertilizers (7 %) and pesticides.<sup>130</sup>

### **7.2.5 Support for the Rice Sector**

In Liberia, concept notes have not morphed into donor projects. However, according to the CARD focal point, many potential donors showed interest when CARD Consultants impressed upon them the idea of transitioning from concept notes to practical project implementation.<sup>131</sup>

The NRDS did not receive full support from the ministry. The various taskforces were also unable to function due to reasons like a lack of human resource and a shortage of the various taskforces also did not have the capacity to function due to reasons such as the lack of human resource as evidenced by the few staff members committed to the cause.<sup>132</sup>

### **7.2.6 Implementation Structure of the Rice Sector**

In the implementation of NRDS in Liberia, the focal point is the Executive Director of the Ministry of Agriculture, who is in charge of the development and implementation of NRDS.<sup>133</sup> Officials of the Ministry of Agriculture, personnel from Liberian research institutes and some from NGOs make up the Task force team.<sup>134</sup> A government-established implementation mechanism is non-existent and the CARD secretariat funds all CARD-related meetings in Liberia.<sup>135</sup>

## **7.3 Current Status and Issues in the Agricultural Sector**

### **7.3.1 Irrigation Facilities**

#### **(1) Current Situation of Irrigation Development**

In Liberia, agriculture is primarily rain-fed. As of the year 1987, 2,100 ha of agriculture land was equipped for irrigation. The use of water control technologies is uncommon, and wherever it is applied, it is majorly in the form of manual, unregulated irrigation, e.g., using watering cans.

FAO's Special Program for Food Security (SPFS) 2000-2002 had the following aims: Develop 50 ha of small swamps, inclusive of irrigation and canals and water control structures; Train farmers and extension staff in the O&M of treadle and petrol pumps; Train farmers and extension staff in water control practices at field level, irrigated field maintenance and improved cultivation methods (particularly rice and vegetables); Demonstration of low-cost small-scale irrigation technologies on 10 ha using treadle pumps and petrol pumps, and of water management practices with the participation of farmers and extension workers.<sup>136</sup>

The LNRDS aspires to rehabilitate existing irrigation infrastructure and to construct new irrigation and drainage. The specific policies and guidelines on irrigation scheme aspects like: maintenance, ownership

---

<sup>130</sup> USAID.

<sup>131</sup> JICA.

<sup>132</sup> JICA.

<sup>133</sup> Ministry of Agriculture Monrovia Liberia.

<sup>134</sup> Ministry of Agriculture Monrovia Liberia.

<sup>135</sup> Ministry of Agriculture Monrovia Liberia.

<sup>136</sup> Food and Agriculture Organization of the United Nations (FAO). Rome, Italy, 'AQUASTAT Country Profile – Liberia', 2005.

and water sharing are yet to be developed.<sup>137</sup> Even though some donors have expressed interest, in Liberia, CARD-related concept notes have not translated into physical project implementation.<sup>138</sup>

### **7.3.2 Agricultural Machinery**

In Liberia, statistics system are not well developed, and there is almost no quantitative information available in recent years on agricultural machinery. Before the civil war, there were attempts made by development partners and NGOs to introduce the mechanization in agriculture on a project basis.

For example, one project introduced tractors and combined harvesters for hiring services in Bong, Lofa, Grand Cape Mount, and Grand Gedeh counties. Farmer's groups jointly used power tillers which the Chinese government provided in Bong, Lofa, Grand Cape Mount, Maryland, and Nimba counties. However, none of these activities continued after the assistance ended, mainly for the following reasons.

- The period of technical support by experts was short, and the technology and knowledge did not fully take root.
- Different support organizations have provided different brand of manufacturers and capacities of equipment.
- Combine harvesters was unable to operate due to soft ground.
- Lack of storage space for equipment.
- Difficulty in accessing the fields due to undeveloped farm roads.
- Low level of ownership by farmer groups.
- Low level of maintenance/repair skills.
- Lack of spare parts and after-sales service, etc.
- The input cost was higher than the price of products due to not considering the cost-effectiveness aspect.
- Low involvement of the Ministry of Agriculture.

Development partners are still supporting for agricultural machinery on a project basis to improve farm productivity and livelihoods. The Ministry of Agriculture has prepared a policy paper on agricultural mechanization.

Based on the lessons from previous projects, NRDS1 (2012-2018) has implemented agricultural mechanization as one component with the following six sub-components.

- **Subcomponent 6.1. Mechanization Options**  
Review of different mechanization options and economic feasibility for rural entrepreneurs who can invest in mechanization.
- **Subcomponent.6.2. Human Resources**  
Development of human resources along the value chain for agricultural mechanization, from local mechanics and artisans to equipment design engineers.
- **Subcomponent.6.3. Policy Tools**  
Application of policy tools to improve business operations in the private sector: dealers, importers, operators, mechanics, service providers, extension services, etc.
- **Subcomponent 6.4. Research and Development**  
Testing and improving the adaptability of machinery and equipment to the local environment to improve operational and cost efficiency.
- **Subcomponent 6.5. Testing and Standardization**  
Design of local testing, standardization, and approval systems for machinery and equipment to

---

<sup>137</sup> Ministry of Agriculture Monrovia Liberia.

<sup>138</sup> JICA.



improve the life and profitability of machinery.

• **Subcomponent 6.6. Promotional Activities**

Provision of information to facilitate the introduction of agricultural machinery.

### 7.3.3 Agricultural Inputs

Rice production in Liberia is dominated by small scale upland farmers and those farmers are tend to avoid taking of risk for agricultural activities. Such tendency leads to low input farming, low productivity and thus, low profitability. Pre-harvest and post-harvest losses by pest and disease are estimated as 40 to 50 percent of production, but most of farmers are used to take physical counter measures only and application of agrochemicals are very limited. Limited use of agrochemicals are enhancing the high rate of pre and post-harvest losses. Therefore, the National Rice Development Strategy 1 describes that “Increasing availability and accessibility to inputs” in Strategic Component 2. As a sub component of Strategic Component 2, following components are described.

- Subcomponent.2.1. Research
- Subcomponent.2.2. Seed production, certification and distribution
- Subcomponent.2.3. Private sector participation
- Subcomponent.2.4. Rural infrastructure
- Subcomponent.2.5. Finance
- Subcomponent.2.6. Incentives for input use
- Subcomponent.2.7. Input delivery systems
- Subcomponent.2.8. Extension and technical services
- Subcomponent.2.9. Labour saving technologies

In Liberia, the system of statistical data collection on the agricultural sector is not well developed and recent quantitative information on agricultural input such as fertilizer production and consumption are not available. Currently, fertilizers used in Liberia is depend on imports from neighbouring countries such as Senegal, Guinea and Sierra Leone, but such importation stopped due to border closure , caused by the COVID-19 crisis. Lack of fertilizer distribution accelerates the tendency of low input farming activities.

Due to the civil war, the rice seed production and distribution system has not been structured in Liberia, and there is no institution to certify and quality assure seed. The Central Agricultural Research Institute (CARI) under the Ministry of Agriculture purchases breeder seed from other international research institutions, such as the West Africa Rice Development Agency (WARDA) and IRRI, to produce foundation seed, but there is a need for improvement in terms of quantity and quality, both, to meet the increasing demand for rice.

**Table 7.1 Seed Chain Production Summary by Year (2008-2013)**

Year	Breeder seed (input)	Foundation seed (input)	Foundation seed (output)	Certified seed (output)	Percent of national requirement (6,529 t)
2008	2		50		
2009	3	50	80	2,100	32%
2010	3	80	120	3,520	54%
2011-2013				7,000	85-100%

Source: Ministry of Agriculture (2012)

### 7.3.4 Status of Implementation of Grants to Assist Poor Farmers

Second Kennedy Round (2KR) grant aid for Liberia has been implemented before 1990, but there was no assistance afterward. The provision of food aid has often been implemented due to a history of civil conflict since 1989, which have damaged the national economy and severely damaged the agricultural

sector. The procured rice was sold in a general market and sales amount arising of it are accumulated as a counterpart fund. Utilizing such fund, the rain-fed rice technical cooperation project was implemented, and the project contributed the improvement of the capacity of domestic rice production. The following table indicates the past result of the 2KR grant aid program.

**Table 7.2 The past result of 2KR grant aid for Liberia**

Year	1985	1986	1987	1988	1989	Total
E/N basis (million yen)	200	200	200	250	250	1,100
Procured item	Unidentified	Unidentified	Unidentified	Unidentified	Unidentified	—

Source: MOFA data book of Official Development Assistance by country

## **Chapter 8 Nigeria**

### **8.1 Outline of Nigeria**

#### **8.1.1 Natural Conditions**

##### **(1) Topography**

Nigeria is located in the tropical zone of West Africa and has a total area of 923,770 km<sup>2</sup>. It is bordered to the west by Benin, to the northwest and north by Niger, to the northeast by Chad and to the east by Cameroon, while the Atlantic Ocean forms the southern limits of Nigerian territory. Land cover ranges from thick mangrove forests and dense rain forests in the south to a near-desert condition in the north-eastern corner of the country. Three broad ecological zones are commonly distinguished in the country: the northern Sudan Savannah, the Guinea Savannah zone or Middle Belt, and the southern rainforest zone. A mountainous zone is found at the border with Cameroon and the plateau zone in the centre of the country<sup>139</sup>.

##### **(2) Weather Conditions**

Nigeria has different climatic zones, due to its size and diversity. The coastal area, where Lagos is located, has a high temperature ranging from the mid -20 °C to the low 30 °C throughout the year, with heavy annual rainfall, averaging 1,778 mm. As regards the rainy season, the coastal area experiences the heaviest rainfall from May to October. In this area, humidity is always high throughout the year but declines when the winter months come. The Central Plateau, where Abuja is located, experiences the highest temperatures which climb to more than 38 °C from March to June. During the rainy season of June to September, this area experiences a hot and humid climate, however, the humidity decreases significantly during the coolest months from December to January, with night temperatures often in the 16 °C. Moreover, the average rainfall in the Central plateau is 1270 mm per year. Northern Nigeria has the driest climate, with the least annual rainfall, averaging as low as 508 mm in the far north<sup>140</sup>.

##### **(3) River System**

There are four (4) principal surface water basins in Nigeria; namely the Niger basin, Lake Chad basin, South-western littoral basins, and South-eastern littoral basins. Niger basin which consists of the main rivers; Niger River and its tributaries (Benue, Sokoto, and Kaduna) covers 63% of the national land. Niger River creates a large and intricate delta as the waters reach the Gulf of Guinea.

#### **8.1.2 Social Economic Conditions**

Nigeria is one of the most densely populated countries in Africa, where more than 250 ethnic groups reside<sup>141</sup>. The country is greatly endowed with mineral resource and this made the country an Africa's biggest oil exporter<sup>142</sup>. However, Nigerian security has been threatening by continuous battle with Boko Haram which is resulted from various challenges such as uneven distribution of oil revenue, high levels of corruption, and violence in the Middle Belt region pose<sup>143</sup>.

Nigeria's GDP amounted to 475 billion U.S. dollars in 2019, with GDP per capita in Nigeria is 2,363

---

<sup>139</sup> FAO Aquastat, 2016

<sup>140</sup> Country Report, 'Nigeria Geography' <<https://www.countryreports.org/country/Nigeria/geography.htm>>[accessed 25 January 2021]

<sup>141</sup> CIA, 'The World Fact Book', 'Nigeria' <<https://www.cia.gov/the-world-factbook/countries/nigeria/>>[accessed 25 January 2021]

<sup>142</sup> The World Bank, 'The World Bank in Nigeria', <<https://www.worldbank.org/en/country/nigeria/overview>>[accessed 25 January 2021]

<sup>143</sup> Council on Foreign Relations, 'Global Conflict Tracker', 'Boko Haram in Nigeria', <<https://www.cfr.org/global-conflict-tracker/conflict/boko-haram-nigeria>>[accessed 25 January 2021]

---

USD, recording the highest GDP in Africa<sup>144</sup>. GDP growth rate for 2019 was 2.3%, marginally higher than 1.9% in 2018 from 2015 to 2016, Nigerian economy slipped into recession due to oil price shock, but the economy is seen emerging back to growth in 2021. However, the fact that the oil still contributes approximately 80 percent of the Federal Government's revenue makes the Nigerian economy highly susceptible to oil price volatility. Although poverty rates are declining, still 40 % of Nigerians (83 million people) live below the poverty line, and 25 % (53 million) remains vulnerable. The limited or lack of strong national development is mainly attributed to the reason of not investing adequately in the human capital development by the Nigerian government.

### **8.1.3 Agricultural Condition**

Although employment rate in agriculture shows 35% in 2020<sup>145</sup>, while agriculture accounts for 21.91% of GDP in 2019<sup>146</sup>, agriculture remains the base of the Nigerian economy through provision of the main source of livelihood for most Nigerians<sup>147</sup>. However, the Nigeria's agricultural trade deficit has been widening as the data shows that during 2016 to 2019, total amount of agricultural export was only a fourth of agricultural import<sup>148</sup>. Nigeria's major agricultural export commodities are sesame seeds, cashew nuts, cocoa beans, ginger, and cotton, while sesame, cashew nuts and cocoa which account for more than half of the nation's agricultural export. Nigeria's essential cash crop is rice, and the country is now the biggest producer of rice in Africa as well as in consumption and amount of import. Moreover, 80% of total production is grown by small-scale producer. Cassava is the second most important cash crop after rice in Nigeria. Nigeria's share of world production of Cassava recorded 21.5% in 2018. Similarly, the crop is predominantly grown by smallholders on small plot.

Even though agriculture remains the base of the Nigerian economy, various factors undermining production include very low level of irrigation development, dependencies on rain-fed agriculture, small-land holding, limited adoption of research findings and technologies, expensive input, unavailability of credit, problem on fertilizer procurement and distribution, lack of adequate storage facilities, and lack of access to market.

## **8.2 Outline of Agricultural Sector**

### **8.2.1 Laws, Policies and Development Plan Relating to the Agricultural Sector.**

In 2016, the Agricultural Promotion Policy (APP: 2016-2020) was developed building on success and lessons learned from the Agricultural Transformation Agenda (ATA: 2011-2015), and APP identified constraints limiting the productivity of the agricultural sector and proposed policies<sup>149</sup>. The basic principles of APP is that /a prosperous agricultural sector encourages manufacturing /by supplying less expensive raw materials as well as food for workers, /reduce the unemployment rate, /reduce rural-urban migration with realization of infrastructural development in neglected rural area. In APP, the intervening strategies are divided into three organizing themes; productivity enhancements; crowding in private

<sup>144</sup> Focus Economics, 'Nigeria Economic Outlook',

<https://www.focus-economics.com/countries/nigeria> [accessed 25 January 2021]

<sup>145</sup> The World Bank, 'Employment in agriculture (% of total employment) (modeled ILO estimate) - Nigeria'

<https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=NG> [accessed 25 January 2021]

<sup>146</sup> The Global Economy.com, 'Nigeria: GDP share of agriculture',

[https://www.theglobaleconomy.com/Nigeria/share\\_of\\_agriculture/](https://www.theglobaleconomy.com/Nigeria/share_of_agriculture/) [accessed 25 January 2021]

<sup>147</sup> FAO, 'FAO in Nigeria',

<http://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/> [accessed 25 January 2021]

<sup>148</sup> PwC Nigeria, 'AfCFTA WORKSHOP', 'Current State of Nigeria Agriculture and

Agribusiness Sector', September, 2020,

<https://www.pwc.com/ng/en/assets/pdf/afcfta-agribusiness-current-state-nigeria-agriculture-sector.pdf> [accessed 25 January 2021]

<sup>149</sup> Odunze Daisy Ifeoma, 'A review of the Nigerian agricultural promotion policy (2016-2020): Implications for entrepreneurship in the agribusiness sector', International Journal of Agricultural Policy and Research Vol.7 (3), pp. 70-79, April 2019 (online)

[https://www.researchgate.net/publication/333118199\\_A\\_review\\_of\\_the\\_Nigerian\\_agricultural\\_promotion\\_policy\\_2016-2020\\_Implications\\_for\\_entrepreneurship\\_in\\_the\\_agribusiness\\_sector/link/5cdc6264a6fdccc9ddb1ebe7/download](https://www.researchgate.net/publication/333118199_A_review_of_the_Nigerian_agricultural_promotion_policy_2016-2020_Implications_for_entrepreneurship_in_the_agribusiness_sector/link/5cdc6264a6fdccc9ddb1ebe7/download) [accessed 25 January 2021]

funding and institutional realignment. These three themes are further broken down into levers, and each of the lever have identified constraints to be addressed, policy reforms and enabling program. For example, as regards productivity enhancements, APP identifies eight policy levers; access to land, soil fertility, access to information and knowledge, access to inputs, production management, storage, processing and Marketing and trade.

### **8.2.2 Implementation Status of the NRDS**

As one of the first group countries in the CARD phase 1 (2008-2018), NRDS1 was developed in 2009, and it targeted to increase rice production in Nigeria from 3.4 million tons in 2007 to 12.85 million tons by the year 2018 in line with three major priority areas identified as: post-harvest handling and processing, land development and irrigation, and seed development and other production inputs<sup>150</sup>. For successful implementation of programs, a National Coordinating Committee was set to guide the implement and monitor the process in Nigeria with representatives of the domestic stakeholders and donor agencies as member. Later, NRDS1 was converted to the Rice Transformation Agenda- Action Plan (RTA-AP) in collaboration with the government rice policy<sup>151</sup>. Moreover, sub-sector strategies such as the seed and mechanization are also developed. Therefore, significant improvement was shown in rice sector in Nigeria during CARD phase 1, and the achievements led to participation in CARD phase 2 by Nigerian government represented by the Federal Ministry of Agriculture and Rural Development (FMARD).

In 2020, Nigerian government formulated NRDS2 (2020-2030), and thus set the overall objective of “Achieving rice self-sufficiency, import substitution and food security” within the period<sup>152</sup>. To achieve the overall goal of the NRDS2, five priorities are identified, and they are; 1) sustain increase in paddy production and storage, 2) sustained production and improved access to quality seed of approved rice varieties, 3) increase access and use of mechanization equipment and tools in rice production and processing, 4) upgrade the processing and marketing of locally produced rice, and 5) improve access to and use of financials service.

### **8.2.3 Rice Food Value Chain Analysis**

Rice value chain in Nigeria is dominated by a multitude of small family enterprises, and this value chain can be divided into production which is consist of mostly the farmers and support services, processing which includes parboiling and milling, and marketing which is mostly bulk through the open air markets<sup>153</sup>. To maximize the benefit of smallholder producers, it is imperative that smallholder producers manage up to six hectares of rice lands to become full time rice farmers, and disengage from other crops. Secondary, it is also imperative to alleviate the burden of manual tasks handled by smallholder producers through strengthening the farm mechanization. For example, smallholder access to appropriate mechanization i.e. tractor for upland cultivation, power tiller for paddy use, mechanical combine, harvester, and power thresher at harvest, should be increased. Additionally, there is also the need that the women whose health under threat by directly exposing to smoke in the process of making parboiled rice have to be protected through provision of less smoky alternative vats currently being developed and promoted by some NGO. Regarding processing, transformation of the single phase mills to two-phase single pass mills is needed to not only reduce the amount of broken grain but also result in 50% increase in recovery. Moreover, it is also expected that more and more locally produced rice being getting involved in bagging of small quantities for supermarket and convenience store sales, though it is crucial that to ensure that the additional cost can be recovered adequately, supported by

---

<sup>150</sup> Federal Republic of Nigeria, ‘National Rice Development Strategy (NRDS)’, May 29th, 2009, <[https://riceforafrica.net/downloads/NRDS/nigeria\\_en.pdf](https://riceforafrica.net/downloads/NRDS/nigeria_en.pdf)>[accessed 25 January 2021]

<sup>151</sup> COALITION for African Rice Development, ‘Nigeria’

<<https://riceforafrica.net/card-countries/group-1-countries/nigeria/nigeria,-july-2019>>[accessed 25 January 2021]

<sup>152</sup> Federal Republic of Nigeria, ‘National Rice Development Strategy Phase 2 (NRDS: 2020-2030)’, 2020

<sup>153</sup> Richard (Dick) Tinsley, ‘Rice Value Chain Analysis – Sokoto State Nigeria (NIG 244)’, ‘Winrock International Nigeria Farmer-to-Farmer Program’

<<https://webdoc.agsci.colostate.edu/smallholderagriculture/RiceValueChain.pdf>>[accessed 25 January 2021]

---

sufficient demand.

At the same time, in enhancements of the value chain, a substantial amount of capital investment is needed. Hence, there will be the need for some form of institutional credit, and the rural credit system allows smallholder producers purchase equipment and procure the operational costs which allow some contract services to be done on credit with in-kind repayment after harvest.

#### **8.2.4 Progress of Support to Rice Sector**

As one of the first group countries in the CARD, JICA has been supported rice sector of Nigeria. Recently, JICA implemented “Rice Post-Harvest Processing and Marketing Pilot Project in Nasarawa and Niger States (RIPMAAP) (completed in 2016)” which aimed to improve the quality of domestic rice in the target states while achieving the main project purpose and other outputs. Other international donor agencies such as WB, FAO, USAID, and DFID are also currently implementing various rice projects.

**Table 8.1 Rice-related projects in Nigeria**

No.	Project	Organization	Period	Type
1	FADAMA III	WB	2008-2017	Loan
2	Onyx Rice Mill	GIZ(CARI)	2014-2017	Matching grant fund
3	Ajifa Rice Mill	GIZ(CARI)	2014-2017	Matching grant fund
4	Study of Quality Control by Integrated Rice mills	GIZ(CARI)	2014	small grant
5	Rice Post Harvest Processing & Marketing Pilot Project [RIPMAAP	JICA	2011-2015	Technical Cooperation
6	Rice Value Chain Development	IFAD	2014-2019	Loan
7	Rice Value Chain Development	IFAD	2015-2022	Loan
8	Strengthening National Seed System in Nigeria	FAO	2013-2015	Technical Cooperation
9	partnership for sustainable rice systems development in Sub Sahara Africa(Nigeria)	FAO	2015-2017	Grant
10	Study of Quality Control and grading standard by integrated rice mills	JICA	2015	Grant
11	1. Rejuvenate breeder seeds of released varieties 2. Capacity development of NASC staff and seed companies	USAID /AfricaRice	2015-2017	Grant
12	Capacity development and experience sharing for sustainable rice value chain development in Africa through SSC	Government of Rep of Korea (Implementing agency-FAO)	2014-2017	Grant
13	Upgrade of infrastructures at the new office complex of NASC	WAAPP/WB	2016	-
14	Nigeria Agricultural Transformation Agenda Support Programme – Phase 1	AfDB	2015-2019	-
15	Nigeria Agriculture Policy Project (NAPP)	USAID	2015-2020	-
16	Third National Fadama Development	The World Bank	2008-2019	-
17	Youth Entrepreneurship and Women Empowerment in Northern Nigeria	Global Affairs Canada	2017-2021	-

#### **8.2.5 Implementation Structure of Rice sector**

Federal Ministry of Agriculture and Rural Development (FMARD) is responsible agency for national rice development. There is a rice desk in Directorate of Agriculture and the office is in charge of planning projects based on needs assessment, monitors and evaluates the achievements of the rice development

program and recommends improvement<sup>154</sup>. As regards rice seed sector, National Agricultural Seed Council (NASC), which was established in 2007, is governmental seed certification agency, and also produce basic seeds by itself. National Cereal Research Institute (NCRI), which was established in 1975, is in charge of breeding cereal variety as well as production of foundation seeds and basic seed. As regards extension service, the Agricultural Development Program (ADP) is the main extension organ which deploys extension officers to disseminate technical information to the farmers and carries out various extension activities to improve farmer's skill in rice cultivation<sup>155</sup>. As regards irrigation development of rice cultivation, River Basin Development Authority (RBDA), which is under Ministry of Water Resources, is working for improvement of agriculture and rural development through irrigation and control of river pollution. Currently, the office is operating 12 irrigation schemes.

### **8.3 Current Status and Issues in the Agricultural Sector**

#### **8.3.1 Irrigation Facilities**

##### **(1) Current Situation**

Of the 40.5 million ha of arable land (FAO, 2019), which represents about 44% of Nigeria's 92.4 million ha land area, rice cultivation area has increased from 1.8 million ha (NRDS, 2008) to 4.9 million ha (FAO, 2017). The actual irrigated area is 325,106 ha (FAO, 2000), or 14% of the irrigation potential of 2.3 million ha (FAO, 2010). According to Bashir Adelodun et al.<sup>156</sup>, 70% of the irrigation potential lies in the northern region with low rainfall, 20% in the wetter southern region, and the remaining 10% is reported to be distributed in the central and western highland regions.

In Nigeria, rice constitutes the major crop cultivated during the rainy season generally. Paddy rice fields cover 510,050 ha, which is not as widespread as rain-fed fields (1,243,151 ha of upland rice and 47,799 ha of lowland rice) in 2008 (FMWR, 2014). Currently, there are 264 existing dams in the country with a total storage capacity of 33 billion m<sup>3</sup> including all uses. Among them, 210 dams are owned by the federal government, 34 by the state governments and 20 by the private organizations. The irrigation districts can be divided into public irrigation districts, which mainly use surface water, and small (less than 50 ha) privately operated irrigation districts, most of which use groundwater as their source of water supply. Public schemes using mainly surface water on 142,106 ha, of which only about 40 percent is actually irrigated (FMWR, 2014), 32 percent for irrigated areas managed by RBDAs and 55 percent for those managed by States (AfDB, 2013). Private schemes are for about 90,000 ha, of which 70 percent is actually irrigated. Almost all of them are small-scale (< 50 ha) and use groundwater.

The Federal Ministry of Water Resources (FMWR) is the main national coordinating body in the water sector. FMWR is also responsible for 16 parastatal agencies including RBDAs which has important role for water resources development and operation and maintenance of the public irrigation.

FMARD formerly involved in irrigation development through the Agricultural Development Projects (ADPs) in particular provides extension services to the public sector irrigation schemes of the RBDAs and the State Irrigation Departments.

##### **(2) Challenges**

The challenges in the operation and maintenance of irrigation facilities in the country include the following:

- The low irrigation development rate is due to the need to rehabilitate many irrigation facilities

---

154 JICA

155 Adebola A. Ajad, et al. 'Farmers' Awareness, Participation and Sources of Information on Extension Activities in Rural Nigeria: A Case of Patigi Local Government Area of Kwara State', *Journal of Rural Problems* 52(4), 253–258 (2016)

< [https://www.jstage.jst.go.jp/article/arfe/52/4/52\\_253/\\_pdf](https://www.jstage.jst.go.jp/article/arfe/52/4/52_253/_pdf) > [accessed 25 January 2021]

156 Bashir Adelodun, et al. 'A review of the evaluation of irrigation practice in Nigeria: Past, present and future prospects', *African Journal of Agricultural Research*, Vol. 13(40), pp. 2087–2097, 4 October, 2018

<<https://academicjournals.org/journal/AJAR/article-full-text-pdf/3EAF05558713>> [accessed 25 January 2021]

(about 80% by area), high maintenance and management costs, deterioration of facilities and pumping equipment, and fuel shortages.

- The lack of coherent irrigation policy, lack of adequate service support, low level of ownership by farmers, and uncertainty in financial expenditures are some of the operational challenges.

### **8.3.2 Agricultural Machinery**

Nigeria's production environment is diverse regarding land-to-labour ratios and use of farm equipment: as of 2012, 4% and 24% of farmers used tractors and animal tractions, respectively, covering 7% and 25% of cultivated land<sup>157</sup>. Such percentages were higher for tractors in the North Central and Northeast regions and lower in the Southwest region. Animal traction service was used by more than 50% of farmers in the northern regions, while it was rarely used in the south. This may be because the use of animal traction service is restricted in southern Nigeria due to the spread of livestock diseases caused by tsetse flies, and that the northern region has relatively light soils and plains, whereas the southern regions have rather heavy soils and hills where root crops and fruit trees are grown.

The median area cultivated by farmers is 0.5 ha, and less than 10% of all farmers cultivate more than 3 ha. The adoption rate of tractors and animal tractions tends to increase in proportion to the size of the farmland area, but the adoption rate of tractors is relatively low even for farmers with more than 3 ha of farmland. Most tractors are of the capacity of 50-75 horsepower, with limited use of power tillers and tractors with lower horsepower than 50 hp.

Since 1970s, the government tractor-hiring service units have gradually expanded, and by 1983 there were more than 3,000 tractors and 300 power tillers in operation with more than 250 hire service units located throughout the country. Government hiring service units received a 25-50% subsidy for their operations, in addition to the government's purchase of tractors and payment of wages and salaries for their employees.

The number of subsidized tractors distributed was determined by the budget situation and varied from year to year. Between 1975 and 1983, 22,000 subsidized tractors (mostly imported) were sold to semi-private organizations such as government regional development agencies, large private companies, as well as cooperatives, farmer groups, and retired operators for use in hiring services.

Subsequently, the government's hiring service unit was deemed inefficient, and the Nigerian government is promoting the Mechanization Implementation Program (MIP) focusing on establishing private-sector hiring service entities called Agricultural Equipment Hiring Enterprises (AEHE). The MIP also provides subsidies to small-scale farmers (those who cultivate 0.5 ha to 4 ha) who use the hiring services. As of 2016, about 80 AEHEs have been established in major industrial clusters, each with five tractors and implements, five power tillers, and several harvesters and threshers, operated by the private sector, including farmers, cooperatives, and entrepreneurs. Compared to 1983, when the government's hiring service used 3,000 tractors, 80 (as of 2016) AEHE operators (5 each) with a total of 400 tractors is still a small number. However, if the government can continue to increase the number of AEHE operators, it will be possible to meet demand gradually.

The public support for financing is also available for machinery purchases, with interest subsidies (interest-free loans with a 3-year repayment period). However, there are issues like delays in loan approval, application fees incurred by beneficiaries, and various transaction costs incurred by the government to monitor repayment.

In the 2000s, the federal government distributed about 1,000 subsidized tractors, but not uniformly every year due to the financial situation. Such was still the case in the 2010s, with the government procuring about 900 tractors annually while the private sector procures about 100 tractors.

---

<sup>157</sup> Overview of the Evolution of Agricultural Mechanization in Nigeria (2018)



### 8.3.3 Agricultural Inputs

In Nigeria, agricultural inputs are usually not supplied on time and in the right quality and quantity. Currently, Nigerian agriculture is facing various constraints such as low quality of agro-inputs in the market, in-appropriate application method, lack of effective monitoring mechanism, low input use, poor quality of inputs available in the market, and non-availability (late supply), inaccessibility (points of sales usually very far from the village) and unaffordability (high market price). To improve the current situation, especially for rice development sector, Nigerian government identifies the measures to be taken such as capacity building for 12 million Rice farmers, training of 4,000 extension workers, putting in place an effective monitoring mechanism for quality of inputs, enacting law on quality of agro-inputs, empowering supervisory agencies with the enabling laws to apprehend and prosecute offenders, and an application of technology for the purpose of traceability.

### 8.3.4 Status of Implementation of Grants to Assist Poor Farmers

The 2KR grant aid program to Nigeria began in the FY1986 and continued until 1993. Nigeria was originally a major agricultural country, but due to the shift in focus by adoption of the industrialization policy with the start of oil production, the agricultural sector began to decline in the 1970s. The country turned from an exporter to an importer of agricultural products. In light of such circumstances, policies to strengthen the agricultural sector, such as increase in rice production, were launched in the latter half of the 1990s. The 2KR grant aid restarted again from the year 1999 onward. The table herein below shows the results of 2KR assistance to date.

**Table 8.2 Past 2KR grant aid implementation to Nigeria**

Fiscal year	1986-1993	1999	2000	2001	2002	Total
E/N basis (million yen)	19.00	4.00	3.40	4.70	4.70	35.80
Procured item		Fertiliser, Agricultural machinery	Fertiliser, Agricultural machinery	Fertiliser, Agricultural machinery	Fertiliser, Agricultural machinery	—

Source: JICA Preparatory survey report for 2KR in Nigeria, MOFA data book of Official Development Assistance by country

The target crops of the 2KR program were staple food crops, mainly rice and corn, and the target area covered the entire country.

In the past, the Department of Agriculture of FMARD, as the agricultural extension agency of the state government, carried out the 2KR program. It sold & procured equipment and input materials directly to the small and medium-scale farmers. Regarding agricultural machinery, technical services, training, and extension unit under the Engineering and Mechanization Department of FMARD cooperated with the National Centre for Agricultural Mechanization (NCAM) in 37 regions of the country to provide operational training, as well as spare parts supply to the small and medium-scale farmers. The NCAM also guided the operation and maintenance of agricultural machinery, and also provided repair services at their workshops.

## 8.4 The Project for Enhancement of Rice Seed Multiplication System

### 8.4.1 Overview of the Survey Area

#### (1) Project Outline

- Country Name: the Federal Republic of Nigeria (hereinafter referred to as “Nigeria”)
- Project Site: Niger, Kebbi and Kwara States
- Project Title: The Project for Enhancement of Rice Seed Multiplication System
- Project Summary: The project aims to renovate facilities and provide equipment and materials for cultivation and post-harvest processing at the National Cereal Research Institute (NCRI) and its

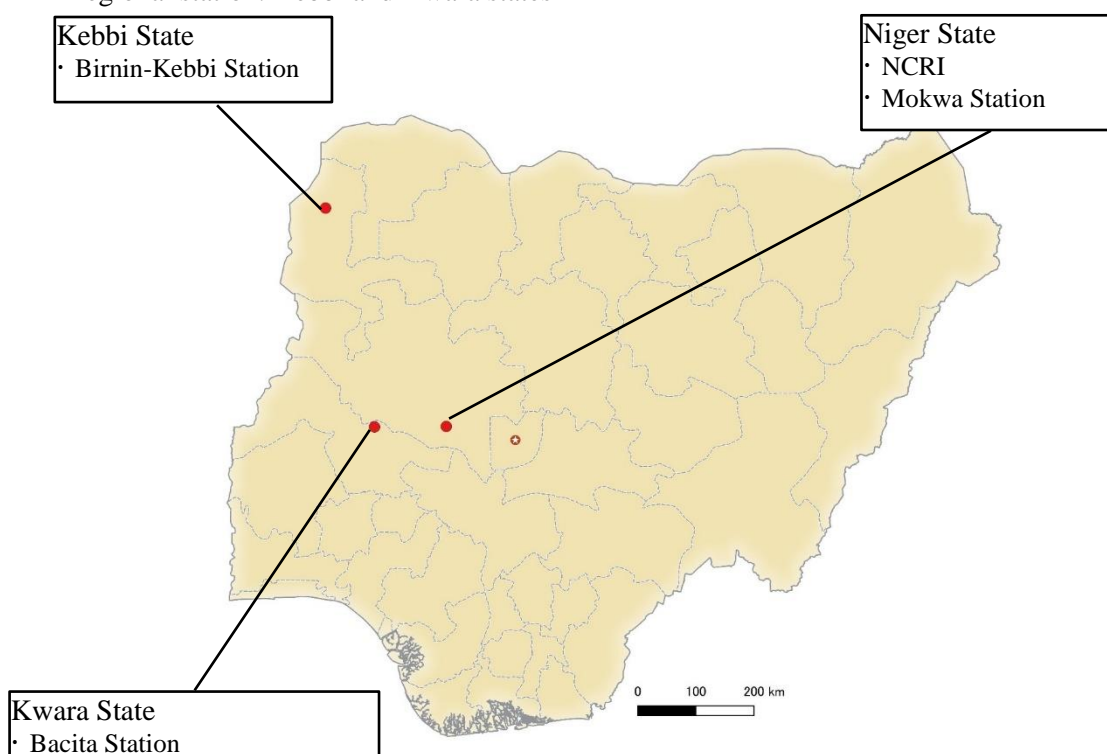
regional stations, which are the source of seeds (pre-basic seed, basic seed, and certified seed) needed to increase rice production. The total estimated project cost is approximately 1,200 million yen.

- **Background of Project Planning:** FMARD aimed to achieve self-sufficiency of rice by 2020 based on the NRDS and related policies, but has not yet achieved it. Therefore, FMARD has set a target in the NRDS2 to double domestic production of rice by 2030, and it has identified the development of a sustainable seed production system as one of its priorities, in addition to the improvement of rice productivity and mechanisation. The quality and supply of certified seed used by rice farmers for cultivation is particularly important for increasing rice production. In Nigeria, breeder seed and foundation seed, which is the source of certified seed for rice, is produced only by NCRI and the International Institute of Tropical Agriculture. However, due to the deterioration of infrastructure for seed production and post-harvest processing equipment at NCRI, it is currently unable to supply sufficient quantities of breeder seed and foundation seed, and there is potential for improvement in quality. It is expected to improve the rice seed supply system through strengthening the seed production system of NCRI, which plays a key role in domestic seed production, thereby increasing the production capacity of rice breeder and foundation seed. The proposed project plan is based on a scale considered appropriate for public institutions in the field of seed multiplication, taking into account their jurisdiction and their performance. Taking into account the above background, the project aims to contribute to the strengthening of the production system of public institutions in the field of seed multiplication.

## **(2) Project Site**

The project sites are NCRI and its regional stations.

- National Cereal Research Institute (NCRI): Niger State
- Regional station: Kebbi and Kwara states



**Figure 8.1 Location of Project Sites (Nigeria)**

## **(3) Implementation/Responsible Agency**

The project implementing agency is FMARD, and NCRI is planned as the agency in charge of operation and maintenance after the project implementation.

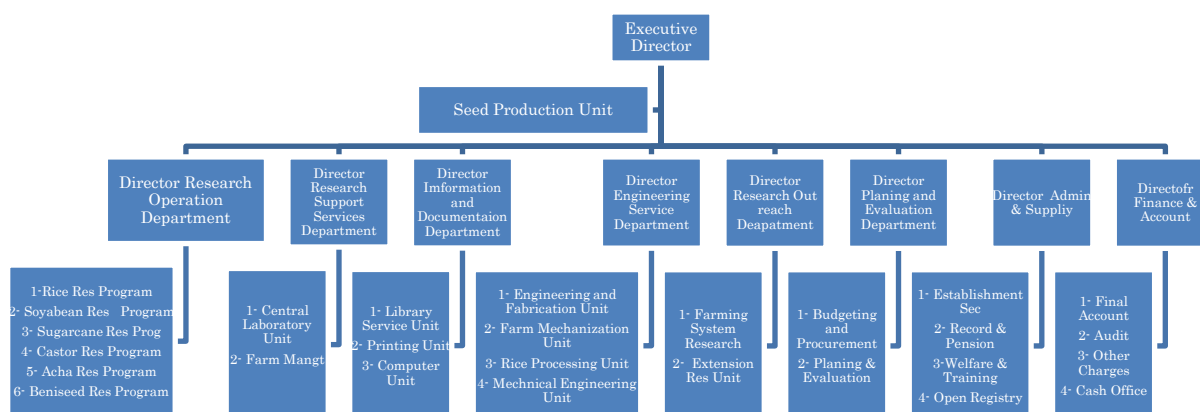
## 1) Federal Ministry of Agriculture and Rural Development (FMARD)

FMARD is the agency responsible for the development, review, and implementation of projects related to the agricultural sector (grain, livestock, fisheries, and forestry). The Ministry aims to improve food security and poverty alleviation in rural areas through increased agricultural output, and provides assistance to improve productivity through technical assistance, development of production infrastructure, and supply of inputs.

## 2) National Cereal Research Institute (NCRI)

NCRI is a research institute under FMARD and is engaged in the development of cereal seed varieties and the production of pre-basic and basic seeds. The headquarter of NCRI is located on the outskirts of Bida, about 160 km west of the capital Abuja. NCRI has 10 regional stations in the country with a total staff of 203. NCRI's annual budget is 210 million yen (2018), including 110 million yen for recurrent budget and 130 million yen for operating expenses.

The Seed Production Unit at NCRI Headquarter has nine departments, as shown in the figure below.

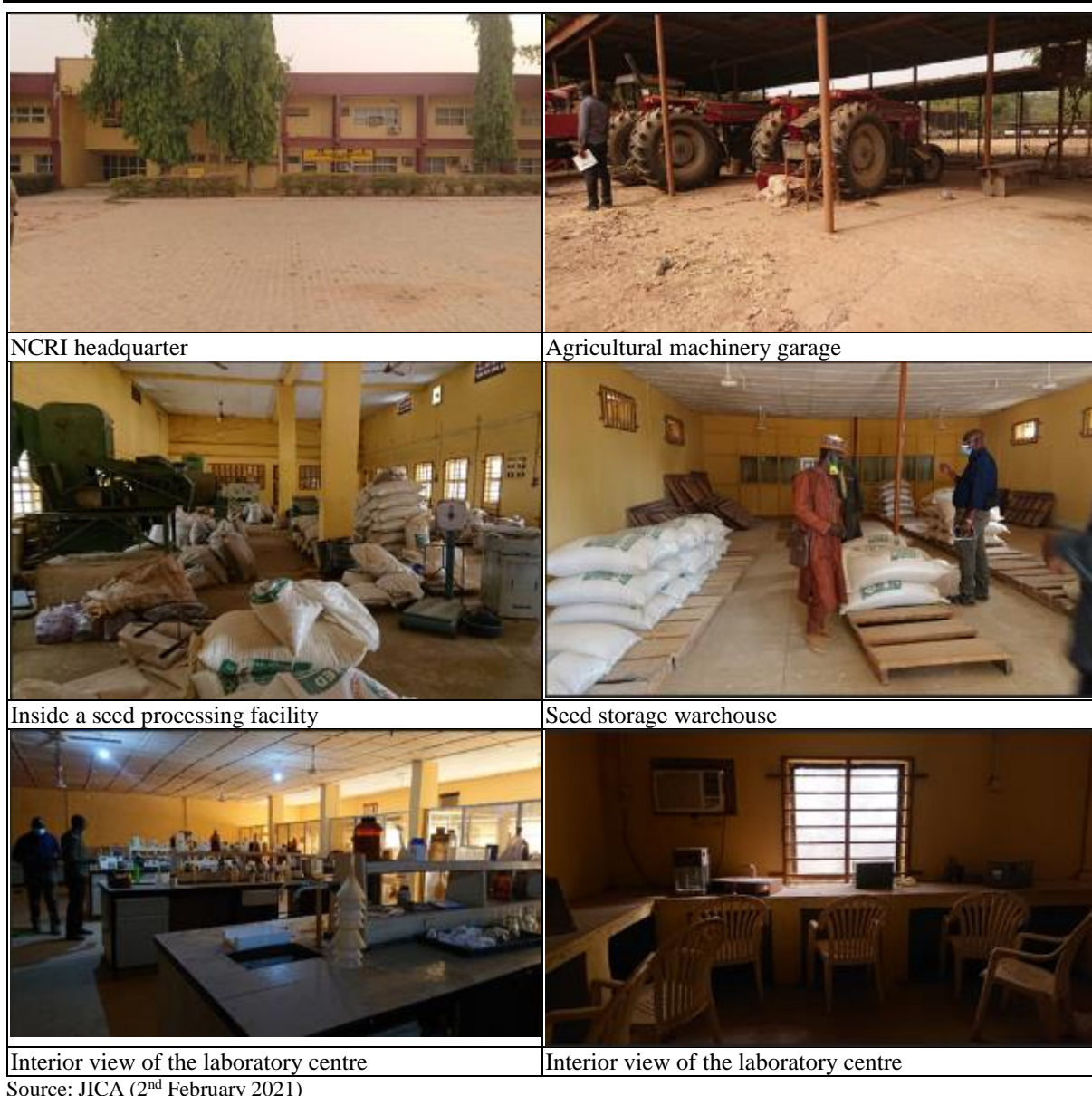


**Figure 8.2 Organization Structure of Seed Production Unit at NCRI**

### 8.4.2 Current Status and Issues

#### (1) NCRI

NCRI is a research institute of the Nigerian government, located in the suburbs of Bida, about 160 km west of the capital Abuja. It is a central research laboratory with an Engineering Unit, an Operation Unit, and a Maintenance Unit, with a total of 203 researchers. NCRI conducts research on breeding, cultivation methods, soil improvement, and pest control for rice and other grains. In addition to the above mentioned research on rice, NCRI produces and sells pre-basic seed, basic seed, and certified seed to the seed companies. Since the production of pre-basic seed in Nigeria is limited to the headquarters of NCRI and IITA, it plays a very important role in rice seed production. However, the facilities and equipment for research are aging and only a limited number of them are in operation, and the environment is not conducive for researchers to fully utilize their capabilities.



Source: JICA (2<sup>nd</sup> February 2021)

**Figure 8.3 Current Status of NCRI Headquarters**

The seed production at NCRI headquarters is being conducted on 32 ha of test plots in the Badeggi Irrigation District (880 ha), an early small-scale irrigation facility in the country constructed in 1953 to draw water from the Musa River, located about 6 km northwest of NCRI headquarters and 15 km from the city of Bida. The present headwork was constructed in 1953. The irrigation facilities, including the present headwork, were constructed by WB between 1980 and 1983, and approximately 3 km from the intake point to the test plots is supplied by an earthen canal main canal. The intake weir is in inoperable condition due to old age, and there is leakage from the embankment upstream of the headwork. The intake weir needs to be renovated to ensure stable headwork for the institute's test plots.



**Figure 8.4 Headwork and Intakes**





Figure 8.5 Location of NCRI and Test Plots

## (2) Agriculture Mechanization for Rice Cultivation

NCRI owns only two tractors as farm machinery, and the post-harvest processing equipment is not in good working condition, although several small and outdated machines exist. The tractors are too big and heavy to operate in small plots for seed production. There are no implements for paddling and chemical spraying. Hence, NCRI cannot manage seed production.

As for equipment for post-harvest processing, NCRI does not have a mechanical dryer and it is difficult to control the moisture control through sun-drying on the drying floor. In particular, upper scale seeds, such as breeder and foundation seeds, require strict moisture control following the quality standards. Although NACR owns cleaning equipment, spare parts are unavailable, and cleaning capacity is also inadequate. Therefore, the quality of upper scale seed is also low, which affects the quality of down scale seed quality. Henceforth, there is a need for an updated mechanized seed production system consistent for production in the seed farm to the post-harvest processing.

### 8.4.3 Proposed Project Components

#### (1) Target components

The target components of the facility and equipment are shown in the table herein below, respectively.

Table 8.3 Objectives, Functions and Components of CARD Grant Aid in Nigeria

Purpose and function
Install agricultural machinery at NCRI and research stations of NCRI and renovation of water intake facilities at NCRI to improve capacities of rice seed production (breeder seed, foundation seed, and certified seed) and seed supply, both.



Post-harvest equipment in NCRI



Water intake structure

Component		
Place	Item	Specifications
Facility		
NCRI, ARC Mokwa, Nija state Bacita ARC, Kwara state, Birnin-Kebbi ARC, Kebi state	Shelter for machinery	W14×D20×H4m×1 place
	Workshop for machinery and equipment	W14×D20×H4m×1 place
	Shelter for a seed dryer and a cleaning unit	W30×D10×H8m×1 place
NCRI	Irrigation Facility Rehabilitation	Water intake weir: Repair of movable weir (sluice gate) and weir post Water intake works: Repair of intake gates Levee improvement: 100m (left and right) improvement ※Fundamental improvement of levees is not included
Equipment		
NCRI, ARC Mokwa, Nija state Bacita ARC, Kwara state, Birnin-Kebbi ARC, Kebi state	Machinery 1 set for each station	Two tractors with rotary tiller, chemical sprayer, wheel, One transplanting machine, One combined harvester, One mechanical seed dryer, seed cleaning unit, One set of maintenance tools, One set of spare parts

## (2) Soft Component

The soft component will plan the following items related to the agricultural machinery for installation.

- Preparation of a seed production plan: A new seed production plan will be prepared in conjunction with the expansion of seed cultivation and post-harvest processing facilities.
- Guidance on seed production: Provide practical guidance on how to properly operate the facilities and equipment to be introduced in order to efficiently produce high quality seeds. In addition, guidance on seed cultivation techniques will also be provided.

## (3) Project Cost Estimation

The total project cost is estimated to be 1,200 million yen.

**Table 8.4 Proposed Estimated Project Cost of CARD Grant Aid in Nigeria**

	Item	Amount (million JPY)
1)	Construction costs	330
2)	Cost for equipment	530
3)	Soft component	20
4)	Costs for detailed design and supervision	240
5)	Contingency	60
	Total	1,200

#### (4) Expected Outputs

This project is expected to stabilize and increase the production of high-quality seeds. The quantitative output will be measured in terms of seed production and rice production as shown in the table below.

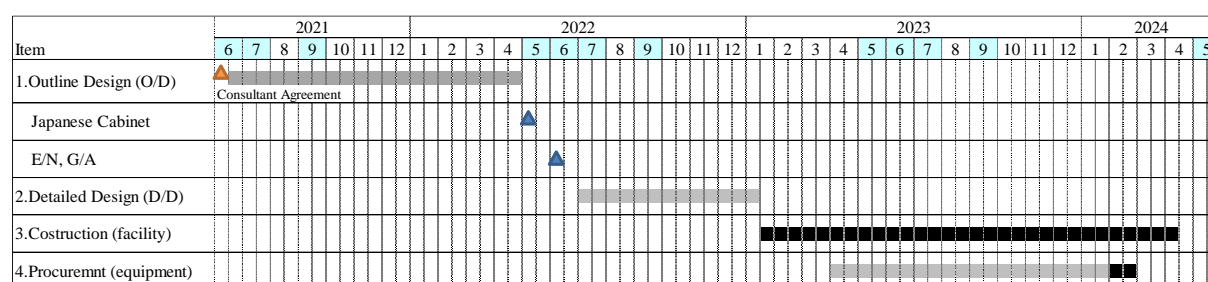
**Table 8.5 Proposed quantitative outputs of the CARD grant aid project in Nigeria**

Indicator	Reference value (Actual result in 2019)	Target value(202X) (3 years after the project completion)	Remarks
Seed production (original seed, original seed, and certified seed) (tons)	Central Laboratory: XX tons (original species), XX tons (raw seed), XX tons (certified seed)	To be confirmed	
Rice production (tons)	Central Research Institute: XX tons		

- Human resource development and strengthening of research functions related to rice research at the National Grain Research Institute
- Human resource development related to agricultural mechanization at the National Grain Research Institute
- Stable seed production through restoration of water intake function in seed production fields

#### (5) Tentative Schedule

The overall schedule is shown in the figure herein below, and is expected to take approximately 23 months beginning from the Exchange of Note (E/N) to the completion of the project.



**Figure 8.6 Tentative Overall Schedule (Nigeria)**

#### (6) Obligation of Recipient Country

- Assignment of a person in charge during project implementation
- Securing the site for the project
- Installation of commercial power supply to the facility
- Maintenance of facilities and equipment after the completion of the construction

**(7)Points to Note**

- The effect of the rainy season needs to be taken into account when considering the schedule of civil works.



## **Chapter 9 Senegal**

### **9.1 Outline of Senegal**

#### **9.1.1 Natural Conditions**

Senegal with reported surface area of 196,710 km<sup>2</sup> is located in the westernmost part of the African continent, and is bordered by Mauritania, Mali, Guinea, and Guinea-Bissau. Senegal has a population of 16.8 million people, a quarter of whom live in the Dakar area (0.3% of the total territory of the country).

Regarding the country's climatic zones, the northern part of the country is classified as arid, the central part as savannah-like with many dry seasons, and the southern part as tropical, generally high and dry. Two distinct seasons characterize Senegal's climate: a dry season from roughly October to May and a rainy season from June to September. While the arid zones receive a rainfall total under 300 mm per year, the forested south receives an average of 1,200 mm/year<sup>158</sup>.

#### **9.1.2 Social & Economic Condition**

In 2021, Senegal's GDP stood at US \$27.6 billion and its per capita gross national income (GNI) was US \$1,540, making it a lower-middle-income country. Senegal's economy grew by more than 6% per year between 2014 and 2018. The GDP growth stood at 0.87% in 2020, down from 4.4% in 2019, and 6.2% in 2018, but showing signs of recovery with 6.1% in 2021<sup>159</sup>.

The COVID-19 pandemic has significantly altered the country's economic outlook, affecting service industries such as tourism and transport, and exports. Senegal has responded with several containment measures and implemented an Economic and Social Resilience Program (Programme de Résilience Économique et Sociale, PRES). Nevertheless, limited fiscal buffers and safety nets, a vulnerable health care system, and a large informal sector pose challenges to the socio-economic scenario. Service industry remains the main contributor to the GDP, and the primary sector (agriculture, in particular) is the most dynamic engine of growth. Oil and gas projects have been delayed because of the pandemic and are not expected to contribute to revenues and exports before 2035<sup>160</sup>.

#### **9.1.3 Agricultural Condition**

Approximately 70% of Senegal's population is engaged in agricultural activities, with a large proportion of the population, particularly in rural areas, directly dependent on agriculture for their livelihoods. However, the agricultural sector contributes only about 15% to the GDP in 2021 and is dependent on imports for much of its main foodstuffs (rice, wheat, maize, etc.). Faced with population growth and increasing urbanization, the Government of Senegal has made increasing national agricultural production a major concern.

Senegal's agricultural land area is approximately 9 million ha, covering about 46% of the country's total land area. The largest area of farmland is occupied by livestock (29%) followed by groundnuts (21%), then millet (20%), maize and sorghum (4% each), and rice and cowpeas (3% each), cassava and mango (1% each).

Total cereal production is estimated to 3,640,545 tons, including 1,349,723 tons of rice (i.e. 37.1%), 1,144,855 tons of millet (31.4%), 761,883 tons of maize (20.9%), 377,323 tons of sorghum (10.4%) and 6,761 tons of fonio (0.2%). Cash crop production is estimated to 1,853,167 tons and remains dominated by the groundnut crop which accounts for almost all cash production (1,797,486 tons, or 97%); the other

---

<sup>158</sup> World Bank, <https://climateknowledgeportal.worldbank.org/country/senegal/climate-data-historical>

<sup>159</sup> World Bank, national accounts data, and OECD National Accounts data files

<sup>160</sup> World Bank, <https://www.worldbank.org/en/country/senegal/overview>

cash crops sesame and cotton account for only 2% and 1%, respectively.

Rice is a popular staple food among the Senegalese population, with per capita consumption estimated at 74kg/year. While apparent rice consumption in Senegal was 400,000 tons in 1995, it rose to 800,000 tons in 2007, with 106 billion CFA francs for net imports. Such rice imports account for 16% of the trade balance deficit and this phenomenon tends to increase over time as national production is growing less quickly than the quantity of consumption, as it covered only 20%. Achieving self-sufficiency in rice is a major step towards the country's self-sufficiency in cereals.<sup>161</sup>

## **9.2 Outline of the Agricultural Sector**

### **9.2.1 Laws, Policies and Development Plans Relating to the Agricultural Sector**

Senegal has established the basic strategies in its national high-level plan i.e. Senegal Emergent Plan 2014-2035 (PSE): 'Structural Reform of the Economy and Growth', 'Human Resources, Social Protection and Sustainable Development' and 'Governance, Public Administration, Peace and Security'. Of these strategies, 'Structural Reform of the Economy and Growth' identifies the agricultural sector as an engine of economic growth, with three visions i.e. : i) strengthening Senegal's food security and reducing the trade deficit associated with agricultural imports; ii) developing a competitive, high value-added agricultural industry; iii) maintaining socio-economic equality and revitalizing the rural economy. To achieve such visions, the priority projects identified in the PSE are to be implemented within the framework of the Programme of Acceleration of the Rate of Agricultural Development 2014-2017 (PRACAS). RACAS states that it concentrates its investments in important crops for Senegal, and has selected 'rice', 'onions', 'groundnuts' and 'fruit and vegetables' as strategic crops. In particular, rice production was identified as a top priority, with the aim of producing 1.6 million tons of paddy (1.08 million tons of milled rice) by 2017, and had set targets for paddy production and cultivated area for 2014-2017, but such goals have not been achieved. Further, the development of agropoles, at three locations (northern, central and southern) is also included as priority project with the aim of developing the agro-industrial sector. The development of agropoles is expected to foster the secondary industry and create new jobs. As a successor programme to the PRACAS, the Agriculture Programme for Sustainable Food Sovereignty 2022-2026 (PASAD) has been prepared, and as of July 2022, a draft version has been approved.

The PSE embodied an action plan for every five years. Following the first phase of the Action Plan 2015-2018 (Plan d'Action Prioritaire: PAP), a second phase of the Action Plan 2019-2023 (PAP2) was developed, but due to the impact of COVID-19 pandemic, the government decided that a review was necessary. Therefore, the second phase of the PSE review was conducted in September 2020 and a promotion plan 2021-2023 (PAP2A) was developed.

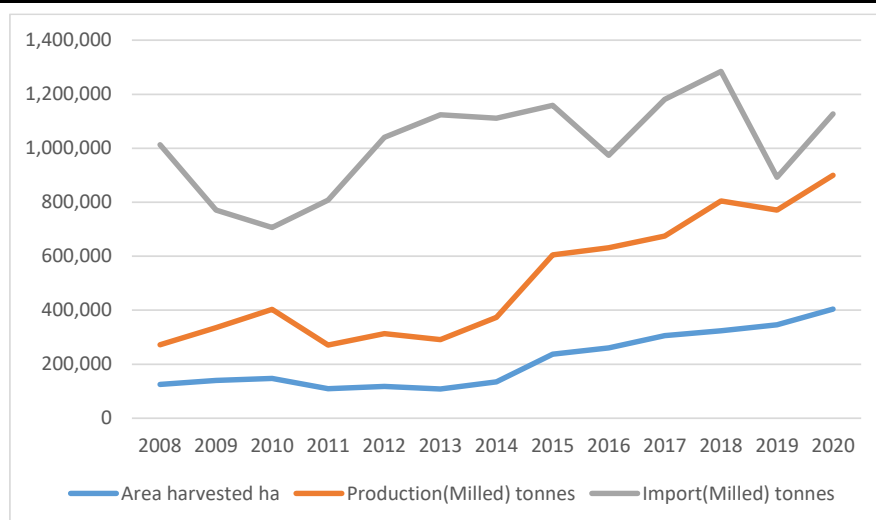
### **9.2.2 Status of NRDS Implementation**

CARD initially began its support by providing technical assistance to the Senegalese Government's own national rice self-sufficiency program (Programme National d'Autosuffisance Alimentaire en Riz: PNAR). The first PNAR was developed in the early 2009 and revised in 2012. Today, PNAR is synonymous to the NRDS.

The Senegal's NRDS was approved as one of the first group of countries in CARD Phase 1 (2008-2018) with the target of producing 1 million tons of competitive milled rice (1.5 million tons of paddy rice) by 2012, which would meet consumer preferences and requirements. During the revision in 2012, the Government set a target of achieving self-sufficiency in rice by 2017. Although the target was not ultimately met, it was recognized as demonstration of excellent results in the CARD final review.

---

<sup>161</sup> Programme National d'Autosuffisance en Riz (2009)



Source: Prepared by the study team based on FAOSTAT data.

**Figure 9.1 Rice cultivated area, production and imports in Senegal (milled rice)**

The CARD final review assessment indicates that some progress has been made on seeds, mechanization, irrigation and financial credit to the farmers. Large-scale activities in these areas have been undertaken and furthermore, it is reported that it has become easier to obtain financial contributions/ support from national and development actors for the promotion of the rice sector. However, needs in other areas, particularly storage infrastructure and logistics, have not yet been met. The success of the NRDS has been attributed to the government's continued positive attitude towards rice promotion and the high level of commitment of the government officials, including the President of the country. On the other hand, challenges include the lack of capacity in terms of number and competence of government staff. In addition, the government is not fully aware of the involvement of the private sector in the rice sector, which makes the sector dependent on a government-led support system.<sup>162</sup>

### 9.2.3 Analysis of Rice Food Value Chains

Rice production systems in Senegal are largely dominated by small-scale family farms. In addition to such family farms, commercial farming is also emerging.

There are two distinct types of rice cultivation: irrigated rice in the Senegal River Valley and the Anambé Basin on the one hand, and traditional or rainfed lowland or upland rice cultivation in the southern regions of Fatick, Ziguinchor, Sédhiou, Kolda, Tambacounda and Kédougou on the other.

With regard to irrigated rice cultivation, the Senegal River valley, River Delta Land Development and Exploitation Company's (SAED) area of intervention, is a territory relatively well endowed with human and natural resources (water, land and sun). The commissioning of the DIAMA and MANANTALI dams has created the basic conditions for the development of sustainable and productive irrigated agriculture. In fact, it has made water resources available in terms of both quantity and quality. Thus, at the end of the 2008 agricultural season (off-season and winter), irrigated rice cultivation occupied 53,279 ha divided between the Senegal River Valley (50,469 ha) and the Anambé Basin (2,810 ha). The particularity of this type of rice cultivation is the adoption of an intensive system with total control of water and the intensive motorization of most of the cultivation and post-harvest operations. The quantities of fertilizer and herbicide applied are higher here. This intensification has resulted in high yields with an average of 6 tons/ha and peaks of 13 tonnes/ha. The contribution of irrigated rice cultivation is 70% of the national production which was 500,000 tons in 2008.

With regard to rainfed rice cultivation, during the 2008 rainy season, it occupied 78,000 ha and contributed 150,000 tons of paddy, or 30% of national production. It is practiced in the region of

<sup>162</sup> Coalition for African Rice Development (CARD) JICA Final Review Assessment

Casamance (Ziguinchor, Sédhiou and Kolda), the regions of Tambacounda, Kédougou, Fatick and Kaolack. Rainfed rice cultivation is characterized by (i) manual cultivation and post-harvest operations; (ii) low use of inputs; (iii) low yields; and (iv) mainly practiced by women.

The actors involved in the rice value chain and their roles are follows;

- Agricultural and agro-product researchers: introduction of new varieties, pre-basic seed production, soil management, socio-economic studies, food processing, etc;
- Suppliers of inputs and agricultural equipment, and services providers: input suppliers (seeds, fertilizers and plant protection products), equipment dealers and manufacturers, service providers (cultivation, harvesting, threshing and processing);
- Financing: credit for campaigns, equipment and marketing, etc;
- Rice producers: rice production under irrigated and rainfed conditions;
- Paddy collectors (distributors, millers, producers): collection of paddy rice;
- Rice millers: industrial rice millers, small-scale rice millers, rice milling using traditional rice millers and simple pestles;
- Distributors (private companies, rice millers, farmers' organizations, producers): For sale of milled rice.

It should be noted, however, that these actors are mainly found in irrigated farming systems. It is more marked in the north of the country than in the other rice-growing areas. In this scheme, producers are increasingly involved in the processing and marketing of their production. The roles of the various actors are thus confused and become not effective.<sup>163</sup>

#### 9.2.4 Status of Support for the Rice Sector

The projects being implemented in line with the NRDS are listed in the table below.

**Table 9.1 List of projects related to rice sector in Senegal**

No.	Project Name	Partner	Period
1	Projet d'Appui à la Sécurité Alimentaire et à l'amélioration de la Mise en Marché dans la région de Matam (ASAMM)/ Project to improve food security and marketing in the Matam region	MAER, SAED, AFD	2013-2020
2	projet de renforcement du Centre d'Initiation et de Perfectionnement dans les Métiers de l'Agriculture (CIPA)/ Center for Initiation and Improvement of Agricultural Professions	MAER, CIPA, KOICA	2014-2019
3	Support Project for Irrigated Agriculture and Economic Development of Podor (AIDEP)/Irrigated Agriculture and Economic Development of Rural Territories in Podor	MAER, SAED, AFD, SAED	2014-2022
4	Projet d'appui à la productivité rizicole (PAPRIZ 2) Project for Improvement of Irrigated Rice Productivity in the Senegal River Valley	MAER, UGP (Unité de gestion du projet), JICA, SAED	2016-2021
5	Projet de développement durable et inclusif de la chaîne de valeur rizicole dans le Département de Podor/ Inclusive and sustainable development project for the rice value chain in Podor	MAER, UGP, KOICA	2016-2019
6	Projet de Développement Rural dans la zone de Waoundé dans le bassin du fleuve Sénégal / (Project of rural development of Wawunde Basin in the Senegalese River Valley )	MAER, SAED, BOAD/WADB	2016-2020
7	Projet de réhabilitation et d'extension du projet agricole de Matam (PAM)/ Project of rehabilitation and extention of irrigated perimeter implemented by the agricultural project of Matam	MAER, SAED, Sudia Fund od development (SFD)	2016-2020
8	Projet d'appui à la réduction de l'emigration rurale dans le Bassin arachidier (PARERBA)/ Project to Reduce Rural Emigration in the Groundnut Basin	MAER, UGP, ENABEL, EU	2017-2022

<sup>163</sup> Programme National d'Autosuffisance en Riz (2009)

No.	Project Name	Partner	Period
9	Support for the promotion of family farms in the region of Matam (APEFAM) / Support for the promotion of family farms in the region of Matam	MAER, SAED, AFD	2017-2022
10	Développer l'agriculture et améliorer la sécurité alimentaire dans les tiers Sud du Sénégal/ Agricultural Development and Food Security of Rural Territories of the South Third of Senegal	MAER, SODAGRI, AFD	2017-2022
11	Projet d'appui à l'investissement agricole avec la Banque Agricole/ Agricultural investment support project with the Agricultural Bank (LBA)	AFD, La Banque Agricole (LBA)	2017-2022
12	Global Development Alliance	MAER, UGP, USAID	2018-2021
13	Projet d'appui Régional à l'initiative pour l'irrigation au Sahel (PARIIS)/ Regional Support Project for the Sahel Irrigation Initiative	MAER, UGP, Les pays membres du CILSS, le Comité inter-États de lutte contre la sécheresse au Sahel, Le Comité régional de développement (Crd), Banque Mondiale, AECID	2018-2024
14	Africarice project	USAID, AfricaRice	2019-2021
15	Ndungal suuf project	MAER, UGP, USAID	2019-2021
16	Mieux connaître l'eau: vers un accès plus équitable et plus durable aux ressources naturelles pour une sécurité alimentaire» appelé KnoWat/ Learning about water : Achieving fairer and sustainable access to natural resources for a better food security	MAER, UGP, FAO, Ministère de l'eau et de l'assainissement, Office des lacs et cours d'eau, Organisation pour la mise en valeur du fleuve Sénégal, SAED, FAO 5 Gouvernement Allemand	2019-2022
17	Projet de promotion de la chaîne de valeur riz (Projet BID)	MAER, UGP (Unité de gestion du projet), IsDB, BADEA, GoS	2020-2025
18	GIZ-Manobi- Africa Rice	MANOBI, GIZ	2021-2021
19	Projet de production de riz irrigué dans la vallée du fleuve Sénégal/ Project for irrigated Rice production in the Senegal River Valley	MAER, UGP, JICA	2020-2021
20	Renforcement des capacités des producteurs pour réduire les pertes de riz après récolte et partenariat public-privé dans les régions du sud du Sénégal/ Strengthening producer's capacities to reduce post-harvest rice losses and public-private partnership in the southern regions of Senegal	FAO	2020-2021
21	Programme d'Appui au Programme National d'Investissement dans l'Agriculture au Sénégal (PAPSEN sud )/ Programme supporting the implementation of the Agricultural National Investment Programme in the south of Senegal	MAER, UGP (Unité de gestion du projet), CNR-Ibe, Italy	2020-2022
22	Projet De Valorisation des Eaux pour le Développement des Chaînes de Valeur (PROVALE –CV)/ Water recovery project for the development of value chains	MAER, UGP (Unité de gestion du projet), Bad/AfDB	2020-2024
23	Femmes, Agricultures et résilience (FAR)/ Women, agriculture, resilience	MAER, UGP, Canada	2020-2025
24	Services de la chaîne de valeurs/ Value Chain Services	MAER, UGP, USAID	2021-2025
25	Projet Agropole Nord/Northern Agropole	Ministère de l'Industrie et de la Petite et Moyenne Industrie (MIPMI), UGP	2021-2026

No.	Project Name	Partner	Period
		(Unité de gestion du projet), Bad/AfDB	

Source: survey team compiled based on the CARD Secretariat website <https://riceforafrica.net/> (last accessed 23 January 2023).

### 9.2.5 Implementation Structure of Rice Sector

The focal point of CARD is one of the high-level officials of the Ministry of Agriculture and Rural Facilities (Ministère de l'Agriculture et de l'Équipement Rural: MAER), coordinator of PNAR and is in charge of the promotion and implementation of PNAR/NRDS.

With regard to sub-sectoral strategies, various directors of management positions within the Ministry are assigned as contact persons, with the Director of Mechanization in charge of mechanization strategies, the Director of Agriculture in charge of seeds, and so on.

Concerning the implementation arrangements, meetings with appropriate government officials are held on a daily basis or as and when required. Apart from such meetings, a yearly general meeting is held to share progress with the President.<sup>164</sup>

## 9.3 Current Status and Issues in the Agricultural Sector

### 9.3.1 Irrigation Facility

The area under irrigation in Senegal was estimated at 119,680 ha in 2002, of which 19,180 ha was allocated to the Casamance basin, 10,000 ha to the West Coast basin (Saloum, Sine, Car Car), 600 ha to the Eastern Senegal basin (Gambia) and the remaining 89,900 ha to the Senegal River basin<sup>165</sup>. For the Senegal River Basin, which accounts for the majority of the irrigated area, the data related to developable, previously developed and undeveloped irrigated area by SAED branch is as follows.

**Table 9.2 Senegal River Basin Irrigated Area by SAED Branch (as of 2015)**

Unit : ha

SAED Branch	Developable area		Existing developed area		Undeveloped area	
	Rice	Others	Rice	Others	Rice	Others
Dagana	55,871	59,329	50,224	35,975	5,647	23,354
Podor	35,687	21,913	16,416	9,425	19,271	12,488
Matam	27,284	15,916	10,383	1,450	16,901	14,466
Bakel	6,983	17,017	2,350	1,829	4,633	15,188
<b>Total</b>	<b>125,825</b>	<b>114,175</b>	<b>79,373</b>	<b>48,679</b>	<b>46,452</b>	<b>65,496</b>

Source : Preparatory Survey Report on the Project for Irrigated Rice Production in Senegal River (December 2019)

### 9.3.2 Agricultural Mechanization

According to the survey by Department of Agricultural Analysis, Forecasting and Statistics (Direction de l'Analyse, de la Prévision et des Statistiques Agricole: DAPSA), for most cultivation operations, the manual type of equipment is used. Harnessed equipment is used more for sowing (79.2% of plots) and crop maintenance (80%). As for motorized equipment, it is still very little in use, and mainly concerns with the soil preparation activities (3.3%) and harvesters (1.3%). Among the constraints that can prevent the development of the activities, 'access to financial services' (64%) followed by 'access to machinery and equipment' (56%)<sup>166</sup>.

<sup>164</sup> Coalition for African Rice Development (CARD) JICA Final Review Assessment (March 2018)

<sup>165</sup> FAO AQUASTAT (<https://www.fao.org/aquastat/es/geospatial-information/global-maps-irrigated-areas/irrigation-by-country/country/SEN>)

<sup>166</sup> Rapport de l'Enquête Agricole Annuelle (EAA) 2020-2021, DAPSA

### 9.3.3 Agricultural Inputs

Most certified seeds are used for the irrigated rice and cotton plots (more than 50%). This can be explained by the fact that the irrigated rice and cotton sectors benefit from the support of supervisory structures (SAED, SODEFITEX) which ensure compliance with technical guidelines/ itineraries and allow direct access to the Agricultural Council. On the other hand, groundnut and maize crops tend to benefit from non-certified seeds (more than 40%). Most households use their personal reserves for these crops.

For fertilizers, it is estimated that the quantities used are generally below the recommended quantities. On the other hand, the average quantities of NPK used for irrigated rice cultivation (133 kg/ha against the recommended 100 kg/ha) and urea used for cotton (84 kg/ha against the recommended 50 kg/ha) meet the recommendations, again indicating the results of SAED and SODEFITEX interventions.<sup>167</sup>

### 9.3.4 Status of Implementation of Grant Assistance for Underprivileged Farmers

The total amount of grant aid (2KR) to Senegal for underprivileged farmers is 23.423 billion yen; before 2001, pesticides accounted for the bulk of the grant, but since 2003 only one item i.e. fertilizers as has been procured.

**Table 9.3 The past result of 2KR grant aid for Senegal**

Year	Total up to 1999	2000	2001	2003	2008	2009	2012	2014	Total
E/N basis (million yen)	207.82	4.00	4.0	2.71	3.90	3.80	3.90	4.10	234.23
Procured Item	Fertiliser, Agrochemical, Agricultural machinery/ Vehicle	Fertiliser, Agrochemical, Agricultural machinery/ Vehicle	Fertiliser, Agrochemical, Agricultural machinery/ Vehicle	Fertiliser	Fertiliser	Fertiliser	Fertiliser	Fertiliser	—

Source: JICA Preparatory survey report for 2KR in Senegal, MOFA data book of Official Development Assistance by country

## 9.4 Proposed Project Plan: Project for Development of Seed Production Field, Inspection, Sorting and Training Facilities

### 9.4.1 Overview of the Survey Area

#### (1) Project Outline

- Country Name: the Republic of Senegal
- Project Site: Saint-Louis Department, Dagana Department and Podor in Saint-Louis Region
- Project Title: The Project for Development of Seed Production Field, Inspection, sorting and Training Facilities
- Project Summary: The project will strengthen infrastructure and facility for rice seed production, distribution and human resource development scattered across the Senegal River Basin, which stretches from the north to the north-east of Senegal. It will also strengthen upstream seed production and supply capacity through increased production of breeder seed (BS) and foundation seed (FS) by ISRA, improved seed sorting machinery under the management of DRDR and strengthened training facilities owned by CIFA, thereby contributing to increased rice production in the country.
- Background of Project Planning: The PNAR, which corresponds to the NRDS, defined a target to produce competitive milled rice of 1 million tonnes (1.5 million tonnes in unhusked rice) and also set a target to achieve rice self-sufficiency by 2017, but the target was not achieved. On the other hand, some progress and successes have been observed in components in the value chain, and these

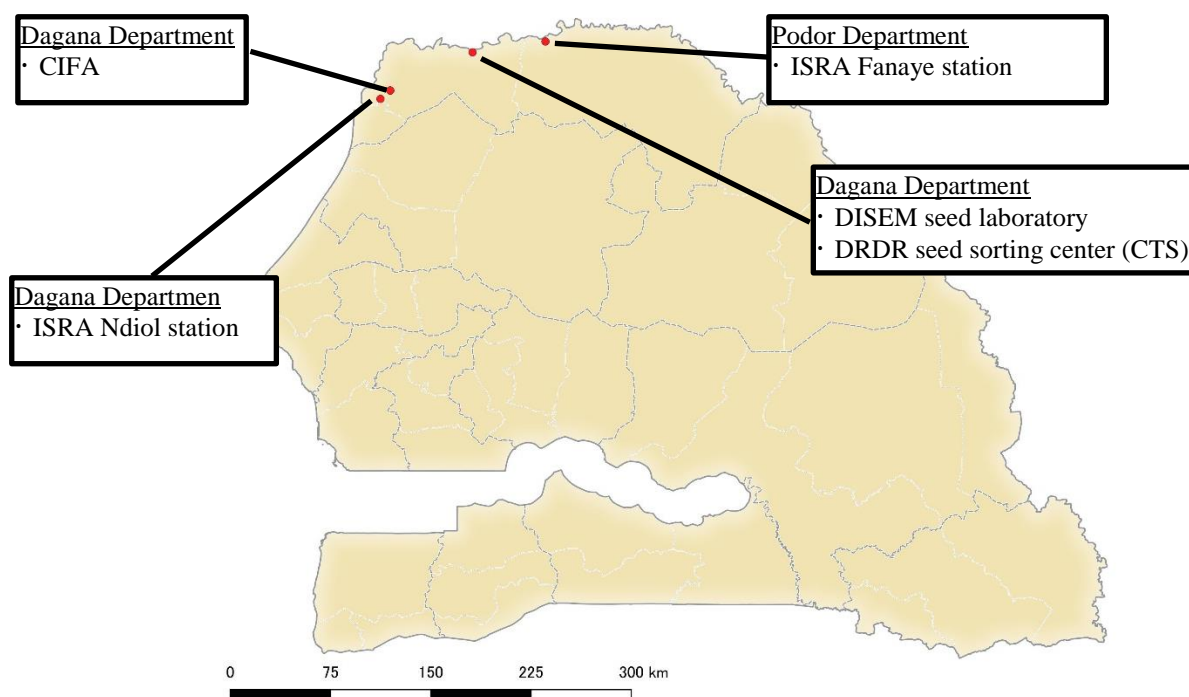
<sup>167</sup> Rapport de l'Enquête Agricole Annuelle (EAA) 2020-2021, DAPSA

have been attributed to the Government's high level of commitment to success. The actors involved in the value chain (industry, academia and government sectors in combination) are also active, particularly in the irrigated rice growing areas in the north of the country. Through the study on the reorganization of the production of rice in Senegal, JICA supported the preparation of a master plan for the promotion of rice cultivation in Senegal and proposed priority programmes. Based on this, Project on Improvement of Rice Productivity for Irrigation Schemes in the Valley of Senegal (PAPRIZ) and PAPRIZ2, Phase 2 of PAPRIZ, provided capacity building to actors in the Senegal River Basin, including the private sector, and supported the preparation of a new master plan for the Senegal River. A further successor project, PAPRIZ3, is currently being implemented. In addition, a preparatory survey on the Senegal River valley irrigated rice farming improvement project will expand the activities of PAPRIZ2 and implement priority projects in the master plan. From the above, the Government and other donors such as JICA are strengthening the capacity of necessary actors in line with government policy. On the other hand, while PAPRIZ2 also addresses the challenges of certified seed production outsourced to the private sector at the field level, there are also challenges for Early Generation Seed regarding to seed multiplication. The challenge in early generation seed production is the deterioration and malfunctioning of the facilities under public institutions which is responsible for seed production systems, and the proposed project plan aims to contribute to strengthening the solution to these problems.

## (2) Project Site

The four target sites are shown in the map herein below.

- ISRA Ndiol station in Dagana Department, Saint-Louics Region
- ISRA Fanaye station in Podor Department, Saint-Louics Region
- DISEM seed laboratory and DRDR Seed sorting centre (CTS: Centre de Traitement des Semences) in Dagana Department, Saint-Louics Region
- CIFA in Dagana Department, Saint-Louics Region



Source: Prepared by the JICA study team using Google Earth Pro based on interviews conducted during the field survey.

**Figure 9.2 Location of Project Sites (Senegal)**

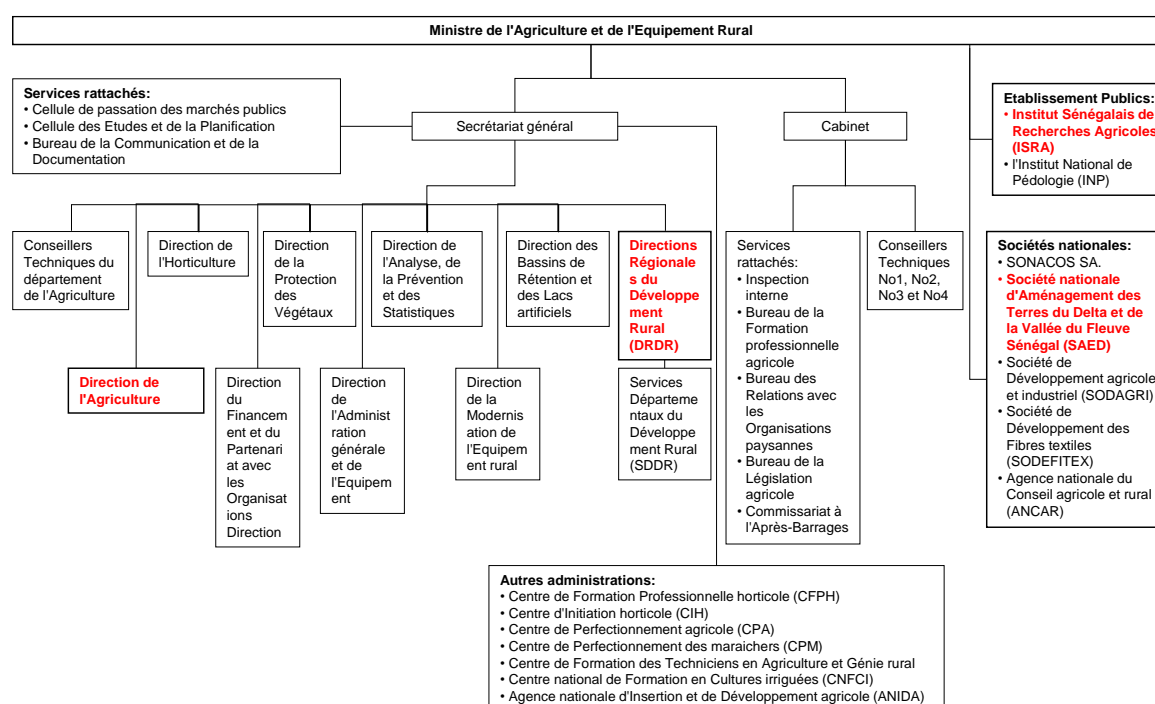


### (3) Implementation/Responsible Agency

#### 1) MAER: Le Ministère de l'Agriculture et de l'Équipement Rural

The MAER has changed to MAERSA (Ministère de l'Agriculture, de l'Équipement Rural et de la Souveraineté Alimentaire) but is the responsible organization for agricultural policy in Senegal, and the departments related to rice cultivation and rice seed production in the Senegal River Basin also are under the MAER authority.

For rice seed production, the Division des Semences (DISEM) of the Department of Agriculture is responsible for the inspection and approval of seed production, while the Regional Directorate of Rural Development (DRDR: Direction Régionale du Développement Rural) is responsible for supervising seed production activities at field level.



Source : Edited by the study team based on Etude sur l'agriculture avec un focus particulier sur la riziculture et la nutrition à Tambacounda, Kedougou, et en Casamance : rapport final (JICA, 2021) and highlighting the departments concerned

**Figure 9.3 Organisation Structure of MAER**

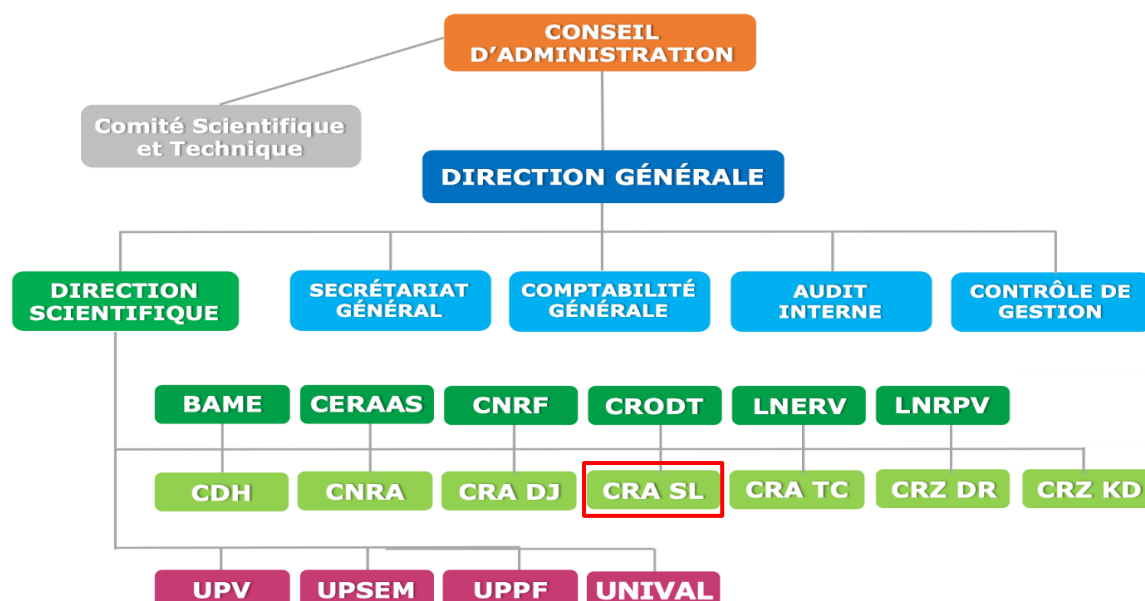
#### 2) ISRA

ISRA, founded in 1974, is a national agricultural research institute in Senegal. It has 100 researchers throughout the country, covering five main areas i.e. livestock production, crop production, forestry, fisheries and rural socio-economy. Headquarters are located in Dakar and there are 13 regional stations across the country, but their functions are divided according to the agro-ecological zones. The Agricultural Research Centre (CRA) in Saint-Louis covers the Senegal River Basin and is responsible for developing rice and wheat varieties.

The base of ISRA CRA Saint Louis (ISRA CRL SL) is located in Saint-Louis and it is a research institute mainly dedicated to rice and cereals research. In addition to the research centre at Saint-Louis, ISRA CRA SL has two seed production and experimental plots at the Ndiol and Fanaye stations.

ISRA has been developing varieties of rice adaptable to each ecological zone in Senegal, such as salinized and rainfed areas, with support from KOICA since 2017, and has developed 15 varieties till now.

ISRA and AfricaRice are responsible for BS production of rice within Senegal. Varieties developed in ISRA are distributed to seed producers (accredited producers) by UPSEM-CL, which is responsible for increasing FS production.

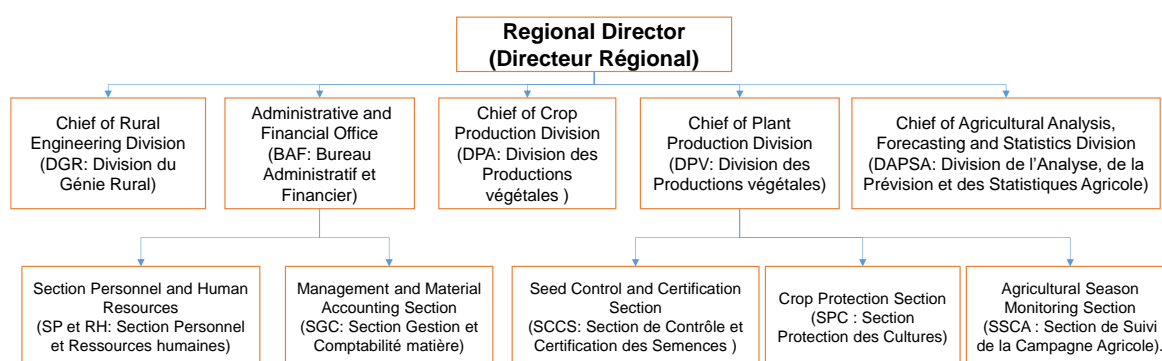


Source : Retrieved 1 November, 2022 from <https://isra.sn/organisation-de-isra/>

**Figure 9.4 Organisation Structure of ISRA**

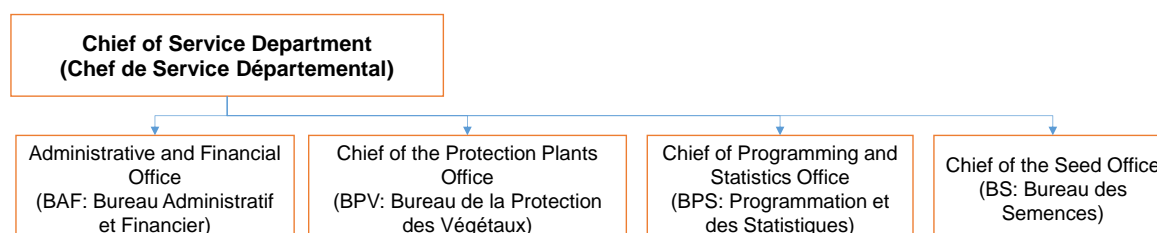
### 3) DRDR

DRDR is a Regional-level organization under the MAER, one office in each region, responsible for receiving BS produced by ISRA and distributing it to approved seed producers. The DRDR is responsible for issuing certificates to seed producers and supervising their seed production plots, sending inspection teams to the plots of approved producers to assess whether they meet the standards. Seeds that pass the inspection are sent to sorting centres where all impurities are removed.



Source: documents provided by DRDR.

**Figure 9.5 Organisation Structure of DRDR**



Source: documents provided by DRDR.

**Figure 9.6 Organisation Structure of SDDR**

#### **4) DISEM**

DISEM is under MAER and is the department in charge of seed policy. It defines 11 priority crops in the country, including rice, maize and groundnut. It is supervised by the DoA and works to maintain quality in accordance with the international standards of the International Seed Testing Association (ISTA). With only two bases - the headquarters in Dakar and a laboratory in Richard Toll and with the DRDR generally responsible for inspection work in the regions, the DISEM is a relatively small organization, with three of its 16 staff working as inspectors in the Richard Toll laboratory. The Richard Toll laboratory carries out tests related to purity and germination.

#### **5) SAED: Société d'Aménagement et d'Exploitation des Terres du Delta du fleuve Sénégal et des Vallées du fleuve Sénégal et de la Falémé**

SAED is an organization responsible for a wide range of activities in the Senegal River Basin, from irrigation scheme development, operation and maintenance and water management, agricultural production to technology dissemination. In relation to rice seed production, SAED's extension units are responsible for disseminating new varieties developed by ISRA, providing guidance on cultivation techniques, monitoring and strengthening farmers' capacities.

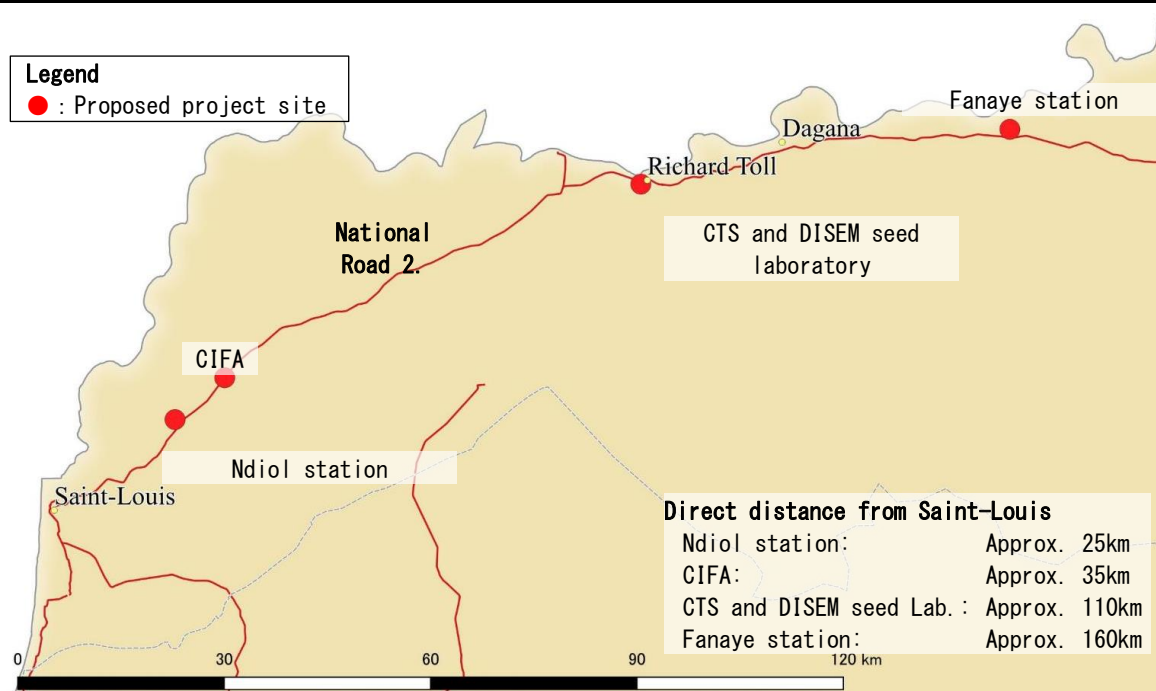
#### **6) CIFA: Centre Interprofessionnel de Formation sur les métiers de l'Agriculture**

CIFA was established in April 1995 as a non-profit organization and to function as a training institute by separating from the SAED structure. As of October 2022, it had total 33 organizations as members, including 23 federations of farmers' organizations (FPOs), five private development assistance organizations (NGOs and foundations), two public institutions for rural development and research, two public education and training institutions and one private company providing materials and services. CIFA's objective is to promote professional and continuing education in agriculture, and the organization's mission includes training of the leaders of farmer organizations, local elected officials and experts in the agricultural sector, training development agents as agricultural advisers and strengthening facilitators' skills in agricultural and rural development. To achieve such missions, CIFA provides training, advice and information and documentation. Located approximately 35 km from Saint-Louis on National Highway 2, the centre has facilities such as conference rooms, lecture rooms, accommodation, etc., and a canteen, for the purpose of facilitating the training of the farmers from all over the country.

### **9.4.2 Current Status and Issues**

#### **(1) Overview of Project Target Sites**

The sites covered by the project are scattered along National Road 2 from Saint-Louis city, with the nearest Ndiol station at a distance of 25 km and the farthest Fanaye station at a distance of 160 km.



Source: Prepared by the JICA study team using Google Earth Pro based on interviews conducted during the field survey.

**Figure 9.7 Location map of proposed project sites for CARD grant aid**

## (2) Current Status and Challenges of Production Infrastructure in Ndiol Station

Basic production infrastructure currently exists, with approximately 50 ha of seed production and test plots at Ndiol station. However, the capacity of rice seed production is limited due to the deterioration of the facilities and, as a result, it is currently only used for 5 ha in the rainy season (1 ha of test plots and 4 ha of salt-tolerant varieties of seed production in 2022) and 10 ha in the dry season. The area under cultivation is more restricted in the rainy season than the dry season due to heavy damage caused by the diseases and insects. Salt-tolerant varieties are grown in the Saint-Louis and Casamance regions, as well as in central Senegal.



View of the main canal. Weeds are overgrown, causing clogging and obstruction to water flow.

The irrigation pumps that extract water from the Lampsar River, the source of the water, use an engine pump installed near the pump house because the commercial power supply is unstable. The pumped irrigation water is supplied to the open main canal, but the main canal is also clogged with weeds, which reduces the efficiency of water conveyance, and the area under cultivation is restricted only to the area around the upstream of the pump side because the water does not reach the most downstream part of the field.

Regarding secondary canals, earth canals have been constructed in the field, but concrete structures such as diversion works have deteriorated and their water conveyance and control functions have declined, while many secondary and tertiary canals have lost their function due to poor water conveyance efficiency caused by overgrown weeds and sedimentation. In addition, problems concerning the access to the fields during the rainy season due to poor drainage are another factor for limiting cultivation activities.



View of secondary canals. Many concreted structures are deteriorating.

The station has a station manager and five permanent workers, with employment of temporary workers during the busy agricultural period. Maintenance of irrigation facilities and water management is outsourced to a GIE; training is provided by ISRA staff for three or four GIE members, and such trained GIE members provide training to other GIE members, under the supervision of ISRA staff.

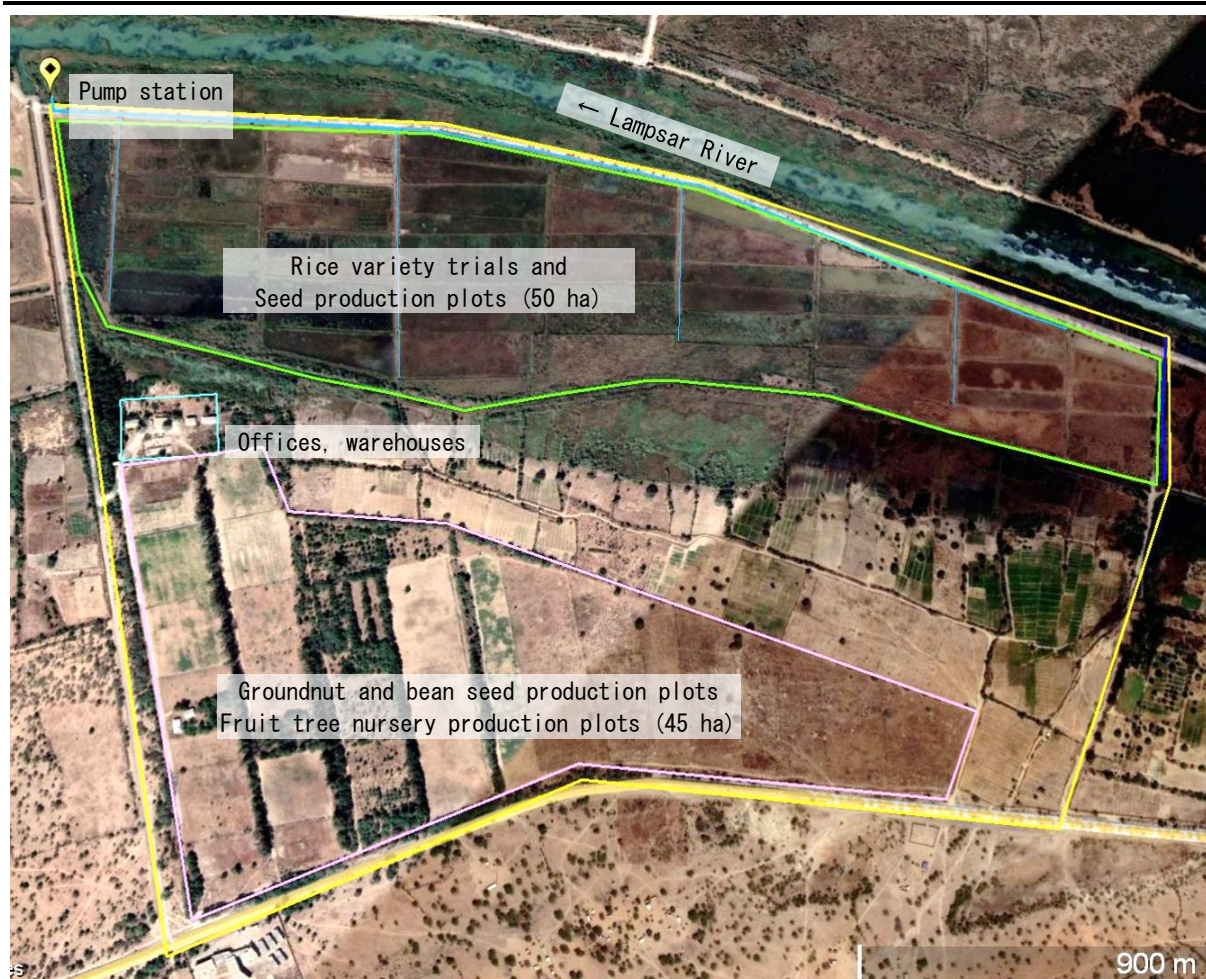
Farm machinery such as tractors and harvesters are owned by ISRA, and operators are sent from the ISRA CRA, Saint-Louis when necessary. However, many of these farm machines are deteriorating. Moreover, although there is a drying yard, it is exposed to bird damage while drying as there is no bird nets, and the concrete floor is also deteriorated, leading to the loss of harvested paddy seeds.

According to interviews with staff at the station, the biggest challenge at the station is salinity damage in the fields due to the lack of drainage pumps. Although the station is used to test salt-tolerant varieties, it is a limiting factor to increase the seed production, and approximately 20 ha of paddy fields are affected by salt damage.

The station site is also used as a BS production field for groundnuts and legumes (cowpeas and sesame) and a nursery field for citrus fruit trees, with a total area of approximately 45 ha. Irrigation for these crops is provided from the existing pumping station to a regulating tank near the station office and from there the water is again pumped to the plots by motor pumps. In the fields, portable sprinklers are used to utilize the pressurized water, but due to loss of water pressure, the pipe canals are not functioning adequately, increasing the workload for relocating the sprinklers and causing uneven growth due to non-uniform irrigation water supply. In addition to the rehabilitation of pumps from the water source, the station's staff are requesting comprehensive facility upgrades, including irrigation facilities for the field crop seed fields, including addressing the deterioration of the regulating reservoirs and pumps.

Paddy seeds grown in the Ndiol station are sorted in the Fanaye station to remove any contaminants.





Source: Prepared by the JICA study team using Google Earth Pro based on interviews conducted during the field survey.

**Figure 9.8 Facility layout in Ndiol station**

### **(1) Current Status and Challenges of Production Infrastructure at Fanaye Station**

The total area of the Fanaye Station is about 112 ha, but currently 10 ha of the 112 ha is used for rice seed cultivation and the remaining 2 ha for wheat seed cultivation, with a target production of 50 t. The station has been developed by ISRA with the financial support of KOICA in recent years.

The plots in Fanaye Station have recently been rehabilitated by ISRA with KOICA funding, and the main canal has been rehabilitated in the downstream part of the station, which is approximately 25 ha. However, the quality of the local contractor's work is poor and there are already numerous cracks in the concrete structures, which are likely to require rehabilitation within a few years. According to interviews with relevant staff, they are aware of the need to rehabilitate the secondary canal, renovate the water distribution facilities and reconsider the gradient of the canal in order to improve the field so that water can be distributed evenly. These rehabilitation works limited rice seed production from 2018 to 2021.

Irrigation water is pumped from the Ngalanka River, a tributary of the Senegal River, by using engine pumps at several locations, but due to the seasonal fluctuations of river water levels some pumps are unable to extract water when the water level drops during the dry season.

Although KOICA has supported the upstream side of the 15 ha of plots by developing the plots, and irrigation and drainage canals, constructing the farm roads and leveling of the plots, however, no crop has been cultivated yet because the irrigation pumps have not been installed. The introduction of floating pumps is being planned taking into account the fluctuations in river water level, but no specific time frame has been set.

The station is also equipped with drainage canals in some parts, and according to interviews with relevant staff, it does not suffer from salinity damage similar to that of Ndiol station. However, during the rainy season, it may not be possible to drain the water because the water level in the river where the water is drained is higher than the water level at the end of the drainage canal.

In addition, although a preparation machine for the produced BS was installed in 2018 with support from KOICA and started operation in 2022, the low height of the walls surrounding the machine on all sides causes rain to blow into the space around the machine during stormy weather, thus disturbing its operation. A cold storage facility for the preservation of BS was installed in 2012 with the support of USAID, but it has lost its functionality since mid-2022 due to the malfunctioning of the power supply system. As a result, there is concern about the deterioration of the stored seeds.

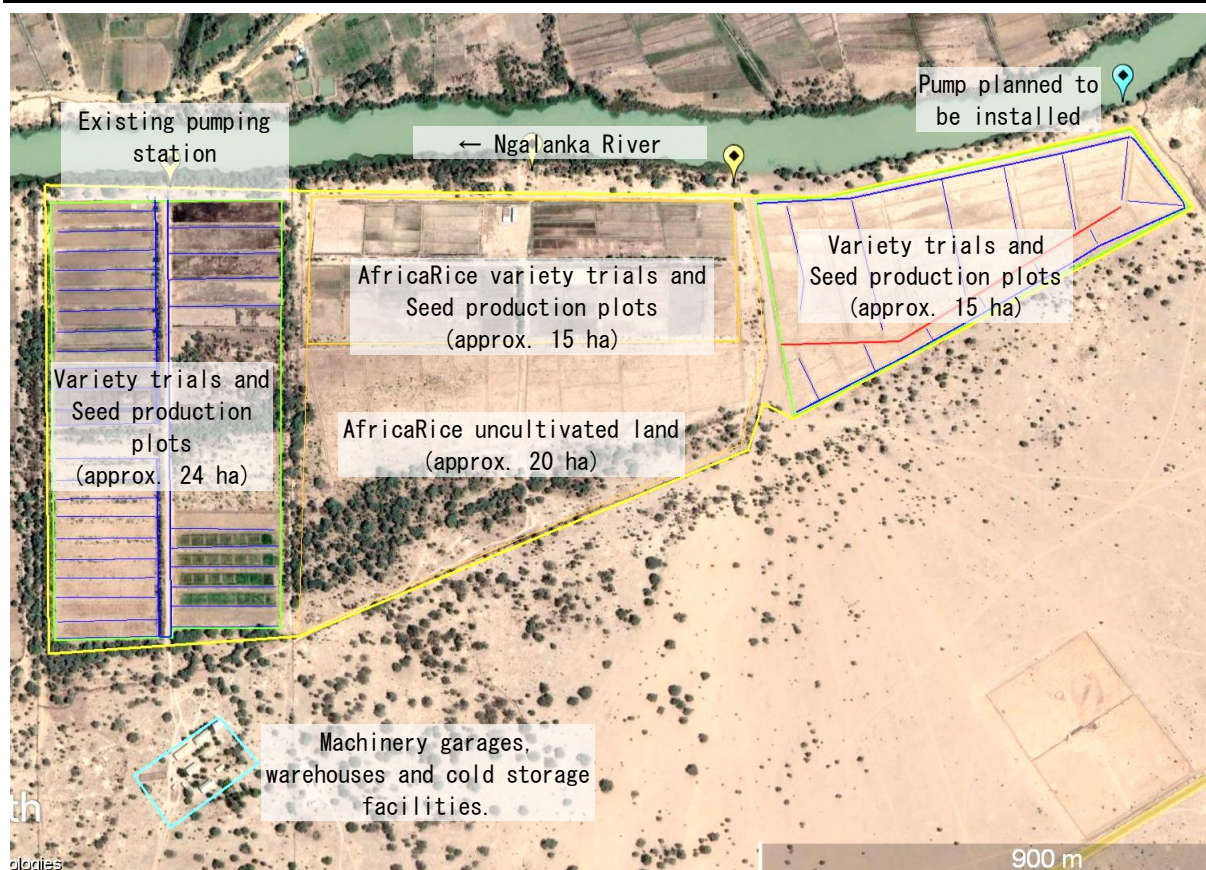
Most of the buildings in the station's office block were developed with USAID support in 1982, and tractors and other agricultural machinery were supported in 2012. There is also a laboratory but with little functionality as most of the space is used for storage of rice seed, and is only used for yield component measurements.

The station has five full-time staff (a station head, a machine operator, a pump operator, an irrigator and a farm labourer), three trainees and 50 temporary staff. It also accepts a number of university student as interns.

In addition to BS production, the station also conducts cultivation trials of varieties of seed developed in ISRA, including tests to assess the adaptability of ecological types, yields and characteristics, as well as fertilizer and herbicide sensitivity tests.

The AfricaRice seed production and trial plots are used for about 15 ha, but due to insufficient Pump Capacity, BS production and variety trials are carried out only in part and about 20 ha are not used. In addition to seed production, a number of varieties are grown for demonstration and collection of growth data as part of the Multi Environment Trials, and their suitability for different characteristics in the Senegal Riverine Basin region is examined and differences are presented when researchers and growers are invited to visit.





Source: Prepared by the JICA study team using Google Earth Pro based on interviews conducted during the field survey.

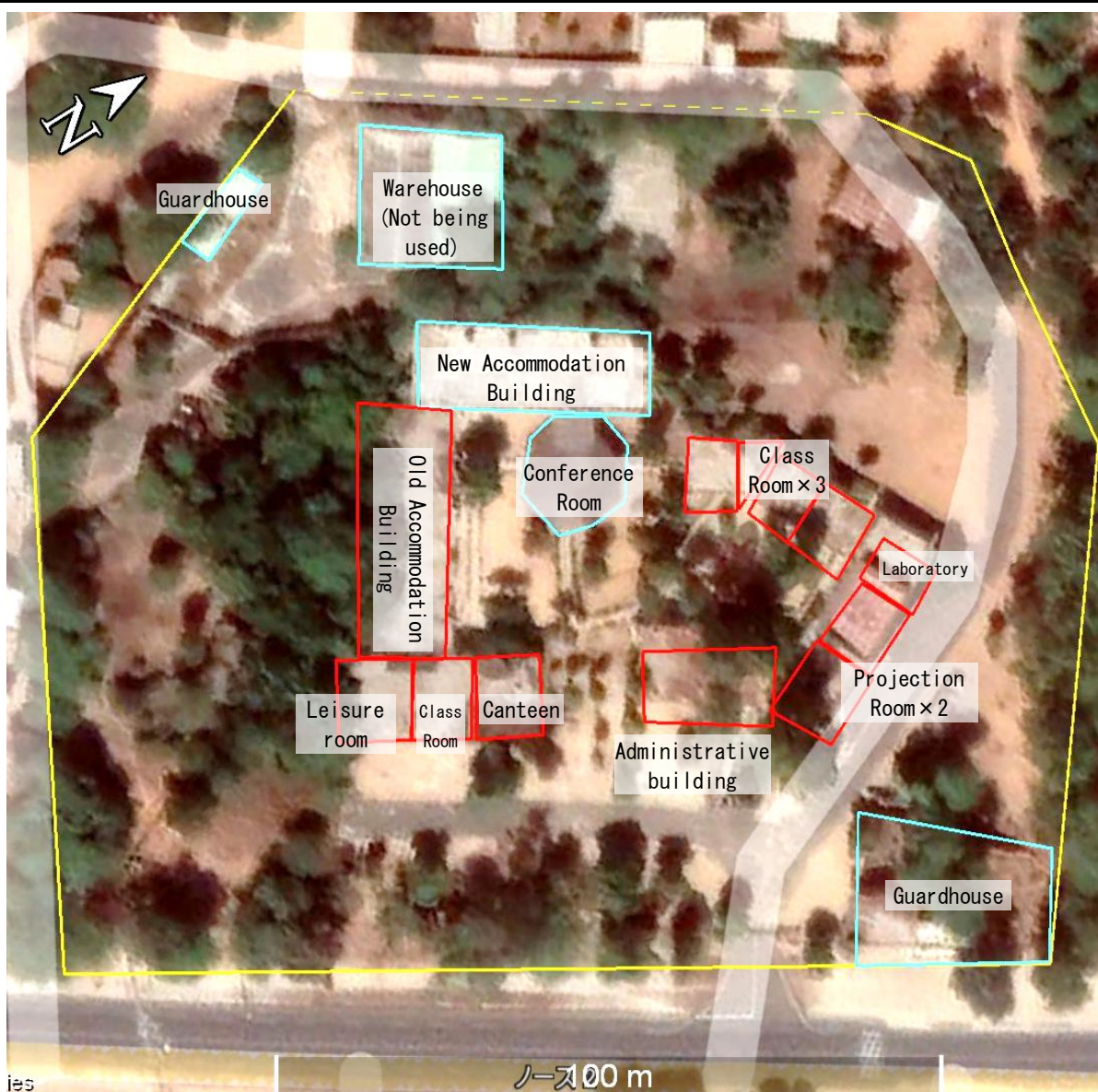
**Figure 9.9 Facility layout in Fanaye station**

## (2) Current Status and Challenges of Training Infrastructure in CIFA

After the CIFA training facilities were established in 1995 by expanding the former training center named CANPATIS, many of the facilities have been used with minor repairs over time, although some of them were renovated in 2019 with the support of the Canadian Provincial Aid Agency of Quebec. As a result, the deterioration of the facilities has resulted such as some of the lecture rooms being seriously damaged due to leaks, while other equipment, such as air-conditioners, and remain out of order. There is no training plots for paddy rice cultivation for training purposes, although there is a small portion of plot for growing vegetables and yams within the premises. As a result, training on rice cultivation is limited to the classroom lectures and practical training cannot be organized.

In addition, the power supply is unstable, resulting in irregular power failures, and the water supply is also unstable, which affects the operation of the facility.





Source: Prepared by the JICA study team using Google Earth Pro based on interviews conducted during the field survey.

**Figure 9.10 location map of the CIFA site and layout of the each facilities.**

### (3) Current Status and Challenges of DISEM Seed Laboratory and CTS

The DISEM seed laboratory in Richard Toll is responsible for testing FS produced in the Senegal River Basin. But only three technicians are working in the laboratory and the laboratory does not have sufficient testing equipment, so analysis is carried out in a consumable-saving way instead of the way it should be done, which means that adequate inspection is not being carried out.

Regarding CTS, one regulator was installed by USAID in 1990 and then another in 1994, but these two regulators are not sufficient to cover the peak demand, and it happens in some cases when seed is not supplied in time for the rice planting season.

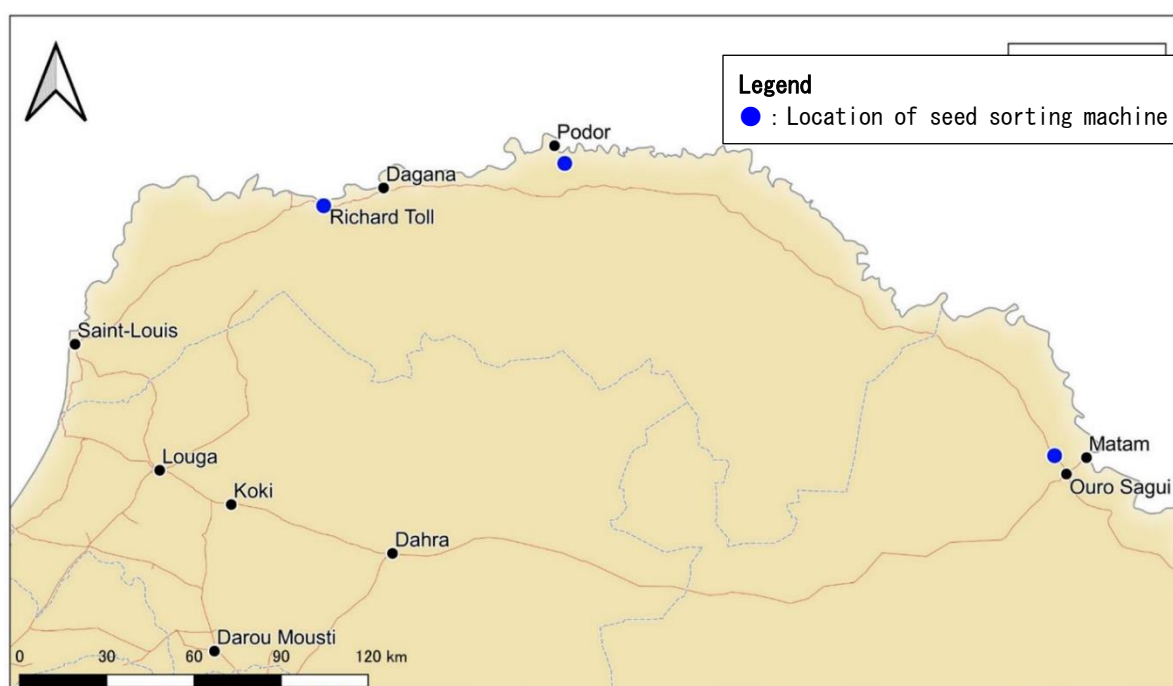


Source: Prepared by the JICA study team using Google Earth Pro based on interviews conducted during the field survey.

**Figure 9.11 Layout of the facility on the premises of the CTS and DISEM seed laboratory.**

Apart from the CTS in Richard Toll, seed sorting machines have been installed in Podor and Matam in the Senegal River Basin with the support of NGOs and donors. In Podor, a seed sorting machine have been kept out of the rain and are not yet operational, as there is no place to install it. For the seed sorting machine in Matam, a cooperative of 16 seed producer farmers, in collaboration with the DRDR in Matam region, is the main operator of the regulator for rice, sorghum, maize and groundnut seeds produced in the region.

The CTS in Richard Toll, therefore, plays an important role in maintaining the quality of FS in the Senegal River Basin.



Source : Prepared by the JICA study team

**Figure 9.12 Location of seed sorting machines in the Senegal River basin.**





### 9.4.3 Draft Project Plan

The project will contribute to increase rice production in the country through strengthening the production infrastructure of rice seeds in the Senegal River Basin, improving distribution and training facilities for seed producers.

#### (1) Proposed Project Components: Ndiol station

**Table 9.4 Purpose, Functions and Components (Seed production fields in Ndiol station)**

<b>Purpose and Functions</b>	
Reinforce the seed production infrastructure to enable the production of BS and FS in sufficient quantities to supply seed with good quality to the country.	
	
Main canal with overgrown weeds and seriously reduced water conveyance.	
Plots where salt-tolerant varieties are being tested	
<b>Components</b>	
<b>[Facilities]</b> <ul style="list-style-type: none"> <li>• Rehabilitation of seed production fields (50 ha: improving irrigation and drainage canals and farm roads).</li> <li>• Rehabilitation of pumping stations</li> <li>• Rehabilitation of administrative offices and warehouses for fertilizers and seeds</li> <li>• Renovation of dry yards with bird nets</li> </ul> <b>[Equipment]</b> <ul style="list-style-type: none"> <li>• Refurbishment of farm machinery</li> </ul>	
<b>Contents</b>	
<ul style="list-style-type: none"> <li>• Rehabilitation of irrigation pumps, main and secondary canals and farm roads in the field to improve productivity, for Ndiol stations where seed production capacity is limited due to deterioration of the production infrastructure.</li> <li>• New drainage canals will be constructed to solve growth damage caused by the salinity.</li> <li>• Rehabilitate deteriorated offices, warehouses and dry yards for paddy drying to reduce the loss of produced rice seeds.</li> <li>• Refurbish old farm machinery to improve productivity and efficiency.</li> </ul>	

#### (2) Proposed Project Components: Fanaye station

**Table 9.5 Purpose, Functions and Components (Fanaye station)**



<b>Purpose and Functions</b>
Improve seed production infrastructure to enable the production of BS and FS in sufficient quantities to supply seeds with good quality to the country.

	
<p>Main canal that has been rehabilitated but the concrete structure is being damaged already due to the low quality of construction.</p>	<p>Secondary and following canals are earth canals and the existing facilities are dilapidated.</p>
<b>Components</b>	
<b>[Facilities]</b>	
<ul style="list-style-type: none"> <li>• Rehabilitation of seed production plots (24 ha: rehabilitation of irrigation canals).</li> <li>• Rehabilitation of pumping stations</li> <li>• Rehabilitation of garage, fence for seed conditioner and dry yard with bird nets</li> <li>• Renovation of laboratory (with refrigerated storage for seeds)</li> <li>• Expansion of accommodation building</li> <li>• Construction of training and conference rooms</li> </ul>	
<b>[Equipment]</b>	
<ul style="list-style-type: none"> <li>• Enhancement of field machinery, office furniture, repair and furnishing of existing accommodation building</li> </ul>	
<b>Contents</b>	
<ul style="list-style-type: none"> <li>• Rehabilitate irrigation pumps, main secondary canals, drainage canals and farm roads in the field to improve productivity, targeting Fanaye stations where seed production capacity is limited due to deteriorating production infrastructure.</li> <li>• Rehabilitate deteriorated offices, warehouses and dry yards for drying paddy rice to reduce loss of seed rice produced.</li> <li>• Rehabilitate deteriorated field machines to improve productivity and efficiency.</li> <li>• Rehabilitate the deteriorated accommodation facilities and training and meeting rooms for ISRA researchers and external visitors to improve the environment for human resource development for breeding and seed production.</li> <li>• Rehabilitate the laboratory, including the cold storage for seeds, which is mostly unfunctioning and facing failures in the Senegal River Basin due to the fluctuation of the electricity supply system, to prevent the quality degradation of BS and seeds for research use.</li> </ul>	

### (3) Proposed Project Components: CIFA

**Table 9.6 Purpose, Functions and Components (CIFA)**

Purpose and Functions
<p>Improve capacity to provide training to rice seed growers and rice farmers through rehabilitation and enhancement of deteriorated training facilities, which will contribute to improving the cultivation techniques of the trainees, thereby increasing the production and quality of rice seed.</p>

	
<p>View of the old dormitory. Although the building is in relatively good condition, the facilities have deteriorated over time and the air-conditioning system has not yet be upgraded.</p>	<p>Small lecture room with deteriorated ceiling and walls due to leakages.</p>
<b>Components</b>	
<p><b>[Facilities]</b></p> <ul style="list-style-type: none"> <li>• Construction of new large lecture room, library/media room and janitor's office</li> <li>• Rehabilitation of administration building, small lecture rooms, canteen and boundary fence.</li> <li>• Reconstruction of old dormitory building</li> <li>• Installation of new transformer and deep well.</li> </ul> <p><b>[Equipment]</b></p> <ul style="list-style-type: none"> <li>• Enhancement of equipment for the main conference room</li> <li>• Buses for trainee transport</li> </ul>	
<b>Contents</b>	
<ul style="list-style-type: none"> <li>• Construct new large lecture rooms which are currently insufficient, a library/media room for archiving training materials and manuals, and a janitor's room, and provide the necessary equipment and appliances.</li> <li>• Rehabilitate the deteriorated small lecture rooms with partially damaged ceilings, the administration block, the canteen and the boundary fence.</li> <li>• Reconstruct the old dormitory building, which is dilapidated, to strengthen the capacity to receive long-term trainees.</li> <li>• In order to improve the unstable electricity and water infrastructure, install its own transformer instead of sharing it with the surrounding community, and build a new deep well as a water source.</li> <li>• Equip a large bus to transport trainees to the training sites, as there are no training plots available within the site.</li> </ul>	

#### **(4) Proposed Project Components : DISEM seed laboratory and CTS in Richard Toll**

**Table 9.7 Purpose, Functions and Components (CTS)**

<b>Purpose and Functions</b>
<p>Strengthen the inspection capability of FS, aiming to improve the quality of FS supplied to the farmers, as well as strengthen the seed sorting capacity for FS that have passed inspection, and enhance the system for supplying FS to rice farmers in a suitable and timely manner.</p>





Deteriorated seed sorter in CTS



More seeds than standard are tested for germination tests using one tissue in the DISEM seed laboratory in order to save consumables.

#### Components

##### [Facilities]

- Rehabilitation of Fence for boundary fencing

##### [Equipment]

- Enhancement of equipment and materials for seed testing
- Renewal of two seed sorter
- Refurbishment of equipment for seed warehouse management (pallets, forklift trucks, weighing scales)
- Repair of generators

#### Contents

- Replace two existing seed sorters that are deteriorated and not able to process during the peak periods, and improve the capacity to ensure the timely processing and distribution of collected BS and FS.
- Enhance the capacity of the seed testing laboratory with the necessary materials and equipment, as there is a shortage of testing equipment and consumables.
- Improve equipment and materials for managing collected and conditioned seed.
- Due to unstable power supply, which limits the time of operations, the generator will be upgraded to ensure a stable power supply so that activities are not affected during the peak period.

## (5) Project Cost Estimation

The costs of construction and equipment procurement per component are as follows.

(Unit: billion JPY)

Project component	Construction	Equipment	Subtotal
Ndiol station	13.6	0.9	14.5
Fanaye station	8.4	0.5	8.9
DISEM seed lab. And CTS	6.3	0.5	6.8
CIFA	0.6	1.3	1.9
<b>Grand total</b>	<b>28.9</b>	<b>3.2</b>	<b>32.1</b>

The estimated total project cost and its breakdown are as follows.

**Table 9.8 Proposed Estimated Project Cost of CARD Grant Aid in Senegal**

	Item	Amount (million JPY)
1)	Construction costs	2,881
2)	Cost for equipment	321
3)	Soft component	20
4)	Costs for detailed design and supervision	260
5)	Contingency	490
	Total	3,972

#### **(6) Expected Outputs**

Through this project, it will be possible to improve the quantity and quality of rice seed (BS and FS) production and increase the quantity of distribution and timely supply in the Senegal River Basin, thereby contributing to the improvement of the quality and quantity of rice seed production throughout Senegal, in terms of both software and hardware.

#### **(7) Obligation of Recipient Country**

- Acquisition of land for the site
- Allocation of the necessary budget from the counterpart organisation to solve the shortage of consumables for the DISEM seed laboratory

#### **(8) Points to Note**

- As there are many organizations involved in the project, the role of each agency, including the main implementing agency, needs to be confirmed during the preparatory survey.
- According to interviews about the land ownership of each facilities to be targeted by the project support, it was mentioned that the land was owned by each organization (GoS). However, documentation on land ownership was confirmed only for the Fanaye station, but the other sites were not confirmed by documents, therefore it is necessary to confirm the ownership of these sites during the preparatory survey.
- Regarding the CIFA training facilities, the condition of the existing facilities should be confirmed during the preparatory survey, in order to determine whether reconstruction is required or whether the current buildings can be renovated and utilized.
- The establishment of a new demonstration paddy field for training in the CIFA premises will be considered if a water source and sustainable O&M system of the field are identified during the preparatory survey.
- As some of the infrastructure facilities in Fanaye Station have been rehabilitated with support from KOICA, and the seed sorting machines at CTS was equipped with USAID support, a coordination with other relevant donors will be necessary.
- Coordination with relevant agencies is needed to ensure that there is no overlap with The Rice Value Chain Development Project (PDCVR) activities being implemented by IsDB during the preparatory survey.
- The effect of the rainy season needs to be taken into account when considering the schedule of civil works.

## **Chapter 10 Sierra Leone**

### **10.1 Outline of Sierra Leone**

#### **10.1.1 Natural Conditions**

Sierra Leone is located in West Africa, bordered by the Atlantic Ocean in the west, Guinea in the north and northeast and Liberia in the east and southeast, and covers a land area of 71,740 Km. Sierra Leone has a special significance in the history of the transatlantic slave trade. Its capital, Freetown, was founded in 1787 as a home for repatriated former slaves from London and the Americas. Sitting on a coastal peninsula, the city overlooks the Sierra Leone Harbor, the world's third largest natural harbor. The country is characterized by a humid tropical climate. Annual rainfall ranges from 1,900 mm in the northwest to over 4,000 mm on the coast, which makes Sierra Leone the wettest country in West Africa. Its landscape includes a flat coastal zone with fringing mangrove swamps. A large plain extends inland that transitions into wooded hills and an interior plateau interspersed with forested high mountains in the east. The country's vegetation is highly complex and characterized by a matrix of patches of forest, woodland, savannas, and cropland. Sierra Leone's economy stems from its rich natural resources but is still recovering from a civil war that destroyed most institutions before ending in the early 2000s. Sierra Leone also possesses substantial mineral resources, particularly iron ore, and has relied on mining for its economic base in recent years. In addition, the country is among the largest producers of titanium and bauxite, a major producer of gold, and in the top ten diamond-producing nations.<sup>168</sup>

#### **10.1.2 Social Economic Condition**

Until the outbreak of Ebola in 2014, Sierra Leone was seeking to attain middle-income status by 2035, but the country still carries its post-conflict attributes of high youth unemployment, corruption, and weak governance. The country continues to face the daunting challenge of enhancing transparency in managing its natural resources and creating fiscal space for development. Problems of poor infrastructure and widespread rural and urban impoverishment persist despite remarkable strides and reforms.<sup>169</sup>

As for the inflation, headline inflation fell to 8.9% in March 2021, before rising sharply to 10.2% by end June, reflecting an increase in food and fuel prices. Food inflation reached 17.1% in June 2021, well above its pre-COVID-19 level of 9.9%.<sup>170</sup>

As for the politics, Sierra Leone held general elections in 2018, the most closely contested in its political history with the opposition Sierra Leone People's Party winning by 0.6% after a second vote. The new Government launched the Medium-Term National Development Plan (MTNDP - 2019-2023), which maps out immediate and long-term development goals and commitment to transform from a fragile state into a stable democracy.<sup>171</sup>

#### **10.1.3 Agricultural Condition**

It is estimated that agriculture is providing employment for around 65% of the country's total labour force and about 75 percent of the population (with women as the predominant labour force).<sup>172</sup> The agriculture sector, including livestock and forestry, is a critical component of the economy. It employs about two-thirds of the labour force and, according to the World Bank, covers more than 60 percent of GDP. The country is endowed with a favourable agricultural environment comprising arable land, abundant rainfall, a temperate climate, and several rivers with significant irrigation potential that could

---

<sup>168</sup> <https://eros.usgs.gov/westafrica/country/republic-sierra-leone>

<sup>169</sup> <https://www.worldbank.org/en/country/sierraleone/overview#1>

<sup>170</sup> <https://www.fao.org/sierra-leone/fao-in-sierra-leone/sierra-leone-glance/fr/>

<sup>171</sup> <https://www.worldbank.org/en/country/sierraleone/overview#1>

<sup>172</sup> <https://www.fao.org/sierra-leone/fao-in-sierra-leone/sierra-leone-glance/fr/>



support the production of enough food to meet local consumption and for export.

It is reported that 80 percent of foodstuffs consumed in the country, are imported. Yet of the estimated 5.4 million hectares of fertile arable land, 75 percent remains uncultivated. The land is suitable for the cultivation of a wide range of crops including rice (the country's staple food), cassava, maize, millet, cashew, rubber, ginger, vegetables, fruits, and sugarcane; cash crops such as cocoa, coffee, and oil palm; and the rearing of livestock. The sector is dominated by smallholder & subsistence farmers utilizing local traditional tools with outdated methods and limited farm inputs. However, a few commercial agricultural companies operate in the production of biofuels and energy, palm oil, timber, rice, sorghum, growing, and canning pineapples, manufacturing juice concentrates, and agro-machinery contracting services.

Rice is the popular staple food for Sierra Leoneans, and its cultivation employs the majority of the rural population. Though consumed daily by almost every household, the country has not been able to produce enough rice to meet local demand. This has increased its dependence on imported rice as the country spends over \$240 million on its importation annually. Improving domestic rice production to reduce import fees and create jobs is a central pillar in the country's national development plan and a key element in the strategies to enhance rice self-sufficiency, stimulate economic growth and increase rural income.<sup>173</sup>

## **10.2 Outline of the agricultural sector**

### **10.2.1 Laws, Policies and Development Plans Relating to the Agricultural Sector**

Since independence, agricultural development policy in Sierra Leone has focused on achieving self-sufficiency in rice, in particular. The Medium Term National Development Plan (MTNDP) 2019-2023 of Sierra Leone identifies agriculture as one of the key drivers of economic diversification and inclusive economic development. In the agricultural sector, the National Sustainable Agriculture Development Plan (NSADP) 2010-2030 identifies rice as a priority crop in one of its pillars, 'Crop Commercialization'. The NSADP is expected to increase production through market-oriented value addition of rice, thereby achieving self-sufficiency and contributing to food security and poverty reduction among small-scale farmers. More broadly, NSADP is also the Comprehensive Africa Agriculture Development Program (CAADP) Compact in the African Union's New Partnership for Africa's Development, which has the role of assisting the Government of Sierra Leone and its development partners to share a common vision for development.<sup>174</sup>

In addition, the National Agricultural Transformation Strategy (NATS) 2018-2023 is a strategy that focuses on developing agricultural value chains, improving the availability of better inputs (seeds, fertilisers, pesticides and machinery), increasing productivity and production, and establishing crop and livestock processing zones across the country. Four elements are prioritized in the strategy: rice self-sufficiency, livestock development, crop diversification and biodiversity management. It also emphasizes three key drivers of realization: improving the policy environment, promoting women and youth participation in agriculture, and private sector-led farm mechanization. The implementation of the NATS is expected to improve low productivity, industry linkages, and access to financial services and markets<sup>175</sup>.

---

<sup>173</sup> <https://www.trade.gov/country-commercial-guides/sierra-leone-agriculture-sector>

<sup>174</sup> National Sustainable Agriculture Development Plan 2010-2030  
<https://extranet.who.int/nutrition/gina/sites/default/filesstore/SLE%202009%20National%20Sustainable%20Agriculture%20Development%20Plan%20%28NSADP%29.pdf> [accessed 27 May 2022]

<sup>175</sup> The Sierra Leone Agribusiness and Rice Value Chain Support Project (SLARiS)  
<https://www.afdb.org/en/documents/sierra-leone-approved-agribusiness-and-rice-value-chain-support-appraisal-report>  
[accessed 27 May 2022]

## **10.2.2 Status of NRDS Implementation**

The NRDS1, established in 2009, was approved by the Ministry of Agriculture, Forestry and Food Security (MAFFS) as part of the first group of CARD Phase 1 (2008-2018) countries with a target to increase rice production from 670 000 tons in 2008 to 3.1 million tons by 2018 and to achieve self-sufficiency in rice production by 2013. A terminal review of the NRDS1 shows that some progress has been achieved in seed, water resources management, agricultural financing, post-harvest processing and marketing. However, progress in the areas of mechanization, research, technology extension and human resource development showed less progress and a concept note on NRDS1 was not prepared, which meant that donor support for the project could not be strongly requested. As a result, the objectives of NRDS1 were not achieved<sup>176</sup>.

NRDS1 ended in 2018, but in order to not to stop progress in the rice sector, the Government of Sierra Leone developed the Sierra Leone Rice Value Chain Development Strategy (RVCDS) in 2019, with the aim of achieving rice self-sufficiency by 2030. A working week was held in December 2021 to revise/update the SLRVCDS and the revised SLRVCDS was finalized to make NRDS2 consistent with other CARD countries. Four (4) policy clusters will be promoted to realize the goal of achieving rice self-sufficiency: i) increasing rice production and productivity; ii) establishing staple crop processing zones; iii) expanding market opportunities for producers; and iv) implementing and coordinating rice self-sufficiency policies<sup>177178</sup>.

## **10.2.3 Analysis of Rice Food Value Chains**

Rice is important for Sierra Leone, both as a food resource and rural livelihood. Rice accounts for the largest share of household food expenditures, accounting for nearly 20% of the average household's total expenditure. According to USDA data, about a quarter of total rice consumption has been imported since 1990, with considerable variation from year to year. However, according to household surveys, only imported rice is consumed in about half of all households. The high dependency on imported rice makes the country vulnerable to international rice price fluctuations and exchange rate depreciations.

The value addition through the domestic rice value chain is very low in Sierra Leone. Markets are not well organized, and the flow from farmer to consumer passes through several traditional actors, thus, making farmers' returns low. The grading system and quality standards for rice are not well defined, and the definition of the unit used for weighing (a bushel) varies from district to district, and sometimes even within a district.

Many farmers cultivate rice mainly for their own consumption, but there are surplus producers in the country, particularly in Koinadugu and Kambia areas, and some rice is exported through informal routes to neighbouring countries like Guinea and Liberia.

Due to the lack of rice mills, fodder processing mills and other agro processing companies, farmers lack the means to process and commercialize their harvests, making it difficult to obtain the necessary finance to cover the cost of inputs. Furthermore, lack of access to adequate credit means that they may have to sell their crops at low prices during the harvest season to pay back their debts<sup>179180181</sup>.

---

<sup>176</sup> JICA Coalition for African rice development (CARD) final review assessment : final report (March, 2018)

<sup>177</sup> Coalition for African Rice Development, 'Sierra Leone' <https://riceforafrica.net/sierra-leone-november-2021/> [accessed 27 May 2022]

<sup>178</sup> Coalition for African Rice Development, 'Sierra Leone' <https://riceforafrica.net/old-site/card-countries/group-1-countries/sierra-leone/sierra-leone,-nov-2021> [accessed 30 May 2022]

<sup>179</sup> Rice Prices in Sierra Leone [https://www.statistics.sl/images/StatisticsSL/Documents/rice\\_prices\\_in\\_sierra\\_leone.pdf](https://www.statistics.sl/images/StatisticsSL/Documents/rice_prices_in_sierra_leone.pdf) [accessed 30 May 2022]

<sup>180</sup> Sierra Leone Rice Value Chain [https://pdf.usaid.gov/pdf\\_docs/PA00J1Q5.pdf](https://pdf.usaid.gov/pdf_docs/PA00J1Q5.pdf) [accessed 31 May 2022]

<sup>181</sup> National Sustainable Agriculture Development Plan 2010-2030

---

## 10.2.4 Status of support for the rice sector

The projects being implemented in line with the NRDS are listed in the table below.

**Table 10.1 List of projects related to rice sector in Sierra Leone.**

No.	Project name	Organization	Period	Type of assistance	Project Budget	Target area	Main activity
1	Sustainable Rice Development Project	JICA	2010-2014	Technical Cooperation Project	JPY 460 million	Kambia District	Expansion of rice cultivation area, capacity building
2	Smallholder Commercialization and Agribusiness Development Project	WB	2016-2021	Loan Project	USD 40 million (rice, cocoa, oil and palm oil)	Countrywide.	Marketing, post-harvest
3	Sustainable Rice Production Project (SRPP)	JICA	2017-2022	Technical Cooperation Project	JPY 750 million.	Bombali, Kambia and Port Loko Districts	Rice area expansion, capacity building

Source : Coalition for African Rice Development (CARD) Final Review Assessment, Mar 2018, edited by the Survey team

## 10.2.5 Implementation Structure of Rice sector

The current focal point for CARD is the Director of Food Crop Services at MAFFS. The department has been mandated to implement projects related to rice and continues to facilitate and coordinate the implementation of the NRDS in collaboration with a task force of key stakeholders from other MAFFS departments, including Sierra Leone Agricultural Research Institute (SLARI), Sierra Leone Seed Certification Agency (SLeSCA) and Seed Multiplication Project (SMP).

## 10.3 Current Status and Issues in the Agricultural Sector

### 10.3.1 Irrigation Facility

Although the area covered by irrigation facilities in Sierra Leone has increased to 30,000 ha in 2019 compared to 6,000 ha in 1970, it is still a small proportion of the arable land area<sup>182</sup>. The total land area of Sierra Leone is approximately 7.2 million ha and 75% of the total area is arable land. In addition, approximately 56% of the total land area is below 150 m above sea level. 78% of the arable land area consists of uplands and 22% of lowlands. The highlands comprise forests, savannah and steppes, while the lowlands consist of 690 000 ha of Inland Valley Swamp, 200 000 ha of Mangrove Swamp, 145 000 ha of Boliland and 130 000 ha of Riverine Grassland, as shown in the table below.<sup>183</sup>

**Table 10.2 Distribution of arable land area in Sierra Leone.**

Ecology	Ecosystem	Area (1,000ha)	% of Arable land	% of Total landscape
Upland	Upland	4,200	78	58
Lowland	Inland Valley Swamp	690	13	10
	Mangrove Swamp	200	4	3
	Boliland	145	3	2

<sup>182</sup> FAOSTAT

<sup>183</sup> Performance Audit Report on Agricultural Mechanisation by the Ministry of Agriculture Forestry and Food Security (2014), <https://www.audit-service.gov.sl/wp-content/uploads/2018/12/assl-performance-audit-report-agricultural-mechanisation-maff-2014.pdf> [accessed 31 May 2022]

<b>Ecology</b>	<b>Ecosystem</b>	<b>Area (1,000ha)</b>	<b>% of Arable land</b>	<b>% of Total landscape</b>
	Riverine Grassland	130	2	2
	Arable Land	5,365	100	75
	Non Arable Land	1,870	-	25
	<b>Grand total</b>	<b>7,235</b>	<b>-</b>	<b>100</b>

Source : MAF

### **10.3.2 Agricultural Mechanization**

Farmers are unable to introduce advanced agricultural technology due to low returns from agricultural production. Ploughing, levelling, transplanting, harvesting and threshing are carried out by means of a harrow, machete or bare hands, rather than machines, and the labour costs are high, with women mainly responsible for these tasks<sup>184</sup>.

The Third Poverty Reduction Strategy Paper, "Agenda for Prosperity" for 2013-2017 identifies "improving farmers' access to agricultural inputs" as one of the strategic goals of the agricultural sector. Among its priority activities is the "construction and provision of equipment for the Agriculture Business Center (ABC) and achieving its full operation. The Ministry of Agriculture is putting tractors for use in the plowing service on the ABC and the market to help farmers reach their full potential in producing rice and other crops. The Ministry of Agriculture has signed a Memorandum of Understanding with a private financial institution to allow hiring service providers and farmer groups to purchase tractors with a loan repayment of 4% per annum for seven years. The tractors were financed through a loan agreement with the Indian government and are being sold with a 40% subsidy.

ABC is owned and operated by a federation of Farmer Based Organizations (FBOs) with the long-term goal of becoming a limited liability company or cooperative providing essential services to their respective rural communities. FBO is composed of 3 to 5 units of Farmer Field School, each with 25 to 30 farmers.

Through ABC, the government is working to help smallholder farmers transition from the use of traditional hoes and sickles to the use of modern agricultural machinery and equipment such as tractors, power tillers, improved seeds, fertilizers, herbicides, harvesters, de-stoners, threshers, rice mills, and cassava crushers.

### **10.3.3 Agricultural Inputs**

There is low fertilizer use in Sierra Leone, with an average of 4 kg/ha compared to an average of 9 kg/ha in sub-Saharan Africa, due to high fertilizer prices and a lack of markets for crops, including rice. The usage of improved seeds by farmers is also low. As a result, yields are also low, ranging from 0.72 t/ha for upland rice to 1.23 t/ha for lowland rice.

Participation into markets for agricultural inputs and machinery and withdrawal from them is generally dominated by the private sector, which is less constrained by government intervention. However, imports of these products are not frequent due to low and uncertain demand. Distribution dealers are also not existing, so farmers have to rely on supplies from the Freetown capital or on cross-border trade, mainly unidentified and unregistered products that enter the market via Guinea. Poor road conditions in rural areas result in high transport costs, and prices for agricultural inputs in the country are generally higher than in neighbouring countries<sup>185</sup>.

### **10.3.4 Status of Implementation of Grants to Assist Poor Farmers**

2KR grants to the Sierra Leonean state were implemented before 1990, but no longer implemented since

<sup>184</sup> National Sustainable Agriculture Development Plan 2010-2030

<sup>185</sup> National Sustainable Agriculture Development Plan 2010-2030

then. Food aid has often been provided to Sierra Leone because of the country's history of civil war, which has severely damaged its agricultural sector following armed conflict between rebel and government forces in 1991. The table herein below shows the achievements of 2KR grant aid in the past.

**Table 10.3** The past result of 2KR grant aid for Sierra Leone

Year	1979	1985	1987	1988	Total
E/N basis (million yen)	2.10	2.50	1.50	1.50	7.60
Procured item	Unknown	Unknown	Unknown	Unknown	—

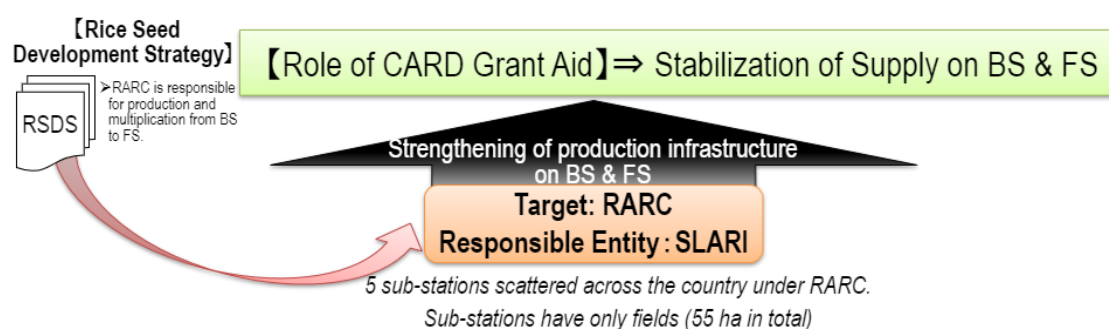
Source : Ministry of Foreign Affairs ODA Country Data Book

## 10.4 Proposed Project Plan: Project for Development of Seed Production Field and Rehabilitation of Research and Training Facilities

### 10.4.1 Overview of the Survey Area

#### (1) Project Outline

- Country Name: the Republic of Sierra Leone
- Project Site: Kambia District Rokupr
- Project Title: The Project for Development of Seed Production Field and Rehabilitation of Research and Training Facilities
- Project Summary : The project aims to strengthen the upstream production and supply capacity of seed by developing plots and irrigation facilities for increased Breeder Seed (BS) and Foundation Seed (FS) production at Rokupr Agricultural Research Centre (RARC) under SLARI, hence contributing to the increase the production of rice in the country. The total project cost is yet to be determined.
- Background of Project Planning: The Rice Seed Development Strategy of the NRDS clarifies the roles of relevant actors in seed production and outsources production to the private sector after certified seeds. The Rokupr Agricultural Research Centre (RARC) is a research institute focused on rice and also a centre for BS and FS multiplication, but it does not appears to be able to satisfy the needs of the country due to deteriorating and malfunctioning facilities. RARC had a relationship of cooperation in the Sustainable Rice Development Project (SPDP), which was a precedence project of the Sustainable Rice Production Project (SRPP), for the development of an appropriate rice production package. Based on the above, the objective of the project targeted the strengthening of functions of the RARC that would be the core of increased production of early generation seed. On the other hand, the development of farmer plots for certified seed multiplication was also mentioned as a need at the interview stage, however, it was excluded since it was considered difficult to include it in the project due to the limited capacity of farmers to be responsible for the operation and maintenance of the fields.



## **(2) Project Site**

The target sites is shown in the map herein below.

- Rokupr Agricultural Research Centre (RARC) in Kambia District



**Figure 10.2 Location of Project Sites (Sierra Leone)**

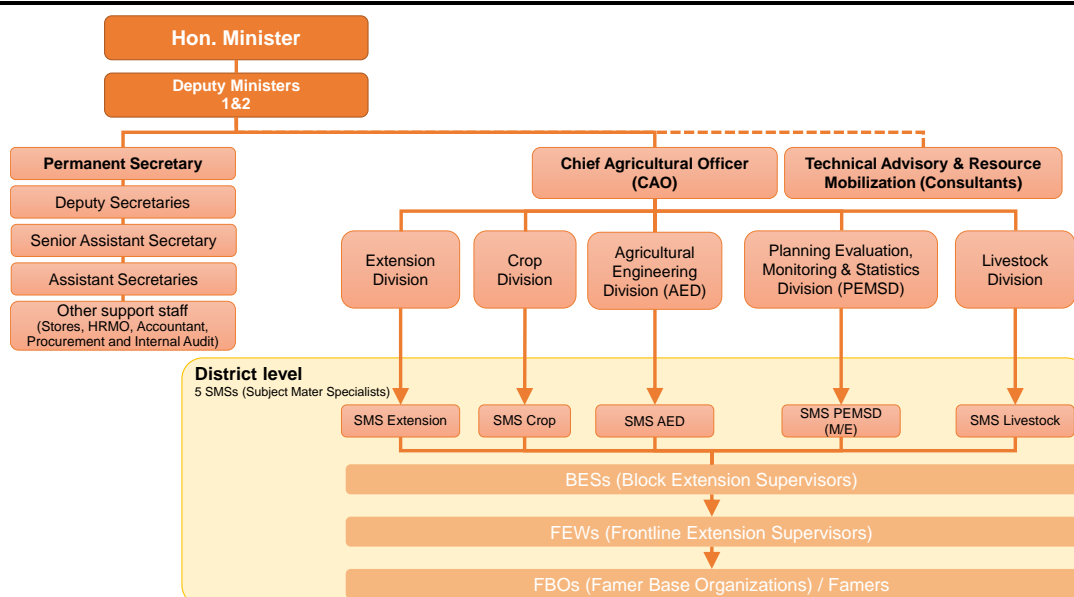
## **(3) Implementation/Responsible Agency**

SLARI and its affiliated RARCs are independent institutions and their budgets are not allocated by the Ministry of Agriculture (MoA), but directly by the Ministry of Finance. The SLARI Council is the supreme body within the organizational structure of SLARI and reports to the Minister of Agriculture. Afterward, the Minister of Agriculture reports to the Cabinet. Although SLARI is independent, in practice the MoA is the competent authority and the implementing agency of the project.

SLARI and RARCs are responsible for the operation and maintenance of the facilities and equipment. Although it is expected that these institutions will be responsible for operation and maintenance practices, the level of technology and the amount of the budget are supposed to be limited. Details will therefore be confirmed in the preparatory survey of project.

### **1) Ministry of Agriculture (MoA)**

Previously it was named as the Ministry of Agriculture and Forestry (MAF), but from 2021 it becomes the Ministry of Agriculture (MoA), which consists of five main divisions, as shown in the figure below. The MoA also provides services to farmers and agricultural groups through Subject Matter Specialists (SMS) in each district under it.

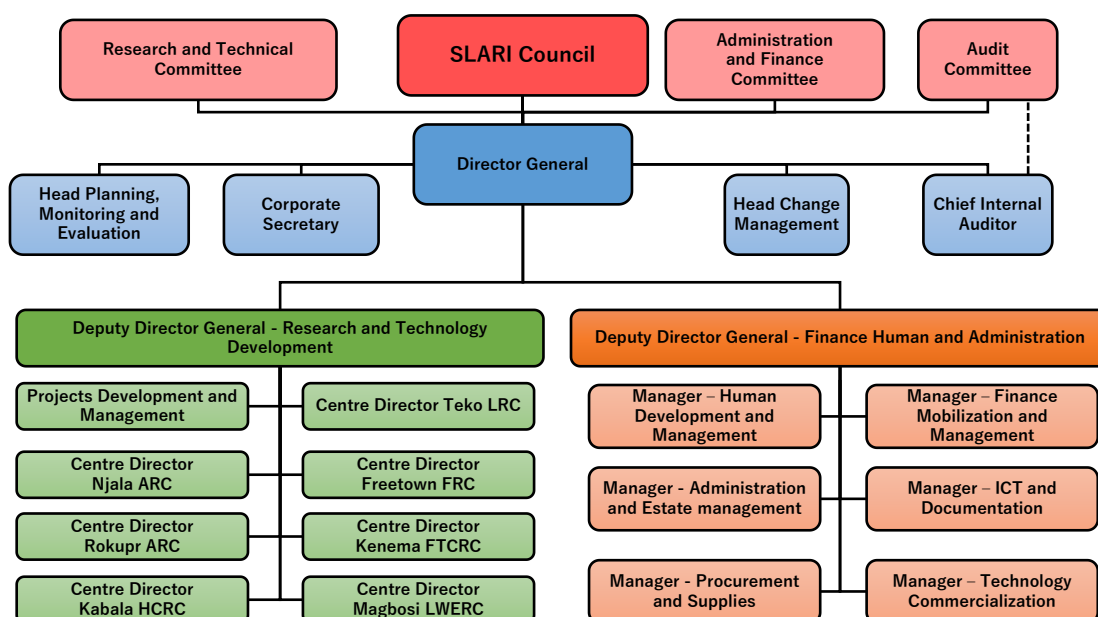


Source : Prepared by the survey team from interviews and other sources.

**Figure 10.3 Organisation Structure of MoA**

## 2) Sierra Leone Agricultural Research Institute (SLARI)

SLARI is the institution responsible for agricultural research in Sierra Leone. While its headquarter is located in Freetown, it does not have a research function, only exercising the administrative function. There are seven research centres in Sierra Leone and each one is responsible for a specific area of research expertise.



Source : Prepared by the survey team from interviews and other sources.

**Figure 10.4 Organisation Structure of SLARI**

## 3) Rokupr Agricultural Research Centre (RARC)

RARC is one of the oldest research centres in Sierra Leone, which was established in 1934 as a mangrove swamp rice research centre of the West Africa Rice Development Association (WARDA). SLARI was established in 2008 and since then the RARC has been operating under the SLARI umbrella. Among the SLARI regional research centres, RARC specialises in the research in the field



of cereals, including rice cultivation. The RARC employs about 140 people in total, and as of July 2022 the RARC had 24 researchers, the most of them (21 researchers) specialising in rice cultivation, including cereals in general. The age composition of the researchers and the educational degrees they have obtained are as follows.

**Table 10.4 The age composition of the researchers and the degrees they have obtained**

Age	Number	Degree	Number
Under 39	14	Doctor	4
Under 49	5	Master	18
Under 59	4	Bachelor	2
Under 69	0		

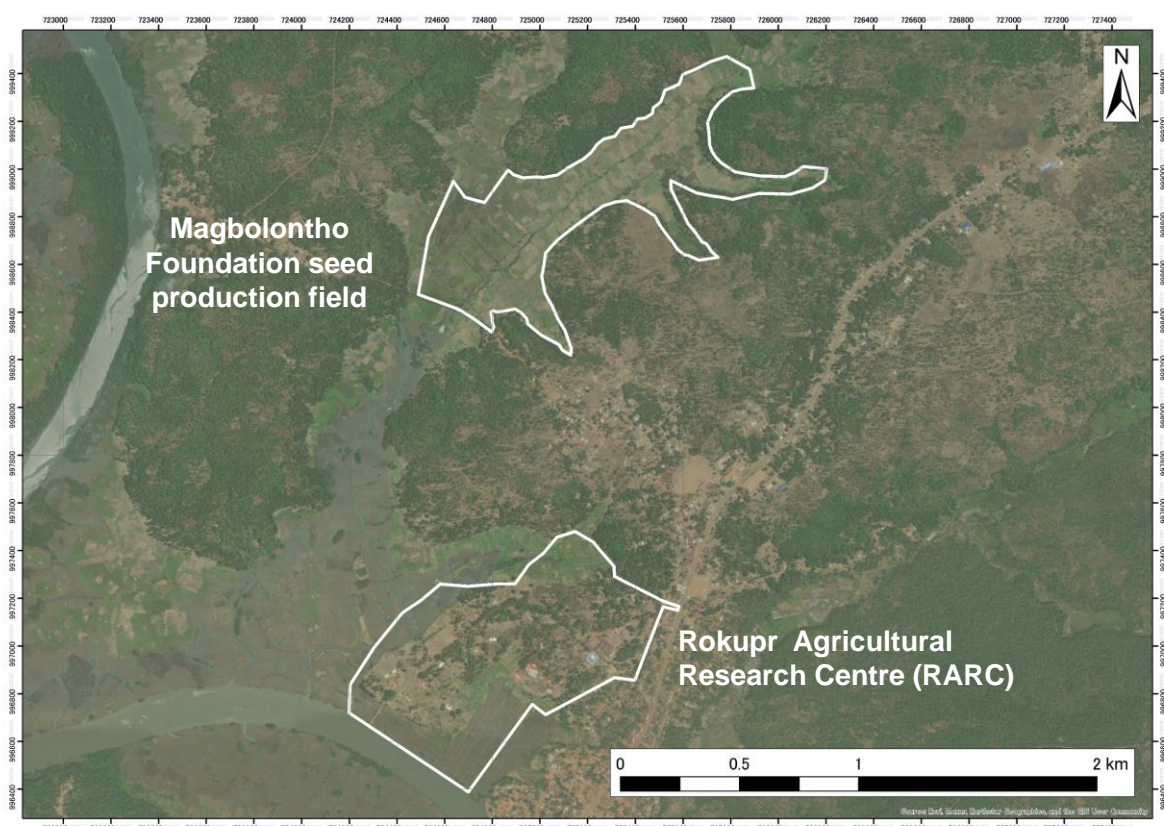
(1 person not answered)

Source: data provided by RARC, organised and prepared by the survey team.

## 10.4.2 Current Status and Issues of RARC

### (1) Summary

RARC, the cooperation target, is located at approximately 3 hours' drive from the capital, Freetown, to the north, and 50 km further north from Port Loko, the capital of the North Western Province. It was established in the 1970s and has been leading in agricultural research in Sierra Leone as one of the main agricultural research centre. The site is located adjacent to the Great Scarcies River, which inundates the research/ experimental plots when the tide rises. Although the RARC is also located at approximately 25 km in a straight line to the Atlantic Ocean, the river has a saline water, and mangrove rice research is also conducted there. For this reason, both IVS experimental site and Mangrove experimental site are established in the RARC's premises.



**Figure 10.5 Location map of RARC premises**

Rice Breeder Seed (BS) and Foundation Seed (FS) production is conducted in the plots within these



institutes, and the production results for the past seven years are shown in the table herein below. A total of seven varieties of BS and FS are grown, mainly two for mangrove swamps (ROK 5 and ROK 10), four for IVS (ROK 24, NERICA L19, NERICA L20 and TGR L19) and one for Upland (ROK 34) varieties <sup>186</sup>.

**Table 10.5 Amount and variety about BS and FS production at RARC (2015-222)**

Unit : ton

Type of seed	Site	Year	2015	2016	2017	2018	2019	2020	2021	2022
<b>Breeder seed</b>	Mangrove Experimental site	ROK 5	0.2	0.1	0.2	0.2	0.3	1.2	1.4	3.0
		ROK 10	0.2	0.1	0.2	0.1	0.2	3.0	2.0	4.0
	Mawirr IVS Experimental site	ROK 24	0.3	0.1	0.2	0.3	0.5	5.0	2.0	3.0
		ROK 34	0.2	0.1	0.2	0.2	0.3	7.0	1.2	3.0
		NERICA L19	0.2	0.1	0.2	0.4	0.3	10.0	1.3	2.0
		NERICA L20	0.2	0.1	0.2	0.5	0.5	4.0	4.0	1.0
		TGR L19	0.1		0.1	0.3	0.2	8.0	6.0	2.0
	<b>Total</b>		<b>1.4</b>	<b>0.6</b>	<b>1.3</b>	<b>2.0</b>	<b>2.3</b>	<b>38.2</b>	<b>17.9</b>	<b>18.0</b>
<b>Foundation seed</b>	Mangrove Experimental site	ROK 5	20.0	0.2	0.2	0.3	0.3	7.0	5.0	8.0
		ROK 10	25.0	0.1	0.2	0.4	0.4	10.0	3.0	10.0
	Mawirr IVS Experimental site	ROK 24	30.0	0.2	0.3	0.6	0.6	10.5	5.0	10.0
		ROK 34	15.0	0.2	0.3	0.5	1.2	10.0	7.0	4.0
		NERICA L19	25.0	0.3	0.3	0.5	1.2	12.0	13.0	15.0
		NERICA L20	5.0	0.3	0.3	0.7	0.9	6.0	5.0	3.0
		TGR L19				0.4	0.8	9.0	10.0	1.0
	Magbolonthe site	ROK 10								15.0
		ROK 24								10.0
		ROK 34								15.0
		NERICA L19								5.0
	Gbomsamba Substation	ROK 24	10.0							
		ROK 34	35.0							
		NERICA L19	30.0							
		NERICA L20	20.0							
		TGR L19	15.0							
	Trotharen Substation	ROK 34								20.0
		NERICA L19								20.0
	<b>Total</b>		<b>230.0</b>	<b>1.3</b>	<b>1.6</b>	<b>3.4</b>	<b>5.4</b>	<b>64.5</b>	<b>48.0</b>	<b>136.0</b>

Note: Production data for 2022 are estimates based on planting plans.

For 2015 and 2020-2022, seed production is funded by external sources.

For the Magbolonthe site, which had not been used since 1972, it was re-cultivated and started to be utilised as an FS production field before the 2022 season.

Source: data provided by RARC and prepared by the survey team.

The produced FS is distributed to the 50-60 Farmer-Based Organisations (FBOs) in the Kambia district. The distribution is for seeds only, and no fertilisers or other inputs are distributed by RARC. 25 kg of FS is distributed free of charge per farmer, but the farmer who receives it is supposed to return 30 kg of the harvest to the RARC. Certified Seed (CS) produced by farmers is sold to seed dealers. According to interviews conducted with an agro-dealer in Freetown, the price of CS sold was 35,000 Leons (before denomination of local currency) / 25 kg.

Most seed production at RARC was carried out when external funding was available and a maximum of 230 tonnes seeds per year was produced. On the other hand, systematic BS and FS production under RARC or SLARI's own budgets is very limited; production stands at about 1.5 tonnes of BS and 3.0 tonnes of FS on average in years when there is no external support in funding. As shown in the table below, RARC is also used as a venue for donor-funded training programs for farmers coming from three neighbouring provinces, and as a training facility for researchers from neighbouring countries.

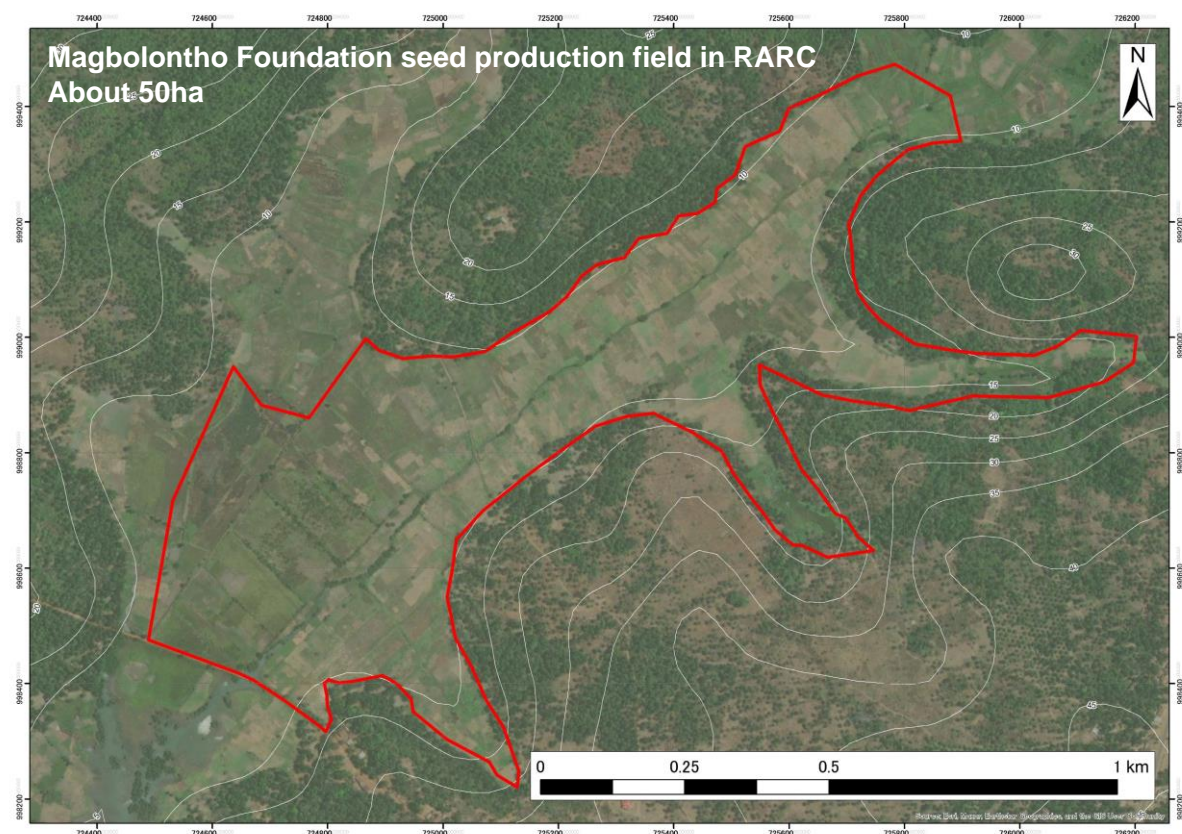
<sup>186</sup> [https://seedssystemsgroup.org/?jet\\_download=2400](https://seedssystemsgroup.org/?jet_download=2400) Table 1 was used as a reference and prepared by the survey team.

**Table 10.6 Training record at RARC (last 12 months from July 2022).**

#	Title	Contents	Participant	Number of Participants	Training Days	Funded by
1	Lead farmers training on improved rice and maize production techniques	Empower lead farmers engaged in rice and maize production to become seed producers	Master farmers	60	3	SLARiS-AfDB
2	Training on rice/maize based and composite recipes for household food and nutrition security in Sierra Leone	Diversify our food system, reduce the importation of wheat flour, thereby increase livelihoods and income of rice and maize value chain actors	Women and youths	240	3	SLARiS-AfDB
3	Group training on rice and maize production techniques for farmers in Sierra Leone	Empower farmer-based organizations engaged in rice and maize production to effectively participate and benefit from improved rice and maize production and postharvest handling techniques	Farmer based organization	120	3	SLARiS-AfDB
4	Training on production and marketing of rice and maize for women farmers association in Sierra Leone	Improve on farmers' rice and maize production and marketing techniques	Women	60	3	SLARiS-AfDB
5	Training on rice and maize field inspection and monitoring for technicians	Increase Field staff ability to quickly analyze situation and determine the appropriate tools and steps required to resolve issues occurring on the field	Extension workers, field technicians, farmers	60	3	SLARiS-AfDB

## (2) Current status and challenges of production infrastructure

The Magbolontho FS production field which is located approximately 1 km away from the centre of the RARC's main research building was reclaimed in 2021-2022 for the purpose of FS production. According to information provided by RARC, the area is approximately 50 ha, and currently a part of the area is under cultivation for FS production. Although there is a stream running through the centre of the field, there exists no drainage facility, and cultivation is currently dependent on rainfall during the rainy season due to absence of irrigation facility. There is a 300 m access road from the farm road to the field by vehicles, but the entire field is not accessible to the agricultural machinery.



**Figure 10.6 Location map of Magbolontho FS production plot**

The location map of the IVS Experimental site, the Mangrove Experimental site and facilities which are located within the RARC premises are shown herein below. The IVS experimental field is about 7 ha and research is being conducted regarding the effects of fertiliser application and the use of organic compost. The field is partly inundated by saline water that rises up due to the tidal effect. Furthermore, due to the lack of a water source, there are no irrigation canals in the field and the crop cultivation there is dependent on rainwater. Therefore, it is not possible to conduct only cultivation experiment in the original purpose under the IVS environment, but also research on irrigated rice cultivation and seed production in dry season.





### **(3) Current Status and Challenges of RARC Research Facilities**

Many of the research facilities at the RARC continue to remain deteriorated or damaged due to the effects of the civil war. The following is a summary of the conditions of the facilities that were mentioned as challenges during the interviews conducted for the purpose of the field survey.

#### **1) Administrative building and Plant Soil Laboratory**

Although the building is in a relatively fair condition, due to the lack of a stable electricity supply, research and experiment activities are disturbed. In addition, the temperature of the experimental refrigerators cannot be maintained at a constant temperature, so it is necessary to use other SLARI centres or university facilities for some experiments and analyses.

Laboratory equipment and apparatus are also deteriorating, particularly equipment installed in the 1980s which is no longer repairable and is currently not suitable for use.

Some of the equipment provided during the implementation of the SRDP (Sustainable Rice Development Project) is still in use, but analytical equipment such as absorption spectrophotometers needs to be replaced.

#### **2) Bio-Technology Laboratory**

The entire facility is still not utilised, because the building has been upgraded under WAARP (The West Africa Agricultural Productivity Program), but the equipment and laboratory apparatus are not in place. To make matters worse, some repairs are needed as miscreants or suspicious persons damaged window glass and screens when entered the RARC premises.

#### **3) WARDA Fence**

Before the occurrence of civil war, there were an experimental screen house and a glass greenhouse, but these are now in dilapidated and unusable condition. Although there was also a cold storage room for the preservation of BS, it is not functioning due to an electrical system failure, which means that long-term seed preservation is currently impossible. Therefore, a practice of periodically cultivation and collection of seeds at the experimental site has been carried out in order to maintain the BS variety in RARC.

#### **4) Engineering Workshop**

Before the occurrence of civil war, an Engineering Department existed in RARC and was in charge of repairing farm machinery for RARC and surrounding farmers. But the civil war damaged the facility and it has not been available for service since then.

Although this facility is no longer available, researcher in RARC make prototypes of small agricultural machinery such as threshing machines, parboiled rice making machines, rotary weeders and rice transplanters.

#### **5) Old Staff Quarters**

There is also staff quarters within the RARC premises, but some of them are still in the same



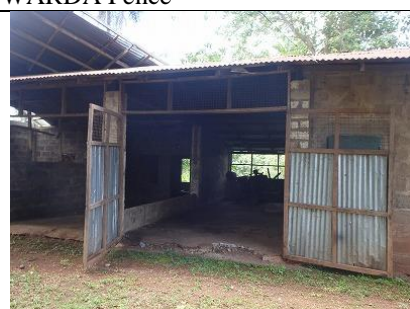
Administrative building and Plant Soil Laboratory



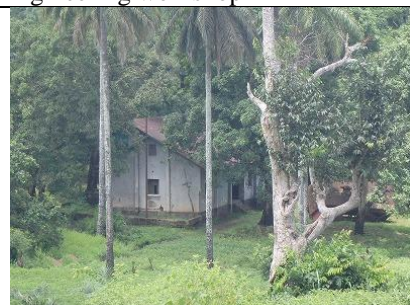
Bio-Technology Laboratory



WARDA Fence



Engineering workshop





Old staff quarters

deplorable state as they were destroyed during the civil war. As a result, there is a lack of accommodation space for staff and for domestic /foreign researchers staying for long terms.

### 10.4.3 Draft Project Plan

#### (1) Proposed Project Components : Development of production infrastructure in Magbolonthe FS production plots.

**Table 10.7 Purpose, Functions and Components at Magbolonthe FS production fields**



<b>Purpose and functions</b>	
Development of production infrastructure for seed production to enable sufficient quantities of FS production to supply quality seed in the country.	
	
Magbolonthe FS production field (Cultivated part of the field)	Magbolonthe FS production field (Uncultivated part of the field)
<b>Components</b>	
<b>[Facilities]</b> <ul style="list-style-type: none"> <li>• Construction of irrigation and drainage canals within the Magbolonthe FS production field (approx. 50 ha)</li> <li>• Construction of farm roads for transporting agricultural machinery</li> <li>• Development of water sources (*optional)</li> <li>• Construction of a warehouse for agricultural machinery and temporary storage of harvested products beside the Magbolonthe FS production field.</li> </ul> <b>[Equipment]</b> <ul style="list-style-type: none"> <li>• Tiller (12hp, work equipment: Trailers, cage wheel, levellers and ploughs)</li> <li>• Harvester (2-row, 2-wheel)</li> <li>• Threshing machines</li> <li>• winnowers (manual type)</li> <li>• One-pass type Rice milling machine(Capacity: 0.7 t/h for paddy, main unit, coarse selector, destoner, engine, lift)</li> </ul>	
<b>Contents</b>	
<ul style="list-style-type: none"> <li>• Development of irrigation and drainage facilities to increase FS production and productivity and construction of farm roads for agricultural machinery in RARC's Magbolonthe FS production plots where production infrastructure has not yet been developed.</li> <li>• Development of water source (small-scale reservoir): To secure a stable water source during the dry season, a feasibility study on construction of a small-scale embankment in part of the upstream side of the RARC property will be conducted, and facilities will be constructed if feasibility is confirmed.</li> </ul>	

#### (2) Proposed Project Components : Development of RARC Experimental Field Infrastructure Development

**Table 10.8 Purpose, Functions and Components for Experimental Field Infrastructure Development**

<b>Purpose and functions</b>
Infrastructure development of IVS experimental field and mangrove rice experimental field that exist at the RARC site to strengthen capacity for BS production and rice research in Sierra Leone.



	
Current status of IVS experimental field	Current status of mangrove rice experimental field
<b>Components</b>	
<b>[Facilities]</b>	
<ul style="list-style-type: none"> <li>• Construction of irrigation infrastructure for IVS experimental field (approx. 7 ha)</li> <li>• Construction of tide embankments to prevent inundation of IVS experimental field</li> <li>• Development of water sources for IVS experimental field (*optional)</li> <li>• Development of mangrove rice experimental field (approx. 6 ha)</li> <li>• Construction of tide embankments on mangrove rice experimental field</li> </ul>	
<b>[Equipment]</b>	
<ul style="list-style-type: none"> <li>• Small power tillers for mangrove rice experimental field.</li> </ul>	
<b>Contents</b>	
<ul style="list-style-type: none"> <li>• Construction of a tide embankment (approx. 200 m long) to prevent the inflow of salt water flowing back upstream from the downstream of the IVS experimental field.</li> <li>• Improvement of existing IVS experimental field: Establish plots with a controlled cultivation environment by Creation of tillage beds, levelling and grading of plots, construction of irrigation and drainage canals and farm roads</li> <li>• To ensure a stable water source during the dry season, a feasibility study on the construction of a new small-scale reservoir upstream of the IVS experimental field will be conducted, and the facility will be constructed once its feasibility is confirmed.</li> <li>• Construction of a tide embankment to prevent erosion of the mangrove rice experimental field due to fluctuating tidal levels. Gates will also be installed to control the water level of the field side.</li> <li>• Improvement of existing mangrove rice experimental field: Establish plots with a controlled cultivation environment by Creation of tillage beds, levelling and grading of plots, construction of irrigation and drainage canals and farm roads</li> </ul>	

### **(3) Proposed Project Components : Improve Equipment to Strengthen Capacity for Rice Research and Training Functions in RARC.**

**Table 10.9 Purpose, Functions and Components for Improve Equipment to Strengthen Capacity for Rice Research and Training Functions in RARC**

<b>Purpose and functions</b>	
1.	Strengthen the capacity of RARC as a rice research hub through rehabilitation and construction of deteriorated research facilities at the RARC;
2.	2-To improve the training environment and strengthen the capacity for technology dissemination through the construction of facilities as training centres for rice farmers and rice researchers.

 <p>Deteriorated laboratory equipment that can no longer be used.</p>	 <p>Laboratory where only buildings were constructed by donor support.</p>
<b>Components</b>	
<p><b>[Facilities]</b></p> <ul style="list-style-type: none"> <li>• Construction of new training centres (training rooms, large conference rooms and administrative offices) and accommodation buildings</li> <li>• Rehabilitation of garages</li> <li>• Construction of fence for boundary of the facility</li> <li>• Construction of cold storage for BS preservation</li> <li>• Repair or construction of new screen house</li> <li>• Construction of new solar panels and batteries for energy storage</li> <li>• Repair or construction of new staff quarters</li> </ul> <p><b>[Equipment]</b></p> <ul style="list-style-type: none"> <li>• Equipment for chemical analysis (Chemical Fume hood and accessories, Soil/plant samples Digestion/extraction unit, Atomic Absorption Spectrophotometer, Spectrometers/ Colorimeters, Kjeldahl distillation unit, etc.)</li> <li>• Equipment for plant experiments (Plant sample grinders and accessories, etc.)</li> <li>• Equipment for soil analysis (Laboratory centrifuges, Soil filtration unit with vacuum pump, soil samplers, soil physics test kits, etc.)</li> <li>• Other laboratory equipment (water purification equipment, laboratory freezers (up to -80°C), electronic balances)</li> <li>• Internet infrastructure, OA equipment for training and a PC set for research.</li> </ul>	
<b>Contents</b>	
<ul style="list-style-type: none"> <li>• Establish a new training centre, including lecture rooms (capacity of about 40 x 3 rooms) for farmer training and accommodation for farmer training participants and long-stay researchers(100 beds).</li> <li>• Renovate or construct new accommodation for RARC staff, which is in short supply.</li> <li>• Install equipment for chemical analysis, soil analysis and plant experiments, which are no longer available due to deterioration and breakdowns.</li> <li>• Rehabilitate garages for the maintenance of agricultural machinery.</li> <li>• Construction of a fence along the RARC premises boundary to prevent the invasion of outsiders and to define the land boundary.</li> <li>• Establish internet environment and PCs.</li> </ul>	

#### **(4) Project Cost Estimation**

The estimated project cost and its breakdown will be confirmed during the preparatory survey of the project.

The costs of construction and equipment procurement per component are as follows.

(Unit: billion JPY)

Project component	Construction	Equipment	Subtotal
Production infrastructure in Magboloncho	13.3	0.5	13.8
Experimental Field Infrastructure Development	5.1	0.1	5.2



Improve Equipment in RARC	3.8	0.8	4.7
Grand Total	22.2	1.4	23.6

The estimated total project cost and its breakdown are as follows.

**Table 10.1 Proposed Estimated Project Cost of CARD Grant Aid in Sierra Leone**

	Item	Amount (million JPY)
1)	Construction costs	2,224
2)	Cost for equipment	205
3)	Soft component	20
4)	Costs for detailed design and supervision	260
5)	Contingency	370
	Total	3,079

## **(5) Expected Outputs**

The following outputs are expected to result from this cooperation in the target areas

- Stabilisation of the BS and FS production system and increased production through the development of seed production plots and experimental plots.
- Improvement of productivity through quality maintenance of BS for each ecological zone and further progress in research on irrigation and farming methods.
- Enhancement of fundamental research capacity through strengthening of RARC research facilities.
- Contribution to increasing rice production through expanded training opportunities for rice farmers and improving the quality of training by enhancing its function as a training centre for rice cultivation technologies.

Additionally, in collaboration with the successor to the SRDP and SRPP, it will be enabled to contribute to the improvement of quality and quantity related to rice seed production both in terms of software and hardware in Sierra Leone. Indicators showing the quantitative outputs of the Project will be considered and set through in the future preparatory survey.

## **(6) Obligation of Recipient Country**

- Land acquisition
- Assignment of a person in charge during project implementation
- Framework and budget allocations for seed production and equipment maintenance after completion of the Project

## **(7) Points to Note**

- To confirm in advance that the budget for seed production-related activities and the operation and maintenance of the equipment provided by the project will be appropriately allocated by the host government.
- Consult with local communities regarding land tenure, and reach a consensus among the concerned parties and acquire the land for the project.
- Due to the lack of information on tidal cycles, water level changes and inundation areas, salinity, etc., it is required to take actual measurements or estimate them at the stage of planning and designing infrastructure development in the target fields.
- The impact to seed production on acid soils in some parts of the RARC site should be confirmed.
- Agricultural machinery support provided by SLARIs to SLARI and RARC should be confirmed during the preparatory survey and coordinated to avoid duplication.
- Although many researchers belong to the RARC, their skill level related to upstream seed

production is not yet confirmed. Therefore, in order to maximise the impact of the Project, it is expected to utilise the outputs (TR-P) and human resources whose capacity has been strengthened through SRPP, and through collaboration with the successor of Technical Cooperation Project.

## Chapter 11 Zambia

### 11.1 Outline of Zambia

#### 11.1.1 Natural Conditions

##### (1) Topography

Zambia is located at latitudes 9-18°S and longitudes 23-24°E, with a land area of 752,610 km<sup>2</sup>, most part of it is a plateau with height between 1,000 and 1,350 m above sea level.

##### (2) Weather Conditions

Most of the country has a subtropical climate, but the southern part of the country has an arid climate. The seasons can be divided into three main periods: the dry season from May to August, the dry season from September to October, and the rainy season from November to April.<sup>1</sup>

There is a clear difference between the rainy season and the dry season. The rainy season is from November to April, with the peak period from December to February. Rainfall is mostly concentrated in the rainy season, but varies from region to region, ranging from about 1,500 mm per year in the northern highlands, 800 to 1,100 mm in the central region where the capital Lusaka is located, and 600 to 800 mm in most of the southern lowlands. There is almost no rainfall during the dry season. The table herein below shows meteorological data for Mongu in the Western Province and Kasama in the Northern Province.

**Table 11.1 Weather Conditions in Western Province and Northern Province**

Month	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.*
Average Temp. (°C)	Mongu	22.8	22.8	22.8	22.3	19.9	17.3	17.8	20.7	24.6	25.4	23.7	22.9	21.92
	Kasama	19.7	19.9	20.2	20.2	18.9	17.2	17.1	18.9	21.8	23.1	21.6	20.1	19.89
Max. Temp. (°C)	Mongu	28.9	28.6	29.1	29.6	28.4	26.5	27.0	29.8	33.4	33.8	31.3	29.3	29.64
	Kasama	26.3	26.8	26.8	26.5	26.0	24.9	24.9	26.9	29.8	30.9	28.9	26.7	27.12
Min. Temp. (°C)	Mongu	18.6	18.7	18.4	16.5	12.7	9.5	9.7	12.4	16.4	18.1	18.2	18.6	15.65
	Kasama	16.1	16.2	16.1	15.2	12.5	9.6	9.3	11.0	13.8	15.9	16.4	16.2	14.02
Rain fall (mm/month)	Mongu	209.1	184.6	139.9	43.4	4.9	0.7	0.0	1.5	2.2	32.7	106.4	192.8	918.20
	Kasama	285.3	242.8	233.1	91.3	10.5	0.4	0.1	0.1	3.0	23.3	158.3	295.0	1343.20

\*: Annual rainfall for rain fall data

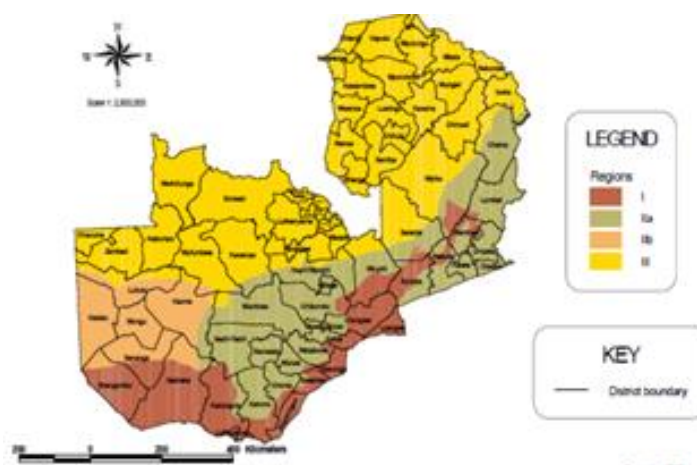
Source: World Climate, <https://www.climate-charts.com/>

Source: JICA, Preparatory Survey Report for the Technical Cooperation of Food Crop Diversification Support Project focusing on Rice, 2012/3,

The agro-ecological zones in Zambia are broadly divided into three zones according to rainfall, as shown in the figure below. The Mount Makulu Central Agricultural Research Station is classified as Zone IIa (800~1,000 mm), while the Mansa Research Station in Luapula Province is located in Zone III (>1,000 mm).

##### (3) River System

The country is divided into two basins, the Zaire River and the Zambezi River, but most of it belongs to the Zambezi River basin.



**Figure 11.1 Agro-ecological Zones in Zambia**

### **11.1.2 Agricultural Condition**

The agriculture sector generates about 16 to 20 percent of the Gross Domestic Product (GDP), provides livelihoods to more than 70 percent of the Zambian population, and absorbs about 67 percent of the labour force and remains the main source of income and employment for women and men, both. Further, the sector has contributed to an increase in rural incomes and marginally led to a reduction in rural poverty as well as an increase in food and nutrition security.

## **11.2 Outline of Agricultural Sector**

### **11.2.1 Laws, Policies and Development Plan Relating to the Agricultural Sector.**

Other than Second National Rice Development Strategy (NRDS 2) 2016-2020, the following government plans and programs are in effect: the Country's Vision 2030, the Revised Sixth National Development Plan (R-SNDP), the second National Agricultural Policy (S-NAP) and the National Agricultural Investment Plan (NAIP) under the Comprehensive Africa Agriculture Development Program (CAADP).

### **11.2.2 Implementation Status of the NRDS**

The NRDS 2 (2016-2020) replaces NRDS 1 (2011-2015) that was developed as a part of the Coalition for African Rice Development (CARD) initiative. The NRDS 2 is a policy framework that is intended to address the challenges affecting the rice industry and guide its development process over the five years. The review of the NRDS 1 started after a stakeholder meeting held in October 2013; had raised concerns and highlighted emerging issues that the strategy should address. One of the major concerns of the stakeholders was the delay in the implementation of the strategy.

The overall objective of the NRDS 2 is to increase local rice production by at least 50% and enhance its competitiveness on the market by 2020. The following specific objectives were set and described to achieve the overall objective:

- To increase yields by at least 25% over the period of five years
- To expand the area under cultivation by at least 20% by 2020
- To improve quality of local rice in terms of whole grain, aroma etc.
- To promote stakeholder innovation capacity and knowledge management across the value chain
- To increase the market share of locally produced rice
- To develop and improve mechanisms for linking value chain players and coordinating the rice sub-sector

### **11.2.3 Rice Food Value Chain Analysis**

Rice is becoming an important staple food in Zambia. In the last 5 years, the crop has seen a steady increase in demand and the growing importance is evidenced by its current status as a strategic food crop. However, the demand for rice exceeds production and the deficit is met through imports mainly from Asia. In the recent years, the country has been importing between 5,000 and 20,000 MT of milled rice annually mostly from Asia to meet domestic demand.

The key features of rice production in Zambia over the past five years (2011-2015) are as follows:

- Rice is grown in all the ten (10) provinces of the country. These are Western, Muchinga, Northern, Eastern and Luapula provinces being the major production areas while Southern, Lusaka, Copper belt and Central provinces are the least producing areas.
- Most farmers still use the traditional methods of production with low level of mechanization, characterized by broadcasting of seed, use of low-yielding traditional varieties, limited fertilizer application, limited weeding of fields, and poor water management.

- The average production level of rice in the country is 44,512 MT and mostly grown by small-scale farmers under rain-fed conditions.
- Average rice farm plot size currently is of 0.57 hectares.
- The average rice yields is 1.16 tons per hectare, which is quite low when compared to other Eastern and Southern African countries.
- Large scale rice production in Zambia is possible especially in farm blocks especially in Nansanga and Luena.

**Table 11.2 Number of rice farmers, area and production by province, Zambia (2011-15 average)**

Provinces	Number of households growing	Area Planted (ha)	Area Harvested (ha)	Production (MT)	Yield (MT/ha)	Average rice plot size per household (ha)
Central	177	72	66	129	1.38	0.41
Copperbelt	93	25	23	33	1.46	0.27
Eastern	5,385	1,581	1,472	2,437	1.55	0.29
Luapula	5,570	1,569	1,390	2,731	1.78	0.28
Lusaka	164	50	42	64	1.06	0.31
Muchinga	13,020	4,823	4,513	7,931	1.66	0.37
Northern	15,893	12,413	11,315	16,182	1.31	0.78
North Western	1,096	345	315	509	1.51	0.31
Southern	109	37	28	17	0.26	0.33
Western	26,542	17,622	9,038	14,479	0.90	0.66
National	68,051	38,537	28,202	44,512	1.16	0.57

Source: MA/CSO Crop Forecast Survey Data, 2010/11-2014/15

The total consumption of rice in Zambia increased from 15,926 MT in 2002 to 59,728MT in 2014, in paddy term, and per capita consumption increased from 1.49 kg in 2002 to 4.11kg in 2014. On the other hand, rice production has increased from 11,645 tons in 2002 to 49,640 tons in 2014, but the supply-demand gap has increased from 4,000 tons to about 10,000 tons. Due to the increasing population and per capita consumption, it is expected that rice consumption will increase in the years to come.

Zambians generally have a preference for the aromatic rice like Supa-Mongu, Nakonde and Chama rice hence the premium price is paid for local rice varieties. In addition, Zambian consumers mostly buy rice on the basis of quality that encompasses size of the grains, colour and free from grit and other impurities.

Locally-produced rice is less competitive in the market largely due to low productivity, which results into higher retail prices. Generally, the lower quality of locally produced rice further contributes to its being less competitive compared to the price of imported rice. However, the locally-produced rice is characteristics in term of aroma which makes it generally preferred by domestic consumers as mentioned above.

In addition, considering the fact that the Southern African region is a net importer of rice, Zambia has an opportunity of presence of readily available market, if the quality and grading of the commodity is improved upon.

There are three (3) ecologies in which rice are grown in Zambia. These are the rain-fed lowland flood plains, rain-fed up-land (including seasonal dambos) and irrigated land. The cropped areas (2008) are 2,500 ha, 27,900 ha and 600 ha, respectively. Each of these ecologies has its own limitations to production and productivity of rice.

**Lowland rain-fed:** The predominant rice producing areas in Zambia are found in the rain-fed lowland ecologies which are characterized by flooding during the rainy season. The extent to which flooding occurs varies depending on the amount and distribution pattern of rainfall, and the characteristics of the lowland.

**Up-land rain-fed:** Up-land rain-fed, which includes dambos, solely depends on rainfall to sustain plant

growth. Rice growing in this ecology is relatively new in Zambia and production has been comparatively lower. The promotion of rice growing in this ecology has been emphasized in recent years, mainly due to its ability to hold water and also the introduction of up-land rice varieties.

**Irrigated lowland:** This ecology is ideal for rice production although it requires investment in irrigation infrastructure. Production of rice in this ecology is, however, limited and underdeveloped in Zambia. It is only in Sefula in Mongu District and Chanyanya in Kafue District where irrigation schemes were developed for rice production. However, lowland ecologies which are widely found in the country can, if put under irrigation and given their high potential, substantially contribute to an increase in production of rice in Zambia.

#### **11.2.4 Progress of Support to Rice Sector**

Zambia was one of the countries in the second group that participated in the CARD. During the first phase of the NRDS (2011-2015), nine C/Ns were created and six of which were implemented with support from JICA. In addition, NRDS 2 (2016-2020) was formulated in 2016. The Zambia Consortium for Accelerated Rice Development in Africa (Zambia Consortium for Accelerated Rice Development (ZCARD)), the task force for the NRDS, is taking the lead in formulating the next NRDS.

JICA has been working on the “Support the Food Crop Diversification Support Project”, “Focusing on Rice Production (FoDiS-R) (2012-2015)”, “Rice Dissemination Project (DSP) (2015-2019)”, “Market-Oriented Rice Development Project (MOREDeP) (2019-2025)”, and other agricultural development projects. These projects strategically support Zambia’s rice sector through the implementation of various agricultural development projects, including the Market-Oriented Rice Development Project (MOREDeP) (2019-2025). A list of rice-related projects being implemented in Zambia by various development partners is provided in the table herein below.

**Table 11.3 List of Project for Rice Sector in Zambia**

No.	Project	Agency	Period	Type
1	Rice Dissemination Project (RSP)	JICA	2015-2019	Technical Cooperation
2	Smallholder Productivity Promotion Project (S3P)	IFAD	2011-2019	Grant, Loan
3	Smallholder Agribusiness Promotion Project (SAPP)	IFAD	2010-2017	-
4	Agricultural Productivity Program in Southern Africa (APPSA)	World Bank	2013-2019	Grant
5	Strengthening Rice Production and Enhancement of Extension for Rice Production	FAO	2015-2017	Technical Cooperation
6	Agricultural Productivity and Market Enhancement Project (APMEP)	Global Agriculture and Food Security Program (GAFSP) /AfDB	2014-2019	Grant
7	Smallholder Productivity Promotion Programme (S3P)	IFAD	2014-2017	Loan
8	Support the Food Crop Diversification Support Project (FoDiS-R)	JICA	2012-2015	Technical Cooperation
10	Market-Oriented Rice Development Project (MOREDeP)	JICA	2019-2025	Technical Cooperation

#### **11.2.5 Implementation Structure of Rice Sector**

The Government of the Republic of Zambia (GRZ) through Ministry of Agriculture will oversee the NRDS 2 implementation process. However, to achieve effective implementation of the NRDS 2 there is need to establish a public-private sector coordinating body and/or forum that will be referred as the Zambia Consortium for Accelerated Rice Development (ZCARD). The ZCARD will constitute a national steering/coordinating body whose membership drawn from a cross-section of many stakeholder

organizations.

The ZCARD has been mainly responsible for:

- a) Coordinating the implementation and review of strategies
- b) Lobbying for resources and policy support
- c) Monitoring and evaluating interventions
- d) Fostering local partnerships
- e) Promoting collaboration with other regional and international rice stakeholders and partners

The membership of ZCARD is:

- a) Ministry of Agriculture (4)
  - Department of Policy and Planning
  - Department of Agriculture
  - Zambia Agriculture Research Institute
  - Department of Agribusiness and Marketing
- b) Ministry of Commerce, Trade and Industry (1)
- c) Ministry of Finance (1)
- d) Zambia Rice Federation (1)
- e) The University of Zambia Department of Agriculture (1)
- f) Agro NGO's representative (1)
- g) Financial Institutions (Bankers Association of Zambia) (1)
- h) Zambia National Farmers Union (1)
- i) National Union for Small Scale Farmers of Zambia (1)
- j) Seed Control and Certification Institute (Regulatory body) (1)
- k) International Development Organizations as JICA (1)

In the value chain of rice, there are following actors involved:

**Farmers:** In Zambia, rice is mainly grown by small-scale farmers. Production, therefore, is largely concentrated in Northern, Muchinga, Western, Eastern and Luapula Provinces. In these areas, the abundance of water creates favorable conditions for rice cultivation especially in the dambos and wetlands.

**Processors:** Rice processing is done by small and medium scale processors. The millers directly buy paddy rice from the farmers, which they mill, polish and pack into different sizes for sale to wholesalers and retailers. Traders also buy paddy rice from farmers and take it to millers for polishing where they pay for the services. The capacity of most of the mills range from 1.5 to 2.5 MT per hour.

**Traders:** Most of the rice produced in Zambia is traded informally in open markets while the rest is properly packaged and sold through established supermarkets. Most of the trading activities are done by middlemen who buy paddy rice from the farmers.

Approximately 31% of the farmers growing rice in Western, Northern, North-Western and Muchinga provinces are women. This trend may be similar in the other rice growing areas in the country. In addition, 90% of the small-scale processors in these provinces are men while 10% are women. Trading of rice is also undertaken by both men and women although the proportions are not known. Women, however, dominate the local retail rice businesses.

### **11.3 Current Status and Issues in the Agricultural Sector**

The Rice Sub-Sector in Zambia is facing a number of challenges which has resulted into low productivity and production. On the other hand, there are also available opportunities in the sub-sector. Challenges and opportunities of irrigation, mechanization, and agricultural inputs will be discussed in

the following items.

### **11.3.1 Irrigation Facilities**

#### **(1) Challenge**

The following issues relating to irrigation facilities were identified in the NRDS2.

**Poor Water Management System:** With the advent of climate change which brings in the increasing variations in precipitations resulting in frequent occurrence of floods and droughts and other extreme weather conditions, farmers are generally finding it more difficult to manage water and making it difficult to improve production and productivity.

**Inadequate Infrastructure:** Inadequate infrastructure support for research and extension, irrigation; storage facilities and processing have had negative effects on the development of the rice sub sector in the country.

#### **(2) Opportunity**

There is potential to develop additional and rehabilitate existing small-scale mini-irrigation schemes in certain districts which have valley areas and the flood plains. These districts include Kalabo, Kaoma, Mongu, Senanga, Sesheke, Mungwi, Kaputa, Isoka, Chinsali, Chama, Mwense, Mansa, Chiengi, Lundazi and Mambwe. This could offer small and medium scale farmers the best option for achieving highest yields per hectare.

#### **(3) Interventions Described in NRDS2**

The Government, through various projects, is increasing support to the development of irrigation infrastructure to support crop production. However, there is limited support for specialized irrigation infrastructure for rice production in the country. NRDS 2 has been directed at:

- Rehabilitation and construction of irrigation structures
- Improving water management skills among farmers
- Construction of rain-water harvesting and storage structures
- Develop and adapt appropriate water management technologies

### **11.3.2 Agricultural Machinery**

#### **(1) Challenge**

**Low level of mechanization:** The reliance by smallholders on traditional hand tools for land preparation, cultivation, harvesting and processing methods, limited area in term of hectare under rice. This is largely due to non-availability or the high cost of mechanized tools locally. Such situation coupled with the poor agronomic practices, largely explains the reasons for low production, productivity and quality.

#### **(2) Opportunity**

Existence of research facilities and extension network that supports generation and dissemination of technologies for increased rice production and productivity. There are research sites present within the country that have a focus on rice research and development, key ones being Misamfu research station in Kasama, Northern province and Mongu research station in Western province. These research stations if strengthened in terms of facilities and human resource capacity, could lead to the development of more appropriate technologies to enhance rice production and productivity.

#### **(3) Interventions Described in NRDS2**



Mechanization of rice farming can be adopted in land preparation, seedling nursery preparation, transplanting/sowing, field management, harvesting, drying, processing and transportation. In this respect, NRDS 2 has focused on:

- Promoting the use of appropriate equipment
- Building the capacity of selected agro-entrepreneurs to provide technical services
- Establishing community based Agribusiness Service Centres

Post-harvest losses is defined as any loss in quantity and quality that occurs from the time of harvest until the product reaches the final consumer. It happens during harvesting, drying, threshing transportation, storage and marketing. In order to minimize such post-harvest losses, NRDS 2 has focused on the following interventions:

- Training for rice value chain actors on appropriate post-harvest technologies
- Facilitating access to appropriate post-harvest equipment and machinery
- Facilitating private sector investment in storage and processing facilities through providing incentives for the establishment of storage and processing plants

### **11.3.3 Agricultural Inputs**

#### **(1) Challenge**

Limited access to improved varieties and quality seed: Farmers have been using recycled seed of local varieties which significantly contribute to low production, productivity and quality. This is largely due to inadequate availability of improved varieties and quality seed as seed companies are not attracted to the development and marketing of rice seed. In addition, the country doesn't have an active system for producing, multiplying and distributing rice seed.

Poor Farming Practices: The traditional cultivation practices (broadcasting seeds, no weeding) used by small-scale farmers fall short of recommended management practices and thus contributes to low production, productivity and quality.

#### **(2) Opportunity**

Scope for expanding rice area by bringing currently underutilized, but suitable upland area under production, using new upland rice varieties.

Diversification Program by the Ministry of Agriculture will have a positive impact on rice growing in the country.

#### **(3) Interventions Described in NRDS2**

Improved seed is one of the most important components of the agricultural development process. Efforts for increasing agricultural productivity and production would be a futile attempt without the availability of improved seeds. It is estimated that a larger percentage of rice farmers in the country use recycled seeds and only a small percentage use certified seeds. The low rate of improved seed utilization in the country is mainly associated with unavailability of reliable supply of breeder and foundation seeds. In addition, the bias of seed companies to produce some crop varieties and neglect others is one of the limiting factors in seed availability and accessibility to farmers. At present most seed companies have a wide range of maize crop varieties as compared to crops such as rice, millet, cowpeas, and sorghum despite the existing high demand for these types of seeds. In view of this, the strategy, NRDS 2, focused on:

- Seed purification of existing varieties
- Identify and evaluate comprehensively high quality local varieties

- Development and improvement of new varieties
- Production of basic and certified rice seeds
- Strengthening rice seed distribution network in the country
- Supporting community on-farm seed multiplication
- Strengthening the capacity of seed companies

Increased and efficient use of modern inputs (fertilizers, agrochemicals, seeds, farm implements, etc.) is a pre-requisite for achieving sustainable agricultural productivity and food security.

NRDS 2 has focused on:

- Strengthening the agribusiness management skills of agro-dealers to enable them to access finances
- Increasing the proportion of FISP allocations to rice production

#### **11.3.4 Status of Implementation of Grants to Assist Poor Farmers**

In Zambia, 2KR grant aid was continuously provided from 1981 to 1996, mainly confined to the provision for fertilizer for increasing food production. The Japanese government had suspended the donation until FY2004. The reason for the suspension was that the Japanese government responded to political problems triggered by the presidential election by freezing bilateral aid from each donor, as well as the inadequacies of the distribution system and counterpart funds on the part of the Zambian government.

In FY2005, 2KR grant aid resumed with fertilizer donations, and the government of Zambia had been providing fertilizers to poor farmers since then. The table herein below shows the results of 2KR assistance provided so far.

**Table 11.4 The past result of 2KR grant aid for Zambia**

Year	1981~1995	1996	2005	2007	2008	Total
E/N basis (million yen)	125.07	8.00	2.80	3.20	3.80	142.87
Procured item	Agri chemical, fertilizer, agri machinery	Fertilizer	Fertilizer	Fertilizer, agri machinery	Fertilizer	-

Source: JICA Preparatory survey report for 2KR in Zambia, MOFA data book of Official Development Assistance by country

Except the provision of pesticides before 1991, the 2KR program procured four types of fertilizers, including urea and NPK, and ten types of agricultural machinery, including small- and medium-sized tractors of 100 horsepower or less, work equipment, and irrigation pumps. The target crop was maize, the staple food crop of the Zambia, and the purpose of the grant aid was to increase maize production. From 1986 to 1996, 2KR grant aid program provided mainly urea because, in maize cultivation, the farmer used hybrid varieties with high nutrient absorption rates.

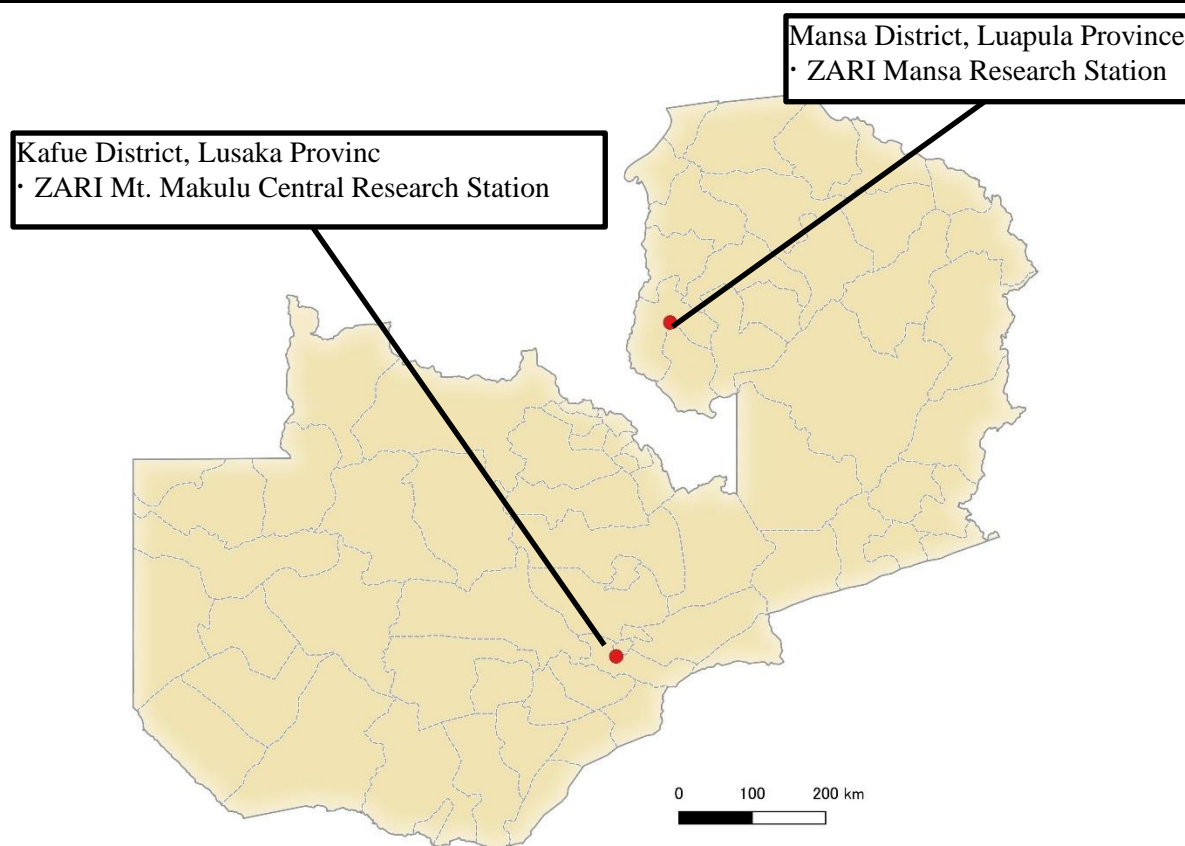
The implementing agency for the 2KR program was the Ministry of Agriculture, and the Department of agriculture carried out the distribution of fertilizers. The 'Technical Assistance Department' under the Ministry got the responsibility of maintaining and monitoring the equipment. In addition, the Economic and Technical Cooperation Division of the Ministry of Finance and National Planning (MOFNP, formerly the Ministry of Finance) was responsible for managing the counterpart funds.

## **11.4 Proposed Project Plan: Project for Development of Seed Production Field and Training Facilities**

### **11.4.1 Overview of the survey area**

#### **(1) Project Outline**

- Country Name: The Republic of Zambia (hereinafter referred to as “Zambia”)
- Project Site: Kafue District, Lusaka Province; Mansa District, Luapula Province
- Project Title: The Project for Development of Seed Production Field and Training Facilities
- Project Summary: The project aims to strengthen the system for the dissemination of rice cultivation technology and the production capacity of quality seeds at the Zambia Agriculture Research Institute (ZARI) Mt. Makulu Central Research Station and Mansa Research Station by developing facilities and equipment for the dissemination of rice cultivation technology, and plots and irrigation facilities for the production of quality seeds, thereby contributing to the increase in rice production in the country. The total estimated project cost is 1,570 million yen.
- Background of Project Planning: The NRDS targeted 25% increase in unit yield in five years, 20% increase under cultivation by 2020 and strengthening of the entire rice value chain. On the other hand, three main challenges faced by farmers in the NRDS2 were identified: inadequate water management due to lack of development including irrigation facilities; low farm mechanisation rates, which limit the expansion of cultivated area; and lack of access to quality seeds. Technical guidance and dissemination of JICA-supported small-scale irrigation development is effective in terms of irrigation development for small-scale irrigation with potential. To address the challenges of limitations in expanding the area under cultivation and the difficulty to obtain quality seeds, it is essential to strengthen the system for increasing agricultural mechanisation and the production of quality seeds. On the other hand, the ZARI Mount Makulu Central Research Station, located near the capital and involved in technical exchange and collaboration with private agricultural machinery manufacturers, has a lot of researchers for general agricultural mechanisation and seed production, but its facilities are deteriorating and its functions are limited. In addition, the ZARI Mansa Research Station, located in an area suitable for rice production, is appropriate as a base for research, technology development and extension methods including rice mechanisation and a quality seed production system, however, the functions of the facility are similarly limited, which is a cause of limiting its effectiveness. Considering the above, In order to promote the strengthening of rice mechanisation and seed production to solve problems in the rice value chain, the strengthening of rice mechanisation and seed production facilities is required, and a draft project plan is considered for the abovementioned research stations, which are a base of Market-Oriented Rice Development Project (MOReDeP) activities, and based on a scale taking into account their jurisdiction and their performance.



**Figure 11.1 Location of Project Sites (Zambia)**

## **(2) Project Site**

The target sites are the following two ZARI facilities.

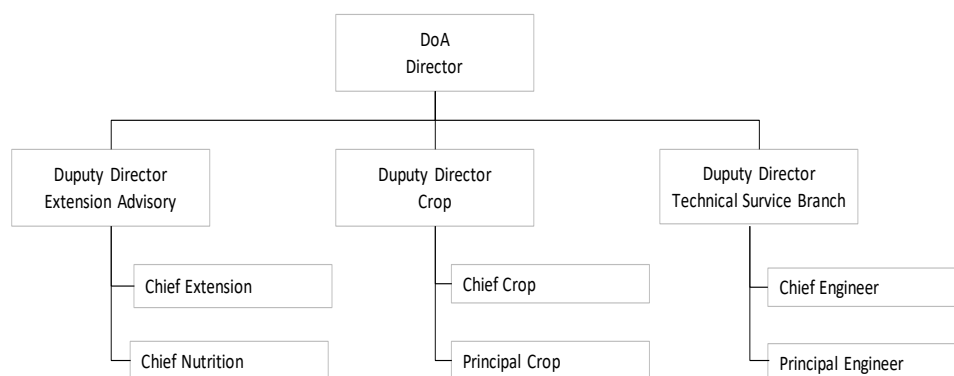
- Lusaka Province: ZARI Mt. Makulu Central Research Station
- Luapula Province: ZARI Mansa Research Station

## **(3) Implementation/Responsible Agency**

The implementing agency is the Ministry of Agriculture, which is responsible for the operation and maintenance of the facilities and equipment at the Mount Makulu Central Research Station and the Mansa Agricultural Research Station. The maintenance teams assigned to both institutions will be responsible for operation and maintenance, and are expected to be equipped with a certain level of technology and budget, details of which will be confirmed in the preparatory survey for cooperation.

### **1) Ministry of Agriculture**

The Department of Agriculture (DoA) of the Ministry of Agriculture is the responsible department, with three sub-departments under the Department of Agriculture (Extension, Crops, and Technical Services) and a technical officer assigned to the department.



**Figure 11.2 Organization Structure of DoA of MoA**

## 2)Zambia Agriculture Research Institute (ZARI)

ZARI is one of the divisions of the Ministry of Agriculture and is headquartered at the Mount Makulu Central Research Institute, about 20 km south of Lusaka City, Lusaka Province. A total of 20 rice research personnel work at the four research stations. In addition to the Central Research Institute, there are Mansa (Luapula Province), Misamfu (Northern Province), and Mongu (Western Province). Of these, the Mansa Research Station, which is the subject of this project, is the main facility for paddy rice in Zambia.

### 11.4.2 Current Status and Issues

#### (1) Mount Makulu Central Research Station

The Mount Makulu Central Research Station is the ZARI headquarters of the Zambian government and is conveniently located 20 minutes from Lusaka, the capital city of Zambia. The Seed Control and Certificate Institute (SCCI), the Gene Bank, and other bureaus under the Ministry of Agriculture are also located at this central institute. They conduct basic research and technology development for rice cultivation at the institute. Initial training for extension workers is also conducted at the station. An ongoing technical cooperation project, MOREDeP, has the Mount Makulu Central Research Station as one of its centres of activity.



**Figure 11.2 Location of Facilities at Mount Makulu Central Research Station**

Although ZARI has centralized research facilities and human resources for all its programs at the Central Research Station, it does not have a program responsible for technological development related to agricultural mechanization, and currently the Technical Service Branch (TSB) of the Ministry of Agriculture is in charge of agricultural machinery. In order to promote the agricultural mechanization planned by the Zambian government, there are not enough facilities and functions to serve as a base for the development and dissemination of agricultural machinery.



**Figure 11.3 Existing workshop at Mount Makulu**

The Central Research Station has a test field (about 1 ha) where experimental cultivation of paddy rice is conducted. A small paddy field is located on a slope and requires irrigation twice daily due to high fallout infiltration. In addition, there are rocks and other debris in the field (see figure on the right), and the level of maintenance is not sufficient for the experimental cultivation. The reservoirs for the water source are not of sufficient capacity and are depleted during the dry season. In 2020, all the trials were interrupted due to lack of water in the reservoirs, and research data could not be obtained.



**Figure 11.4 Existing Test Field**

## **(2) Mansa Research Station**

### **1) Farmer Training Facilities**

The ZARI Mansa Research Station is the main facility for technology dissemination and training in paddy rice cultivation in northern Zambia, located about 5 km southeast of the provincial capital of Luapula Province, and the MOREDeP currently underway uses the Mansa Research Station as one of its activity bases. Mount Makulu Central Research Station has a small plot of land, so the Mansa research field is suitable for practical training in cultivation, machine operation, and maintenance. However, the current Mansa research field is inadequate as a training facility because it is not equipped with a proper training site or a plot for training. In addition, there is a need to expand its functions as a base for technical cooperation project activities, as it does not have sufficient space for office functions, field machinery for training, and maintenance, inspection, and storage of post-harvest processing facilities.



**Figure 11.5 Workshop at Mansa**



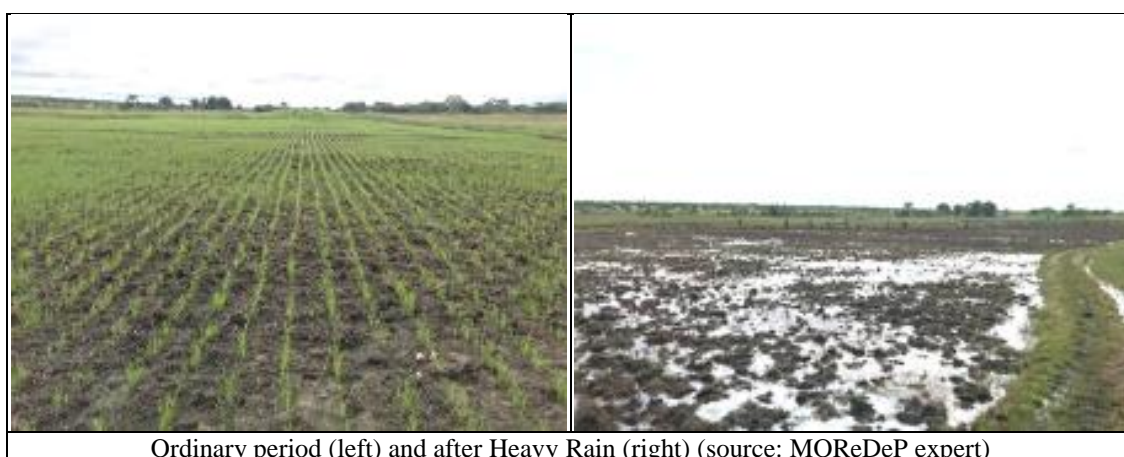
## 2) Seed production field

The Mansa Research Station is positioned as a centre for rice technology development as it is the most water resource-rich research station in the country. The seed production field (about 3 ha) at the Mansa Research Station is responsible for the production of all certified seeds in Zambia, and has been maintained with the support of technical projects, etc. However, the irrigation and drainage facilities are not sufficient, and stable seed production is affected by the unstable production base. In addition, there is not enough field area to supply certified seeds to the country, and there is not enough space for training plots where farmers can operate agricultural machinery for training purposes.



Figure 11.6 Location of Seed Production Fields

ZARI Mansa Research Station plans to produce all certified seed in Zambia starting in 2021. However, Mansa's seed production fields are located in rainfed lowland areas, which means that most of the fields become waterlogged when heavy rains occur (see figure below). In 2020, 3 ha of seed had to be reseeded due to poor germination, but the continued heavy rains made it impossible to reseed. Therefore, improving drainage of seed production fields is an urgent issue.






Ordinary period (left) and after Heavy Rain (right) (source: MOREDeP expert)

Figure 11.7 Seed Production Field

## 3) Water Resource

The reservoir, a water source facility of the seed production fields, is inadequate as a national fundamental facility because there are several leaks from the dyke and the current siphon-type intake facility does not provide stable water intake. Therefore, improvement of the water source facilities is essential for managing the cultivation of rice research facilities and for stable seed production.

	<ul style="list-style-type: none"> <li>➤ There is a small-scale water storage facility (reservoir, about 2 m high and 150 m long) established in a valley that is the main source of water for the seed production plots (3 ha) of the Mansa Research Station.</li> <li>➤ The existing reservoir was partially rehabilitated by a local contractor in 2017 with the support of a technical cooperation project.</li> <li>➤ However, the leaks from the embankment were observed at three locations, and the embankment had been breached in the past, so it is necessary to construct a new embankment.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ The embankment height is about 2 m. The picture on the left shows that the reservoir has reached its maximum storage capacity, and the water storage capacity is not sufficient.</li> <li>➤ A siphon facility was installed as a water intake facility, but the valve downstream of the embankment has also failed, and function of water intake cannot be properly carried out.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Currently, the excess water overflowing from the spillways at the centre as shown in the photo is led through an earthen canal and used in the seed production field.</li> <li>➤ The water is not available for irrigation in a timely manner, and it is necessary to improve the water intake function and develop water facilities that can manage the discharge.</li> </ul>

Reservoir spillway, taken from downstream.

Source: MOREDeP Expert

**Figure 11.8 Current Status of Water Source Facilities**

#### **4) Other Ancillary Facilities**

In addition, other improvements to access roads, alternative water sources, and a field superintendent's office will be required to implement this cooperation in conjunction with the continuation of the seed supply and technical cooperation project activities in the northern paddy rice region.





### 11.4.3 Draft Project Plan

#### (1) Proposed Project Components



##### 1) Mt. Makulu Central Research Station

**Table 11.5 Purpose, Functions and Components at Mt. Makulu Central Research Station**

<b>Purpose and functions</b>	
Expansion of the agricultural mechanization centre, seed production fields for testing and research by agricultural research station technicians, training & exhibition of field machinery and post-harvest processing facilities for extension workers nationwide.	
	
Existing workshop	Existing reservoir (left) and fields (right)
<b>Components</b>	
<b>[Facilities]</b> <ul style="list-style-type: none"> <li>• Construction of agricultural mechanization centre (laboratory and office)</li> <li>• Construction of a workshop and garage for agricultural machinery</li> <li>• Construction of drying and milling facilities</li> <li>• Construction of seed production field (1 ha) and its water source</li> </ul> <b>[Equipment]</b> <p>(1) Laboratory equipment: Agricultural machinery (1 tractor and implements, 1 harvester, 1 threshing machine) A set of equipment for laboratory</p> <p>(2) Equipment for Agricultural Mechanization Centre: Agricultural machinery (5 units each of tractor, work equipment, harvester, threshing machine, combine harvester), 1 batch dryer, 1 set of equipment for laboratory, 1 set of dryer, 1 set of dryer, 1 set of dryer Batch dryer (1 unit) Maintenance equipment, rice milling plant</p>	
<b>Contents</b>	
<ul style="list-style-type: none"> <li>• Install field machinery and rice milling facilities for testing and research of rice milling technology at Mt. Makulu Central Research Station, initial training and training for extension workers, and demonstrations for private sectors.</li> <li>• Establish a new agricultural machinery training centre.</li> <li>• Renovate aging workshops and warehouses for equipment maintenance.</li> <li>• Build a new drying/milling facility.</li> <li>• Improvement of existing research fields: Creation of tillage beds, levelling and grading of plots, and application of soil dressing to create an impermeable layer and improve soil water retention.</li> <li>• Construction of water source (wells): To secure a stable water source, a feasibility study on drilling new wells and building new small-scale reservoirs will be conducted, and facilities will be constructed if feasibility is confirmed.</li> </ul>	

## 2) Mansa Research Station

**Table 11.6 Purpose, Functions and Components at Mansa Research Station**

<b>Purpose and Functions</b>	
<p>The project aims to enhance seed production in the northern region by developing training facilities for post-harvest processing mainly for farmers and private contractors, based on the Mansa Research Station in the northern region, where paddy rice has developed. In addition, water source facilities, irrigation canals, and research field will be developed to ensure a stable production base for seed production field, and to strengthen the supply system of quality seeds to the northern region.</p>	
	
Mansa Research Station	Existing Meeting Room
<b>Components</b>	
<p><b>[Facilities]</b></p> <ul style="list-style-type: none"> <li>• Construction of a new rice training centre (training room, laboratory, and office) and accommodation building</li> <li>• Construction of a garage and workshop for agricultural machinery, a dry yard, and storage space</li> <li>• Construction of drying/milling facilities</li> <li>• Rehabilitation of water source facilities (reservoirs) and construction of irrigation canals</li> <li>• Construction of seed production plots (2 ha) and research plots (1 ha) and a field caretaker's office</li> <li>• New training plots (6 ha) and improved drainage</li> </ul> <p><b>[Equipment]</b></p> <p>(1) Laboratory equipment:</p> <ul style="list-style-type: none"> <li>Agricultural machinery (3 each of harvesters and threshers)</li> <li>1 batch dryer</li> <li>Maintenance equipment</li> <li>Rice milling plant</li> <li>Equipment and materials for inspection</li> </ul> <p>(2) Equipment for quality seed production</p> <ul style="list-style-type: none"> <li>Agricultural machinery (one each of tractor, work equipment, and small combine harvester), post-harvest processing equipment (one batch dryer, small seed sorting equipment)</li> <li>Post-harvest processing equipment (1 batch dryer, small seed sorting plant)</li> </ul>	
<b>Contents</b>	
<ul style="list-style-type: none"> <li>• Installation of agricultural machinery and rice milling facilities for farmer and private contractor training and demonstration.</li> <li>• Construction of a rice training centre for farmer training and experimentation</li> <li>• Construction of an accommodation building for researchers and technicians from the centre and other states.</li> <li>• Construction of workshops and other facilities for maintenance and inspection of introduced machinery</li> <li>• Construction of a dry yard and storage space for quality seeds produced.</li> <li>• Construction of facilities for drying and milling machinery for demonstration purposes.</li> <li>• Rehabilitation of water source facilities and irrigation canals and field maintenance to ensure a stable production foundation for seed production plots.</li> <li>• Improvement of existing seed production plots and research plots</li> <li>• Construction of new plots for training of agricultural machinery and improvement of drainage</li> </ul>	

## (2) Details of Facilities, Machinery and Equipment

The target components of the facility and equipment are shown in the table herein below

**Table 11.1 Details of Machinery and Equipment**

Name	Item	Specification
<b>【Facility】</b>		
Mount Makulu Central Research Station	Training Preparation Building	W50xD14xH4m(Used for both offices and training rooms)
	Shelter for machinery	W14xD40xH4m
	Workshop for machinery	W14xD20xH4m
	Drying and milling facility	W30xD20xH8m
	Seed farm	Agricultural land development of existing plots 1 ha
Mansa Research Station Construction	Rice Crop Training Centre	W50xD14xH4m (Used for both offices and training rooms)
	Shelter for machinery and equipment	W14xD20xH4m
	Workshop for machinery	W14xD20xH4m
	Drying yard	W12xD22xH3.5m
	Storage facility	W12xD27xH4m
	Dryer and milling unit	W30xD20xH8m
	Field caretaker's office	W4xD5m x2rooms
Mansa Research Station Irrigation facilities	Renovation of reservoir	1 set (embankment height: 3 m, embankment crest length: 150 m)
	Seed field development	Improvement of existing plots (drainage channels, infrastructure development)
	Creation of training plots	Development of training plots (drainage channels, infrastructure development)
	Drainage improvement	Excavation of drainage channels approx. 4 km
<b>【Machinery and equipment】</b>		
Mount Makulu Central Research Station	Research equipment	Tractor (1), implements (2), reaper (2), thresher (1), mechanical dryer (1), seed cleaning plant (1), set of tools and equipment
	Equipment for machinery training centre	Tractor (1), implements (5), reaper (5), thresher (5), combined harvester (5), batch type mobile dryer (1), rice processing plant (2 tons/hour), (1), set of tools and equipment, set of laboratory equipment (1)
Mansa Research Station	Equipment for training of machinery and post-harvest activity	Tractor (1), implements (1), combined harvester (1), mechanical dryer (1), seed cleaning plant (1), set of tools and equipment
	Equipment for training of seed production	Reaper (3), thresher (3), batch type mobile dryer (1), rice processing plant (1.5 tons/hour) (1), set of tools and equipment (1), set of laboratory equipment (1)

### (3) Soft Component

The soft component will plan for the following items related to the agricultural machinery to be installed

- Operation and maintenance training of agriculture machinery and post-harvest equipment
- Preparation of inspection and maintenance manuals of agriculture machinery and post-harvest equipment

### (4) Other

Short-term experts on agricultural machinery will be continuously dispatched to technical cooperation projects linked to this cooperation, and training will be conducted and upgraded in step wise stages at the Agricultural Machinery Training Centre with the introduced equipment.

### (5) Project Cost Estimation

The total project cost is estimated to be 1,570 million yen.

**Table 11.7 Proposed Estimated Project Cost of CARD Grant Aid in Zambia**

	Item	Amount (million JPY)
1)	Construction costs	880
2)	Cost for equipment	350
3)	Soft component	20
4)	Costs for detailed design and supervision	240
5)	Contingency	80
	Total	1,570

### (6) Expected Outputs

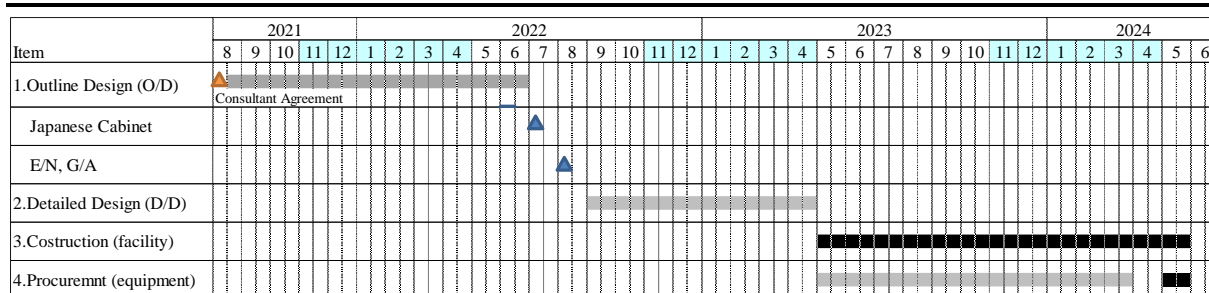
By linking with the technical cooperation project using the facilities constructed under this project, it is expected to develop human resources related to agricultural mechanization, and to stabilize and increase the quality seed production. The number of training participants and the production of quality seeds shown in the table herein below will serve as quantitative indicators.

**Table 11.8 Indicators for Quantitative Evaluation of CARD Grant Aid in Zambia**

Indicator	Baseline value (actual value in 2019)	Target value(202X) (3 years after project completion)	Remark
Total number of trainees (persons/year)	To be confirmed		
Yield of quality seed (pre-basic and basic seed) (ton/year)			

### (7) Tentative Schedule

The overall schedule is shown in the figure below, and is expected to take approximately 22 months from the Exchange of Note (E/N) to the completion of the project.



**Figure 11.9 Tentative Overall Schedule (Zambia)**

## **(8) Obligation of Recipient Country**

- Assignment of a person in charge during project implementation
- Securing the site for the project
- Installation of commercial power supply to the facility
- Maintenance of facilities and equipment after construction

## **(9) Points to Note**

The following are challenges and points to be considered in the future implementation of the preparatory survey for cooperation and the proposed cooperation program.

- Capacity building for the operation and maintenance of farm machinery and research equipment should be considered; in the short term appropriate advice through soft components of the grant aid program; and in the long term an expert dispatch through technical cooperation projects.
- The effect of the rainy season needs to be taken into account when considering the schedule of civil works.

## **Chapter 12 Cameroon**

### **12.1 Outline of Cameroon**

#### **12.1.1 Natural Conditions**

Cameroon covers an area of 475,000 km<sup>2</sup>. It is bordered by Nigeria to the west, Equatorial Guinea, Gabon, and Republic of the Congo to the south & near to the equator, Chad and Central Africa to the west, and the Sahara Desert to the north. The Cameroon is an undulating country and divided into four ecological zones and characterized by two major climatic zones. The climate is diverse in nature, ranging from equatorial to tropical and to desert climates in the northernmost part of the country. Major cultivated crops include potatoes, tomatoes, rice, yams, maize, and cassava. Crop production begins during the rainy season. Average monthly temperatures vary from about 15°C in the highlands to about 27°C in the lowlands, and soil fertility is high.

#### **12.1.2 Social & Economic Condition**

Despite positive growth of economy over the past two decades, poverty reduction and improvements in social indicators such as health have not progressed, and regional disparities are widening. The total population is approximately 24 million (World Bank, 2016) and consists of more than 280 diverse ethnic groups. The English-speaking population, mainly concentrated in the Northwestern and Southwestern provinces, accounts for just under 20% of the total population. The population growth rate is 2.6% (CIA, 2013), with 42.7% of the population under 15 years old (World Bank, 2016). The urban area, where 55.5% of the total population resides, has a high population growth rate of 3.6%. The birth rate is also high (4.5 births, 2019), with large regional disparities, including more than 6 births in the Far North, Northern, and Western Provinces. The unemployment rate is 42.42% (2017, National Bureau of Statistics), but is not considered to reflect the actual situation.

The underemployment rate has worsened to 75.8% (2005), 71.1% (2007), and 79.0% (2014) with the passage of time, although the goal was to reduce it to below 50% by 2020. Since 90% of employment is said to be falls under the informal sector, the creation of stable employment is a challenge.<sup>187</sup>

#### **12.1.3 Agricultural Condition**

In Cameroon, more than 70% of the population is engaged in the agricultural sector, which contributes significantly to the country's economy. Due to its agro-ecological diversity, Cameroon has a potential for large agricultural productivity that can contribute to a population of more than 24 million people. On the other hand, since the early 1990s, the country has been importing large quantities of food products including rice, corn, onions, tomatoes, milk, chicken, and so on. This has reduced the production capacity of domestic agricultural products and has also forced many producers out of farming activities as a result of unfair competition with imported agricultural products.

Lack of government subsidies, the negative impact of climate change on current and future agriculture, and other challenges abound. The area of farmland per household is small, ranging from 0.5 to 2 ha. Generally, traditional farming methods and coarse production management are used. Fertilizer use is low, labour input is high, and awareness of soil conservation is low. In addition, agricultural infrastructure is inadequately developed. Farmers rely on hand tools and traditional techniques.<sup>188</sup>

---

<sup>187</sup> JICA Country Analysis Paper for the Republic of Cameroon, May 2020

<sup>188</sup> Proposed Strategies to Sustain Productivity, 2016

---

## **12.2 Outline of the Agricultural Sector**

### **12.2.1 Laws, Policies and Development Plans Relating to the Agricultural Sector**

The Government of Cameroon formulated its long-term development strategy "CAMEROUN VISION 2035" in 2009 with the aim of becoming an emerging country by 2035, and set the following goals: (1) poverty reduction (target poverty rate of 10%); (2) entry into middle-income countries (target growth rate of 9.9%); (3) industrial development (target ratio of secondary industry to GDP of 28.3%); and (4) strengthening of national integration and democratic processes. The "Strategic Document for Employment and Growth 2010-2020" (Document de Strategie pour la Croissance et L'Emploi: DSCE) was formulated as the first 10-year development plan for the realization of CAMEROUN VISION 2035. DSCE sets forth the following goals and priority policies: (1) Achieve an average growth rate of 5.5% over the same period; (2) Reduce the underemployment rate from 75.8% to below 50%; (3) Improve the poverty rate from 39.9% (2007) to 28.7%; and (4) "growth through infrastructure development and modernization of the productive sector," "employment promotion through improving the quality of the labor force and activating the labor market," and "strengthening governance and public sector management" with the goal of achieving the MDGs/SDGs.<sup>189</sup>

In line with the DSCE, the government has developed a National Rice Development Strategy (Stratégie de Développement du Secteur Rural: SDSR, 2010-2020) to promote modern, sustainable, and competitive agriculture based on small, family farmers. National Agricultural Investment Plan (Plan National d'Investissement Agricole: PNIA 2014-2020) is designed to implement these strategies and serves as a framework for domestic and foreign investment in agricultural sector development. The PNIA 2014-2020 includes a number of key elements.<sup>190</sup>

The PNIA 2014-2020 includes four priority action plans: (1) developing production chains and improving food and nutrition security; (2) modernizing rural infrastructure and improving access to financing; (3) sustainable natural resource management and resource value addition; and (4) governance and institutional development. The Cameroonian government has made the promotion of rice cultivation a priority policy in the DSCE from the perspective of eliminating dependence on rice imports, creating jobs, and developing the domestic economy. In addition, NRDS has been developed, as the country is positioned as the first group of CARD.<sup>191</sup>

### **12.2.2 Status of NRDS Implementation**

According to government officials, the introduction of high-yielding rice varieties has led to improvements in the seed production sector. Through various projects, human resource development in seed selection and growing techniques was also undertaken. This capacity building was not limited to seed production, but also included dissemination of good practices to extension officers, farmers, and planners of rice development, according to the report.

On the other hand, little progress was made in agricultural mechanization, as priority was given to improving seed production and the development of mechanization strategies was put on the back burner. In addition, in 2018, the NRDS focal points and task forces have just finished formulating the mechanization strategy, and no specific projects on mechanization have yet been implemented. Progress on the development of infrastructure for irrigation and water management has not been good due to the large amount of investment required.<sup>192</sup>

### **12.2.3 Analysis of Rice Food Value Chains**

The main actors in the rice value chain in Ndop, Cameroon's main rice-producing region, are input

---

<sup>189</sup> JICA Country Analysis Paper, May 2020

<sup>190</sup> Republic of Cameroon Country Strategic Opportunities Programme 2019-2024, IFAD, Jul. 2019

<sup>191</sup> JICA Country Analysis Paper, May 2020

<sup>192</sup> Coalition for African Rice Development (CARD) Final Review Assessment, Mar 2018

marketers, rice producers, parboiled rice producers, rice millers, and rice marketers. The local rice value chain is very simple, but consists of many actors. The local rice market channel is based on the interventions and activities of middlemen. There are two channels for distribution and marketing of local rice within and outside the Ndop, and for direct sales of local rice to consumers within the Ndop. The main buyers of the local rice paddy are wholesalers and rice millers who work with collectors. The constraints of local rice value chain include low prices for rice paddy, limited access to credit, labor shortages, unstable electricity supply, and high fertilizer price and marketing costs. Challenges to such value chain may include strengthening market information and extension systems, improving yield and production efficiency through the use of improved agricultural inputs, and capacity building on rice production and marketing technologies. Most local rice farmers do not have the technical education necessary to produce quality rice to generate sufficient income. Local rice farmers still grow traditional varieties of rice in their field, and excessive use of pesticides is also observed. Most rice farmers use external inputs such as fertilizers, seeds, and herbicides, which are not cost-effective and leave much room for improvement. Access to extension services needs to be improved, and technology and knowledge on production and post-harvesting of rice need to be improved. If these farmers learn proper post-harvesting skills and proper use of compost, their profits from local rice production could be further increased. The rice milling industry in Ndop is a cottage industry, with many small-scale local rice millers that are inefficient in processing large volumes of rice paddy. They need to grow from small-scale to medium-scale and large-scale rice milling factory to improve milled rice quality, reduce operation costs, and improve profits. To this end, it is necessary to provide training in business management for the owner of the local rice milling factories and develop a suitable financing system for them.<sup>193</sup>

#### 12.2.4 Status of Support for the Rice Sector

The table herein below shows the status of support for the rice sector in the country.

**Table 12.1 The status of support for the rice sector in the country**

Name of the Project	Donor	Duration	Modality	Budget	Area of Intervention (Sub-Sector)	Area of Intervention (Geographic)	Outputs/ Activities
Project for Mechanized Complex Dept. for Irrigated Rice Cultivation of Centre Region in CMR	Korea rural Community Coop	2011- 2014	Grant		Quality Improvement		Training on the mechanization on rice cultivation is provided. Equipment for mechanization is disseminated
Upland Rice Development of the Tropical Forest Zone in Cameroon	JICA	2011-2016	Technical cooperation	320 million JPY	Technology, Dissemination, Quality Improvement	Central, East and South region	Upland rice varieties and cultivation techniques for extension are identified by experiments in the project farm. Various layers of government officers and extension officers for promotion of upland rice cultivation are trained

<sup>193</sup> Marketing and Profitability Analysis of the Rice Value Chain in Ndop Subdivision, Sep. 2020



Name of the Project	Donor	Duration	Modality	Budget	Area of Intervention (Sub-Sector)	Area of Intervention (Geographic)	Outputs/ Activities
							Upland rice cultivation is promoted mainly in the pilot areas of the 3 regions through dissemination activities by key farmers, extension officers and staff of local office of MINADER. Post-harvest techniques at the farm level are improved in the advanced pilot areas.
Enhancement of Nat Agriculture Extension Sces for Nat Food Security	KAFACI/Rural DVt Administ ration of Korea	2013-2016	Grant		Technology, Dissemination, Quality Improvement		Training on rice technology cultivation and extension services are provided
Project for the Upland Rice and Irrigation Rice Development	JICA	2016-2021	Technical cooperation	950 million USD		Central, East, South and Northern west regions	The production of high quality rice seed increased in the subject area. Farmers that grow and consume dry-land rice increased in the subject area: central, southern, and eastern state. The irrigated hydroponics technology of farmers improved in UNVDA controlled irrigation development area. Harvesting of the rice for marketing and post-harvest processing technology will improve in UNVDA's controlled irrigation development area.
Component of the Agricultural Competitiveness Project (PACA) : Study on the	WB	Completed	Loan		Technology, Dissemination, Quality Improvement		Agricultural mechanization is adapted to different crops

Name of the Project	Donor	Duration	Modality	Budget	Area of Intervention (Sub-Sector)	Area of Intervention (Geographic)	Outputs/ Activities
Suitability of Agricultural Equipment for Types of Crops and Agro-Ecological Zones							
Training Center on Mechanization	Korea rural Community Corp	Negotiation phase	Technical cooperation		Quality Improvement		Improvement of productivity, improvement of post-harvest techniques

### 12.2.5 Implementation Structure of Rice Sector

The Ministry of Agriculture and Rural Development (Ministere de l'Agriculture et du Développement Rural: MINADER) is the agency responsible for planning the government-related operations and agricultural development programs. MINADER is also the responsible agency for the NRDS, and the head of the Program and Project Unit in MINADER plays a central role in the implementation of the NRDS as the focal point of the NRDS. The ministries responsible for related research, economics, trade, SME business and industry are involved and cooperate in the implementation of the NRDS within the framework of the task force.

## 12.3 Current Status and Issues in the Agricultural Sector

### 12.3.1 Irrigation Facility

Various irrigation projects are being developed in Cameroon, but there is no clear definition of the project scale and standard of irrigation projects. In terms of scale, the projects can be divided into large-scale, medium-scale, and small-scale irrigation projects. Société d'Expansion et de Modernisation de la Riziculture de Yagoua (SEMRY) is a large-scale irrigation project in the Far North Province, and SEMRY-1, SEMRY-2, and LAGDO-1 are the largest irrigation projects in the country. SEMRY-1, SEMRY-2 and LAGDO-1 are the seminal rice cropping areas. SEMRY II and LAGDO-1 have a water storage capacity of 360 million m<sup>3</sup> at the Maga Dam and 400 million m<sup>3</sup> at the Lagdo Dam, respectively, ensuring adequate water supply. SEMRY-1 has international agreements that impose restrictions on the use of water pumps for irrigation.

On the other hand, the production area for wet-season rice cropping with supplemental irrigation (one-season rice cropping) includes the Upper Nun Valley Development Authority (UNVDA) and the Mont Mbappit Rural Development Project (Projet de Développement Rural du Mont Mbappit: PDRM). There are no large dams in these areas, and irrigation water is used through small-scale dams or intake works on rivers without large dams. In total, about 20,000 small farmers cultivate rice in these large-scale schemes.

Regarding the medium scale schemes, there is a group of irrigation projects that have been underway for last 10 years. Some are dedicated to rice and maize production, while others are oriented toward diversification, combining cereal crops and vegetables. These medium-scale schemes are mainly located in the Northwest province and cover less than 1,000 ha each, but have a large regional impact on the local economy.

Smaller schemes include small-scale schemes using small rivers in the region managed by MINADER. These schemes are very small in scale (5-10 ha), but there are many of them. Many of such schemes have vegetable production, which supports the local economy. This type of scheme is particularly

common in the suburbs of large cities such as Douala and Yaounde.

UNVDA, one of the large-scale irrigation schemes in the North West, has a general irrigation development plan for the district level, but there is no detailed irrigation development plan at the central level and also no design standards exist for irrigation facilities. In addition, there are no laws pertaining to the water rights or water use fees. Furthermore, there is no system in place for observing meteorological data such as rainfall and water source flow rates, and even when data do exist, there are many cases where the reliability of the data bears the question marks. For example, when proceeding with an irrigation project, only a construction contract and a basic canal cross-sectional map are prepared for the project. Thus, it is difficult to say that the project policies and related systems necessary to promote irrigation projects are sufficiently in place. In addition, the quality of the construction work to be carried out by local contractors must also be taken into consideration. In many cases, small local contractors tend to receive orders for projects ordered by UNVDA, but the conditions of concrete construction are not good. In fact, the canal in the Upper Bamunka area in Ndop was severely damaged in several places within a few years of installation. In addition, most of the contractors are not well capitalized, and few of the small gold contractors have their own construction equipment, which tends to delay the construction process.

### **12.3.2 Agricultural Mechanization**

In Cameroon, service cattle are still the most commonly used power source for agricultural work. Regardless of crop type, hand tools account for 89.8% of the basic farming tools used by farmers. In the western region of Cameroon, the use of service cattle is less than 1%, while in the north the percentage is higher. Only 6.25% of farmers have had the opportunity to utilize any kind of farm machinery, and modern farm machinery and equipment have not been fully introduced at the national level. The majority of farmers do not own or share or borrow modern agricultural machinery. In terms of tractor penetration per 1,000 ha, Cameroon not only lags behind developed countries, but also behind all developing countries in the world.

Farmers who own agricultural machinery use it primarily for tillage, soil preparation, seeding, and harvesting. In addition, more than 70% of farmers are interested in installing machinery and equipment that not only serve the purpose of increasing production, but also contribute to improving the quality of the final product. Examples include machinery and dryers for harvesting cocoa, cassava processing machines, corn dryers, and sorghum washing equipment.

The main challenge faced by farmers in agricultural mechanization is the lack of financial institutions to provide the necessary financing for agricultural production activities. Second, although hand tools are used by farmers throughout the country, such tools are very simple and not appropriate to perform the function. Appropriate farm tools are not always used, a factor that hinders the improvement of crop productivity. Another major challenge is the lack of access to spare parts for farm machinery. Lack of spare parts can lead to equipment becoming unusable and abandoned after the first year of use. Demand for critical agricultural equipment such as tractors, tillers, combines, irrigation pumps, and diesel engines is on the rise, but it is very difficult, especially for small farmers, to acquire agricultural equipment without the necessary financing.<sup>194</sup>

### **12.3.3 Agricultural Inputs**

#### **(1) Fertilizers**

One of MINADER's departments, the Directorate for Quality Control and Regulation of Materials and Agricultural Products (Direction de la Reglementation, du Controle de Qualité des Intrants et Produits Agricoles: DRCQ), is responsible for planning the distribution of agricultural production materials such

---

<sup>194</sup> Insight into Agricultural Mechanization in Cameroon: Case of Farm Operators, Users of Agricultural Equipment and Machines, Jan, 2020

---

as pesticides and fertilizers. According to the NRDS, financing for fertilizer purchases is a challenge for rice farmers partly due to insufficient government financial support. Many farmers borrow fertilizer in advance on the condition that they will pay three bags of harvested products for one bag of fertilizer.

## **(2) Seeds**

As in the case of fertilizers, the DRCQ is also responsible for certification, registration, and quality control of seeds. The Ministry's Direction du Développement de l'Agriculture (DDA) is responsible for the development of seed and seed production. The Institut de Recherche Agricole pour le Développement (IRAD) is a national agricultural research institute under the Ministry of Science, Technology and Innovation, and it is responsible for the production of original seeds, including rice. Cameroon's NRDS has set the goal of increasing rice production and achieving self-sufficiency, and the promotion of certified rice seed production has been identified as one of the strategic targets to achieve its goal. The main rice-producing regions in the country are the Far North province, Northwest province, and Northern provinces. The SEMRY in the Far North province, UNVDA in the Northwest province, and the M'bo Plains Rice Development Corporation (Mission pour le Développement de la Riziculture dans la plaine des M'bo: MIDERIM, Société de Développement de la Riziculture de la M'bo) in the West province are the public corporations in charge of produces developed through irrigation, certified seed using breeders seed obtained from IRAD and sells it to local rice farmers.

### **12.3.4 Status of Implementation of Grant Assistance for Underprivileged Farmers**

2KR grant program in the Cameroon have been very limited in terms of both frequency and amount compared to other African countries. It has been granted only in FY1980, FY1990, FY1991, and FY1992, and has not been granted since afterward. Partly due to the human rights violations during the 1992 presidential election, the World Bank, the African Development Bank, and the French Development Fund have suspended their financial assistance since 1993. Japan, recognizing the problems of opaqueness of national financial management, has also limited its assistance to only basic livelihood sectors such as water supply and education, and no 2KR assistance has been provided since then. The table herein below shows the results of 2KR assistance provided to date.

**Table 12.2 2KR grant program to Cameroon**

<b>Year</b>	<b>1980</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>Total</b>
E/N (100 million Yen)	2.50	2.00	2.50	2.00	9.00
Procured item	Unknown	Unknown	Unknown	Unknown	-

Source : Ministry of Foreign Affairs of Japan ODA Country Data Book

## **12.4 Proposed Project Plan: Project for Enhancement of Rice Value Chain**

### **12.4.1 Overview of the survey area**

#### **(1) Project Outline**

- Country Name: Republic of Cameroon
- Project Site: Northwestern and Central Provinces
- Project Title: The Project for Enhancement of Rice Value Chain
- Project Summary: The project will provide UNVDA and the Centre d'études et d'expérimentation du machinisme agricole (CENEEMA) with necessary equipment and materials to improve production efficiency, distribution system, rice production environment, and post-harvesting facilities, which are necessary to increase local rice production. The project is to provide necessary equipment and materials to the UNVDA and the CENEEMA. The total estimated project cost is approximately 1,160 million yen.
- Background of Project Planning: The NRDS aimed to increase rice production from 100,000 tonnes to about 970,000 tonnes, while a production increase target of about 700,000 tonnes was aimed to

be achieved by expanding upland rice production by about 22 times or more. JICA implemented Upland Rice Development of the tropical Forest zone in Cameroon (PRODERiP) with Ministry of Agriculture and Rural Development (MINADER) as the implementing agency and carried out activities from May 2011 to May 2016 in relation to the introduction of improved upland rice varieties, preparation of technical manuals, training of extension officers, establishment of upland rice seed production systems and introduction of post-harvest processing technologies, which contributed to the achievement of these results. However, the number of farmers continuously engaged in upland rice cultivation did not increase as much as expected at first, and it appeared the need to develop and disseminate cultivation techniques adapted to the cultivation environment and farming pattern, as well as the production and distribution of quality seeds, in order to promote the establishment of upland rice cultivation. Therefore, the Project for the upland rice and irrigation rice development (PRODERIP) was launched as a successor project, and activities are ongoing to enhance irrigated rice cultivation for stable high yields in addition to upland rice cultivation, to improve rice quality to competitive levels with imported rice, and to improve the profitability of rice production, in order to increase rice self-sufficiency. A series of technical cooperation projects, based at the UNVDA, have implemented capacity building in technical aspects, such as extension officers, to increase the production of certified seeds and other quality seeds. However, it is essential for further strengthening to prioritise the improvement of production efficiency, distribution and production environment and post-harvest management, which can be the basis for producing and supplying domestic rice that is more competitive than imported rice, to the CENEEMA, which has a partnership with UNVDA and PRODERIP. Therefore, a proposed project plan was considered for public institutions in cooperation with PRODERIP, based on the scale envisaged, taking into account their jurisdiction and their performance.

## **(2) Project Site**

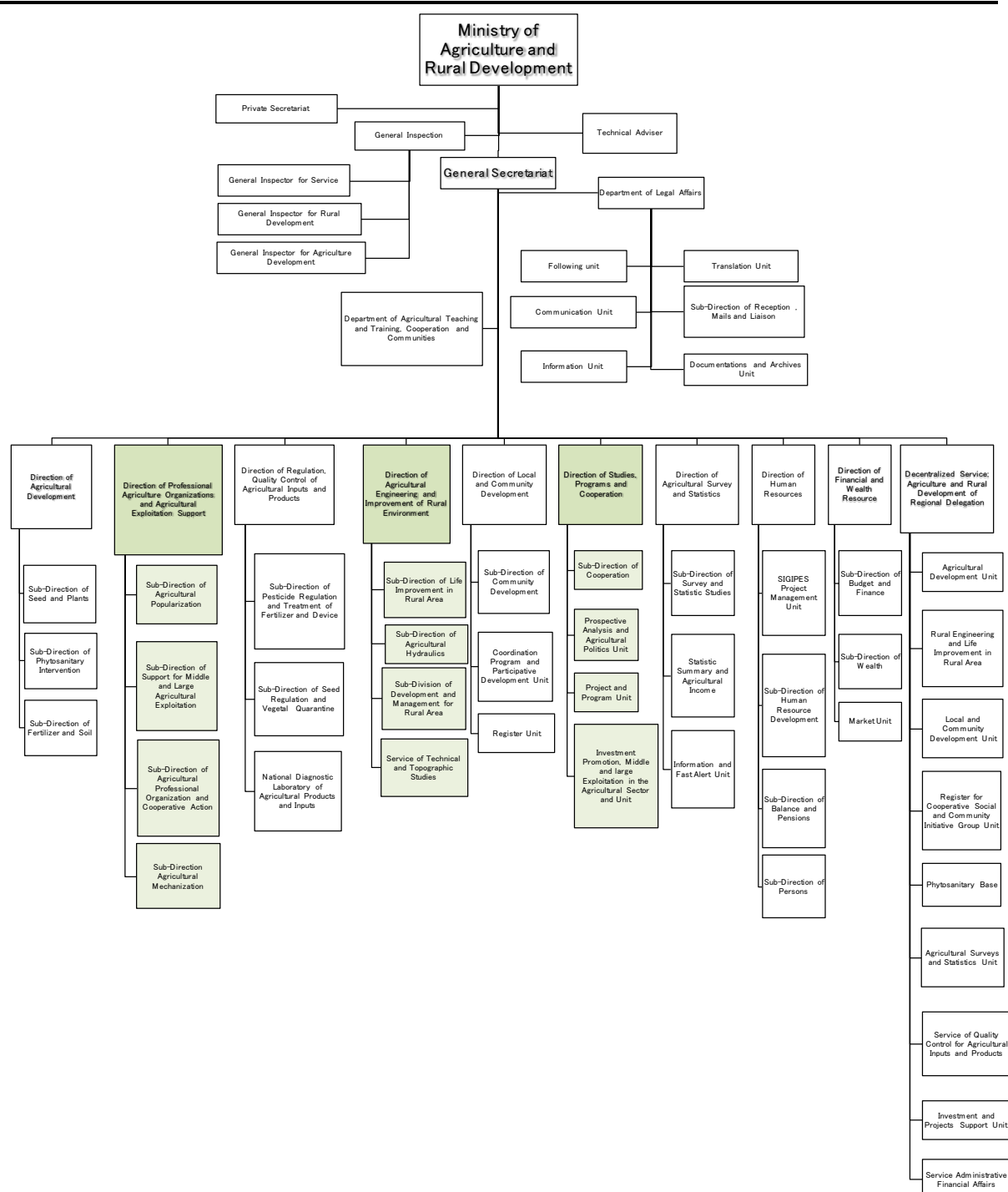
The target project areas are the Northwestern province where UNVDA is located and the Central province where CENEEMA is located.

## **(3) Implementation/Responsible Agency**

The project implementing agency is MINADER. UNVDA and CENEEMA come under the Ministry of Agriculture and Rural Development, and the Ministry will be responsible for the operation and maintenance of the facilities and equipment provided. In addition, the maintenance teams assigned to both organizations will be responsible for the practical operation and maintenance of the equipment and materials, details of which will be confirmed in the preparatory survey in the future.

### **1) MINADER**

The organization chart of MINADER is shown herein below. Among all the Ministry's departments, the Department of Research, Planning and Cooperation (Direction des Etudes, des Programmes et de la Coopération: DEPC) is envisioned as the main counterpart for this project. DEPC is responsible for conducting agriculture-related surveys, planning and coordinating agricultural development programs, and preparing investment plans and promoting investment in the agricultural sector.

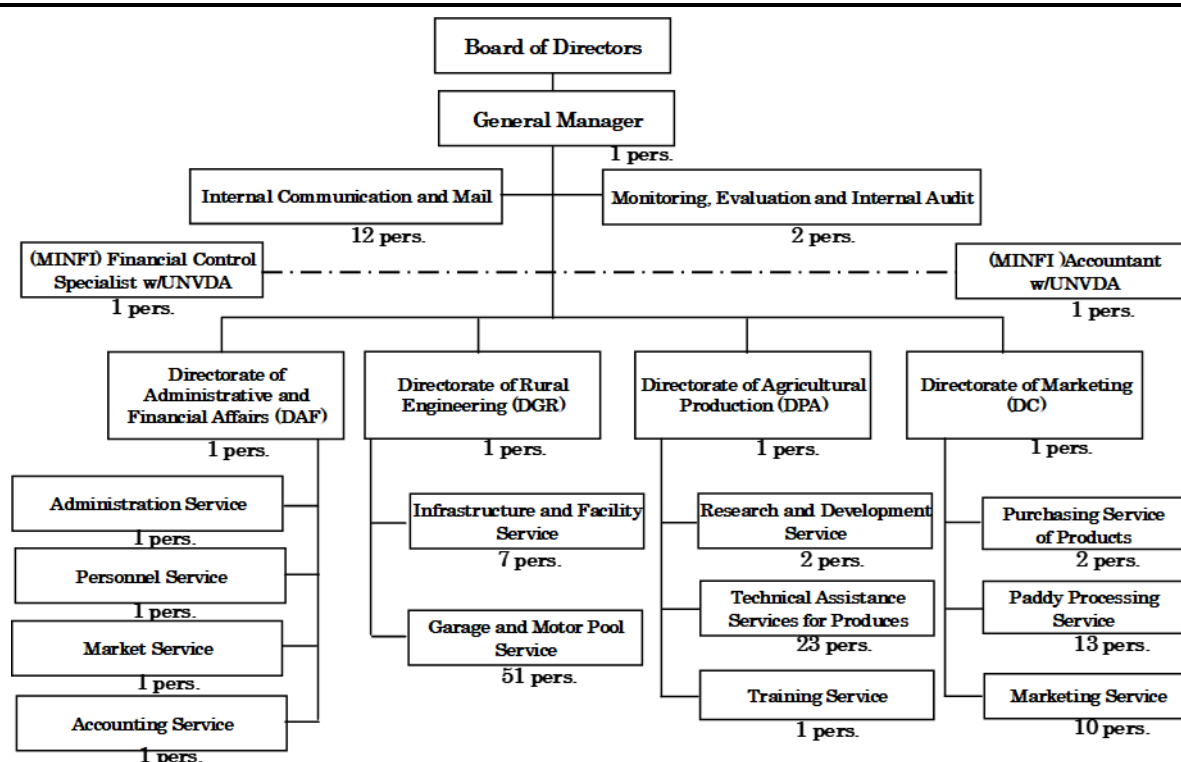


Source : Preparatory Survey of Rural Infrastructure Improvement Project in Cameroon (Final Report) JICA 2017

**Figure 12.1 Organization chart of MINADER**

## 2) UNVDA

UNVDA is an independent administrative organization under MINADER. Based in Ndop, Ngoketunjia department, Northwestern province, UNVDA was established to contribute to the development of irrigated rice cultivation and the promotion of local rice production in the Nun Valley watershed. The total number of staff is 144, of which 7 belong to the Infrastructure and Facilities Division, 51 to the Garage and Vehicle Management Division, and 13 to the Post-Harvest Processing Division (as of 2014).



Source: UNVDA

Figure 12.2 Organization chart of UNVDA

### 3) CENEEMA

CENEEMA is a state-owned company established in 1974 that is responsible for promoting agricultural mechanization in Cameroon. The centre provides agricultural machinery services mainly to small farmers with less than 10 ha. The provided machinery services range from new field development, field preparation such as plowing, seeding, harvesting, and farm road maintenance. In addition to providing machinery services, the centre also provides training in the operation and maintenance of machinery, inspects machinery, and develops agricultural machinery. The centre has four branch offices i.e. at Yaunde in the Central province, Garoua in the Northern province, Bambui in the Northwestern province, and at Nanga-Eboko in the Central province.

Table 12.3 Rice cultivation-related equipment owned by CENEEMA

Category No.	Category label	List of gear	Mark
Machinery for operation	Small craft - A	Two-axle wheeled tractors ≤60 hp. One-axle wheeled tractor (Cultivator) [12 to 15 hp]	SONALIKA, DONFENG, CHANGCHAI, YANGDONG
	Small craft - B	Tractors with two axles 75, 90 and 110 hp	SONALIKA, CASE
Opening machinery and maintenance of escape routes for rice products	Clearing gear	Tracked tractor or bulldozer	Liebherr, Komatsu
	Loading equipment	Loading shovels	Volvo, JCB
	Levelling gear	Niveleuses	Komatsu, SDLG
	Compaction machine	Compactors	JCB, HAMM
	Transport unit	Dump trucks, Crane trucks, Trailers	Volvo, Renault
	Non-production	Tank door	Volvo, Renault

## 12.4.2 Current Status and Issues

### (1) UNVDA

The core of the UNVDA administered area is the Upper Nun Valley Plain, commonly known as the Ndop Plain, with an elevation of 1,020 to 1,200 meters, an annual rainfall of 1,500 mm to 2,000 mm, and an average annual temperature of 21.3 degrees Celsius. Since becoming a development corporation in 1978 (Presidential Decree No 78/157 of 11/05/78), the cultivated area of rice in each year in the District, whose data is managed by UNVDA, has increased from 824 ha in 1978 to 3,992 ha in 2018 (the largest ever), however, the cultivated area in 2020 was of 3,602 ha. The UNVDA estimates the developable area of the managed area at 15,000 ha.

The main reason for the decrease in cultivated area since 2018 is the temporary abandonment of cultivation by farmers due to the deteriorating security situation in the area. The area is inhabited by English-speaking residents, and there have been occurrence of a number of small-scale incidents instigated by separatists since 2018. As of September 2021, the designated risk level by the Japanese Ministry of Foreign Affairs is of Level 3, which is a major barrier to undertake the activities of the CARD-related JICA technical cooperation project currently underway.

The following is an overview of the agricultural infrastructure in the areas developed by UNVDA since its establishment. The maintenance and management of these infrastructures, as well as their expansion and improvement as needed, is an important part of UNVDA's work.

**Table 12.4 Overview of agriculture-related infrastructure developed by UNVDA**

Items	Number
Dams and Reservoirs	14
Diversion Works	49
Irrigation and Drainage Canals	220 km
Farm Roads	270 km
Bridges	25
Box Culverts	152

UNVDA has a rice milling plant (milling capacity: 3.5 t/h). Until the beginning of 2000, the plant was milling approximately 30,000 tons of paddy rice produced in the region annually. However, due to the aging of the facility (made in Germany), the milling capacity is now declining significantly. The equipment used in agricultural facilities in the district and agricultural machinery services in the field are maintained and managed in a workshop attached to UNVDA. The condition of the owned equipment and machinery is as follows.





**Table 12.5 List of construction and agricultural equipment owned by UNVDA (As of 2021)**

SN	Equipment/Vehicle/ Machine	Reference	Type	Present State	Observations
<b>Heavy Duty- Civil Engineering Equipment</b>					
01	CAT. 140 K	SKL00348	Grader	Good	
02	CAT. 140 B	61S01202	Grader	Good	
03	CAT 140 H		Grader	Good	
04	CAT. 950 H	JAD00130	Wheel LOADER	Good	
05	CAT. CS 56	FC00635	(Vibration Type)	Good	
06	DYNAPAC		(Wheel Compactor)	Bad	
07	BOMAC	094903051076/0413	(Hand Compactor)	Bad	
08	CAT. 320 DL	KGF04572	Excavator	Good	
09	SHANTUI SD 16	SD16AA124987	Bulldozer	Good	
10	SHANTUI SD 16		Bulldozer	Bad	
11	CAT. D4 E	88X0486	Bulldozer	Bad	
12	CAT. D5 B	43X0453	Bulldozer	Bad	
13	CAT. D5 B	43X00684	Bulldozer	Good	



SN	Equipment/Vehicle/ Machine	Reference	Type	Present State	Observations
14	CAT. D5 B	13X00774	Bulldozer	Bad	
15	CAT. D5 B	43X00722	Bulldozer	Bad	
16	ALBARET	841B208	Compactor	Bad	
17	CHAMPION 720 D	11-111-9990	Grader	Scrap	
18	CHAMPION 720 D	11-100-0823	Grader	Bad	
19	POCLAIN -60		Excavator	Scrap	
20	POCLAIN -60		Excavator	Bad	
<b>Heavy Vehicles (Trucks)</b>					
01	NW 865 AG	WJMS3TSS60C227659	Tipper(Iveco)	Bad	
02	LT 875 IF		Tipper (Mercedes)	Good	
03	NW 866 AG	WJMS3TSS60C227554	Tipper(Iveco)	Good	
04	NW 1567 A	34601315218533	Tipper(Mercedes)	Bad	
05	NW 4612 A	34601315269717	Tipper(Mercedes)	Bad	
06	NW TR 241AA	WDB9341611L749875	Tractor	Good	
07	NW 394 AM	ZCFA1RF0202592906	Van(Iveco)	Bad	
08	NW 564 AM	WJMS3TSS60C247124	Van(Iveco)	Good	
09	NW 314 N	ML100146	Lorry	Bad	
10	NW 332 R	34300115149541	Lorry	Bad	
<b>Light Vehicles</b>					
01	NW 0956 D	JTFDE626100081301	Toyota Pick-Up	Bad	
02	NW 0957 D	JTFDE626500080846	Toyota Pick-Up	Bad	
03	NW 864 AF	AHTFK22G303044618	Toyota Pick-Up	Good	
04	NW640 AJ	AHTFK22G903054800	Toyota Pick-Up	Bad	
05	NW641 AJ	AHTFK22G703055315	Toyota Pick-Up	Good	
06	NW642 AJ	AHTDK22G600007278	Toyota Pick-Up	Bad	
07	NW 663 AL	AHTFK22G503062019	Toyota Pick-Up	Bad	Vandalized
08	NW 368 AO	AHTFK22G103071221	Toyota Pick-Up	Good	
09	NW 175 AP	AHTFK22G803069997	Toyota Pick-Up	Good	
10	NW 714 AA	JTEBK29J500024137	Toyota Prado	Bad	Vandalized
11	NW 719 AT	JTEBH9FJ905071377	Toyota Prado	Good	
12	NW 010 AU	JS3TD54V0F4100641	Suzuki Vitara	Good	
<b>Trailer (Attachments)</b>					
01	LOW LOADER		Remorque	Good	
02	NW 017 RE	20R2SPIEGO	Remorque Routiere	Good	
03	LTSR 894 AH	TYSRB201000012	Semi-Remorque	Good	
04	LTSR 892 AH	TYSRB201000011	Semi-Remorque	Good	
<b>Light Equipment (Agricultural Machines)</b>					
01	MF 440 -01	BVY10004	Tractor	Good	
02	MF 440-02	BVY10005	Tractor	Bad	Spare parts for maintenance 2017
03	MF 440 -03	KAC002769	Tractor	Bad	
04	MF 1715	X51B22AA413A	Tractor	Good	By PACA
05	MF 1114	M025542	Tractor	Bad	Spare parts for maintenance 2017
06	MF 440-04	CAC002590	Tractor	Bad	
07	MF 385 -05	G84250/04/12	Tractor	Bad	
08	MF 440-06	ECC009346	Tractor	Good	
09	SONALIKA -DI 60	GZDDC204840/3	Tractor	Good	
10	SONALIKA- DI 60	GZBDC200047/3	Tractor	Bad	
11	SONALIKA- DI 75	FZKDC203386/3	Tractor	Bad	
12	SONALIKA-DI 75	GZKDC201182/3	Tractor	Bad	
13	SONALIKA- DI 75	AZKDC197631/3	Tractor	Bad	
14	SONALIKA-DI 75	EZKDC210856/3	Tractor	Bad	
15	SONALIKA- DI 75	GZKDC201355/3	Tractor	Bad	
16	SONALIKA-DI 90	EZLDC2099227/3	Tractor	Good	
17	SONALIKA- DI 90	EZLDC209548/3	Tractor	Bad	
18	SONALIKA- DI 90	EZLDC10917/3	Tractor	Bad	
19	SONALIKA	GZBDC200789/3	Combine Harvester	Good	
07	MF 210	1808	Tractor	Bad	
08	MF 290	K255030	Tractor	Scrap	
09	MF 290	391779	Tractor	Scrap	
10	MF 290	J259063	Tractor	Scrap	
11	MF 290	723498	Tractor	Scrap	
12	MF 290	391759	Tractor	Scrap	

SN	Equipment/Vehicle/ Machine	Reference	Type	Present State	Observations
13	MF 390	U50267	Tractor	Scrap	
10	MCCOMICK	G165834	Tractor	Good	By PACA

	
Irrigated rice plots and farm road managed by UNVDA	Building of the rice milling plant managed by UNVDA
	
Mortar grader used by UNVDA to maintain farm roads in the controlled area	Garage for agricultural machineries in UNVDA

Source: UNVDA

**Figure 12.3 Irrigated rice field and equipment managed by UNVDA**

Based on the above, the following are the main issues related to facilities, infrastructure, and equipment that should be considered when planning the grant aid projects.

Improvement of agricultural production-related infrastructure and maintenance equipment:

Improvement of production efficiency and distribution environment:

Improvement of post-harvest handling capacity:

Improvement of irrigation and drainage facilities (rehabilitation of existing facilities and construction of new facilities) / Plotting and levelling of irrigation rice fields / Improvement of equipment for maintenance and management of facilities

Promotion of the use of agricultural machinery such as tillers in local rice production activities / Maintenance of farm roads

Renovation of existing old rice milling factories / New construction of small-scale and medium-scale rice milling factories

In developing a grant aid project, it is necessary to take into account the fact that UNVDA has been continuously developing the target areas for about 40 years since its establishment. In conceptualizing the content of the grant aid project, it is effective to conduct a project based on UNVDA's past experience in the development and maintenance of agricultural infrastructure, facilities, and equipment related to irrigated rice cultivation, in addition to the basic rice value chain development.

## (2) CENEEMA

CENEEMA is the central centre for agricultural mechanization in Cameroon. The centre's budget is directly linked to the funding of its activities and is an important factor in promoting agricultural mechanization. In recent years, CENEEMA's budget has been reduced due to COVID-19, which is a major problem.



Source: CENEEMA

**Figure 12.4 Equipment managed and operated by CENEEMA**

### 12.4.3 Draft Project Plan

#### (1) Project Components

**Table 12.6 Components of Proposed Project Plan in Cameroon**

Objectives
Introduce equipment and materials that will contribute to improving production efficiency, distribution and production environment, and post-harvesting process in the rice value chain. This will strengthen the rice value chain, and improve the productivity of upland and paddy rice. It will contribute to achieving self-sufficiency in rice production in the country.
Components
<b>【Equipment】</b>
<b>UNVDA</b>
1) Production efficiency improvement package: Tiller, medium-sized truck (4 ton), heavy truck, aluminium bridge, maintenance equipment
2) Distribution and production environment improvement package: Mini-backhoe with earth removing plate, backhoe, vibratory roller (0.8t-1.1t), vibratory roller (3t), vibratory roller (10t-20t), motor grader, bulldozer, trailer truck, dump truck (20t), dump truck (4t), maintenance equipment
3) Post-harvest processing improvement package:

Paddy dryer, engine forklift, maintenance equipment	
<b>CENEEMA</b>	
1) Production efficiency improvement package: Tiller, medium-sized truck (4 tons), aluminium bridge, maintenance equipment	
2) Distribution and production environment improvement package: Mini-backhoe with earth removing plate, vibratory roller (0.8t-1.1t), dump truck (4t), maintenance equipment	
<b>Contents</b>	
<b>UNVDA</b>	
1) Promote the provision of agricultural machinery services to local rice producer groups or the lending of agricultural machinery to local rice producer groups in order to improve rice production capacity.	
2) Promote projects to improve and renovate irrigation facilities in order to shift from rain-fed rice cultivation system to irrigated rice cultivation system.	
3) Promote the construction and rehabilitation of farm roads to improve the distribution environment of local rice produced in the target area.	
4) Improve the capacity of harvest transportation and post-harvest processing equipment including paddy dryers and rice milling facilities in anticipation of future increases in local rice production.	
<b>CENEEMA</b>	
(a) 1) Promote the spread of agricultural mechanization using small agricultural machinery in upland rice production areas.	
(b) 2) Promote the implementation of farm road maintenance and renovation projects that will stimulate agricultural mechanization in upland rice production areas.	

## **A. Production Efficiency Improvement Package**

### **Purpose / Uses:**

- Plowing of traditional rain-fed paddy fields and irrigated paddy fields,
- Transportation of production materials such as fertilizer, and transportation of harvested agricultural products.

No	Equipment	Use
A-1	Tiller (12PS) with attachment including trailer, cage wheel, plow)	Plowing paddy fields / transportation of production materials in the field / transportation of harvested agricultural products in the field
A-2	Medium-sized truck (4t)	Transportation of production materials in the target areas / transportation of harvested agricultural products in the target areas / transportation of A-1, B-1, B-3, B-4 in the target areas
A-3	Heavy truck (10t)	Transportation of large quantity of production materials over long distances / transportation of large quantity of harvested agricultural products over long distances
A-4	Aluminum bridge (for 4t)	-
A-5	Maintenance equipment (maintenance tools and device)	-
A-6	Maintenance equipment (spare parts for tiller)	-
A-7	Maintenance equipment (spare parts for others)	-

## **B. Distribution and Production Environment Improvement Package**

### **Purpose / Use:**

- Improvement of rice production field and related facilities; levelling of rice production field / large plots of rice production fields / rehabilitation of branch farm roads / rehabilitation of branch irrigation canals and branch drainage channels
- Rehabilitation of main farm roads
- Rehabilitation of main irrigation canals and main drainage canals.

No	Equipment	Use
B-1	Mini-backhoe with earth removing plate (0.09m <sup>3</sup> )	Transportation of fill materials / excavation of irrigation canals
B-2	Backhoe (0.8m <sup>3</sup> )	Excavation of drainage canals, shaping of farm road slopes / removal and installation of concrete structures
B-3	Vibratory roller (0.8t-1.1t, hand guide type)	Compaction of fill material for branch farm roads, main farm road and foundation sand for concrete canals
B-4	Vibratory roller (3t, boarding type)	Compaction of fill material for branch farm roads, main farm roads, and wide-area farm roads
B-5	Vibratory roller (10t-20t, boarding type)	Compaction of fill material for main farm roads and wide-area farm roads
B-6	Motor grader	Levelling and reshaping of main farm roads and wide-area farm roads
B-7	Bulldozer (8t or 20t)	Levelling of fill material on main farm roads and wide-area farm road / spreading fill material in the field
B-8	Trailer truck (40t, low platform type)	Transportation of B-2, B-5, and B-7
B-9	Dump truck (20t)	Transportation of fill materials
B-10	Dump truck (4t)	Transportation of fill materials
B-11	Maintenance equipment (maintenance tools and device)	-
B-12	Maintenance equipment (spare parts)	-

## **C. Post-harvest processing improvement package**

### **Purpose / Use:**

- Improvement of the efficiency of paddy drying operations
- Improvement of the quality of milled white rice
- Improvement of work efficiency at existing rice milling plants

No	Equipment	Use
C-1	paddy dryer	drying of rice paddy to be processed at the rice milling plant
C-2	engine forklift (2.5t, Diesel)	loading and unloading of rice paddy and polished rice at the UNVDA rice milling plant site

### **(2) Soft Component**

The soft components required are yet to be determined.

### **(3) Estimated Project Costs**

The estimated total project cost is 1,160 million yen.

**Table 12.7 Estimated project cost for CARD Grant Aid Project in Cameroon**

	<b>Items</b>	<b>Yen (Million )</b>
1)	Equipment procurement costs (UNVDA)	1,100
2)	Equipment procurement costs (CENEEMA)	30
3)	Detail design and design supervision cost	30
	<b>Total</b>	<b>1,160</b>

### **(4) Expected Results**

The implementation of the project is expected to have the following outputs in the target areas.

#### **1) UNVDA**

- ✓ Improvement of production efficiency in irrigated rice field
- ✓ Improvement of distribution and production environment in irrigated rice fields
- ✓ Improvement of post-harvesting process in irrigated rice fields

#### **2) CENEEMA**

- ✓ Promotion of the opportunities for agricultural machinery demonstrations to local rice farmer
- ✓ Promotion of agricultural mechanization among upland rice farmers through provision of agricultural machinery services

Indicators showing the quantitative outputs of the Project will be considered and set through in the future preparatory survey.

### **(5) Obligation of Recipient Country**

- Assignment of a person in charge during project implementation
- Providing the facilities for storing procured equipment and materials
- Implementing management and maintenance of the equipment

### **(6) Point to be considered**

Confirm that the budget of the government is appropriately allocated for the management and maintenance of equipment and materials procured.