

Republic of Uganda

FY2016 Ex-Post Evaluation of Technical Cooperation Project

“NERICA Rice Promotion Project in Uganda”

External Evaluator: Isao Dojun, Chuo Kaihatsu Corporation

## **0. Summary**

This Project was implemented with the project purpose of improving NERICA<sup>1</sup> rice production (upland rice and lowland rice) in its quantity and quality in the target area, and with the overall goal of contributing to improved rice production for self-sufficiency of Uganda, and increasing farmers’ incomes, at the National Crops Resources Research Institute (hereinafter referred to as “NaCRRI”) and the Zonal Agricultural Research and Development Institutes (hereinafter referred to as “ZARDIs”) under supervision by the National Agricultural Research Organization (hereinafter referred to as “NARO”), acting as the project implementing agency. NARO is a research institute directly controlled by the Ministry of Agriculture, Animal Industry and Fisheries (hereinafter referred to as “MAAIF) of the Republic of Uganda.

At the time that this Project was planned and at the time of its completion, modernisation of agriculture and promotion of rice production had high importance in the Ugandan development policy, plans and development needs. Furthermore, at the time of planning, the Project was highly consistent with the Japan’s ODA<sup>2</sup> policy. Therefore, the relevance of this Project is high. The capabilities of NaCRRI and ZARDIs for research and dissemination of NERICA rice (upland rice and lowland rice) have generally improved, and the appropriate rice cultivation techniques are being transferred to farmers, etc. in the target area. On the other hand, regarding improvement of NERICA rice production in its quantity and quality in the target area which was a purpose of this Project, although the result of improvement in quality and quantity has been produced, the indicator for the production quantity has not been achieved. Some of the indicators associated with the overall goal are not necessarily appropriate, and specific numerical targets have not been set, therefore, although it is difficult to evaluate the degree of achievement by comparison with the target values, it can be said that the overall goal has been mostly achieved, as the Project has contributed greatly to the increase income of rice producing farmers. Other impacts of the Project include contribution to improvement in the livelihood of rice producing farmers, improvement of the status of women within the household, etc. In light of the above, effectiveness and impact of the Project are fair. Although the Project was implemented according to the predetermined schedule, the project cost exceeded the planned cost, therefore, efficiency of the Project is fair. As for sustainability of the Project, although no particular problems are observed

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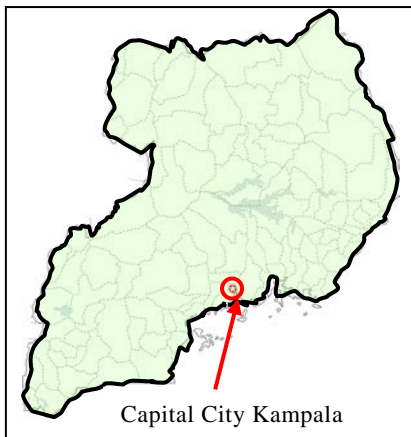
<sup>1</sup> NERICA (New Rice for Africa) rice is general term of rice cultivars developed in 1994 by interbreeding high yield Asian rice varieties with disease- and weed-resistant African rice varieties. There are wet- and dry-growing varieties, enabling NERICA rice to be grown on both dry plots and paddy fields.

<sup>2</sup> Official Development Assistance

in the policy and institutional aspects, there still remains some issues regarding organizational aspect, such as the number of extension officers (agricultural officers), linkage between research and extension. In the technical aspect, some problems remain to be solved in terms of improvement of rice cultivation skills of the agricultural officers, and there are also some problems in the financial aspect, the sustainability of the effects generated by this Project is therefore fair.

In light of the above, this Project is evaluated to be partially satisfactory.

## 1. Project Description



Project Location (Target area: Suitable area for NERICA rice production in Uganda)



NERICA rice cultivation field (Masindi District)

### 1.1 Background

In Uganda, agriculture is the key industry and it accounts for about 43% of the country's Gross Domestic Product (GDP), about 85% of total exports, and about 80% of employment. The Ugandan government has promoted a range of poverty reduction policies based on the national development plan "Poverty Eradication Action Plan (PEAP)" (2004/5-2007/8), especially agriculture was regarded as a significantly important sector indispensable for solving two issues<sup>3</sup> of the country's five priority issues (pillars) established in PEAP. In addition, the government, by developing in 2000 a sector program, the "Plan for Modernisation of Agriculture (PMA)," had been working to make a shift from subsistence agriculture to commercial agriculture. Specifically, under the strong initiative of the Vice President of Uganda, the promotion of NERICA rice production had been advanced in an active manner.

Under these circumstances, in June 2004, by dispatching individual experts (NERICA rice application plan) to Uganda, JICA started technical cooperation in earnest to promote NERICA rice production and implemented 1) various tests including rice

<sup>3</sup> The 2 issues are (1) and (2) of the following five: (1) Economic management, (2) Production, competitiveness and incomes, (3) Human development, (4) Safety, conflict resolution and disaster management and (5) Good governance.

variety experiments and 2) training for farmers. As a result, Uganda became one of the countries in Sub-Saharan Africa where promotion of NERICA rice production is advanced. Based on these results, the Ugandan government requested the Japanese government to provide assistance to this Project, aiming at further increasing NERICA rice production. In parallel with this Project, in 2009, a grant aid project, “Project for Construction of Rice Research and Training Centre” was implemented and research on rice cultivation was conducted and techniques that had been developed were disseminated. In addition, a technical cooperation project, “Technical Assistance Support to Sustainable Irrigated Agriculture Development Project in Eastern Uganda,” (June 2008- June 2011) was also implemented at the same time as this Project, with the aim of promoting irrigated rice cultivation in Eastern Region of Uganda.

### 1.2 Project Outline

Overall Goal		Rice is produced adequately for self-sufficiency and farmers’ income is increased through the increased production and productivity of rice in Uganda.
Project Purpose		NERICA rice production is improved in its quantity and quality in the target area.
Output(s)	Output 1	Research and extension capacity of NERICA (upland and lowland) in National Crops Resources Research Institute (NaCRRI) and Zonal Agricultural Research and Development Institutes (ZARDIs) is enhanced.
	Output 2	Appropriate NERICA rice production techniques are introduced to farmers, farmers groups, rice millers, etc. in the Project area.
Total cost (Japanese Side)		385 million yen
Period of Cooperation		August 2008 – June 2011
Implementing Agency		National Agriculture Research Organization (NARO) (*a research organization under the control of the Ministry of Agriculture, Animal Industry and Fisheries)
Other Relevant Agencies/ Organizations		<ul style="list-style-type: none"> <li>• National Crops Resources Research Institute (NaCRRI), 9 Zonal Agricultural Research and Development Institutes located around the country (ZARDIs), National Semi-Arid Resources Research Institute (NaSARRI) and Agricultural Engineering and Appropriate Technology Research Centre (AEATREC) (*all of the above entities are research institutes under the control of NARO)</li> <li>• Agricultural offices located in each district (district level and sub-county level)</li> </ul>
Supporting Agency/ Organization in Japan		None
Related Projects		<p>&lt;JICA Technical Cooperation Project&gt;</p> <ul style="list-style-type: none"> <li>- Technical Assistance Support to Sustainable Irrigated Agriculture Development Project in Eastern Uganda (2008-2011)</li> <li>- Promotion of Rice Development Project (2011-2018) (including an extended period)</li> </ul> <p>&lt;JICA Grant Aid Project&gt;</p> <ul style="list-style-type: none"> <li>- The Project for Construction of Rice Research and Training Centre (March 2009)</li> </ul> <p>&lt;Other Donors’ Support&gt;</p> <ul style="list-style-type: none"> <li>- World Bank:</li> </ul>

	1) Agriculture Cluster Development Project (2015-2022), 2) Agricultural Technology and Agribusiness Advisory Services Project (ATAAS) (2010-2017) - Netherlands: Integrated Seed Sector Development (2012-2016)
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1.3 Outline of the Terminal Evaluation

1.3.1 Achievement Status of Project Purpose at the Terminal Evaluation

Since there is no reliable data on the amount of NERICA rice production, it was not possible to accurately determine how far targets were achieved. On the other hand, the direct increase effect of NERICA rice production can be expected to be around 6,500 tons, based on a calculation using data including the number of farmers that have attended training, land area expected to be used to cultivate NERICA rice per farmer’s household and average yield of NERICA rice. By inspecting rice submitted by trained farmers and rice millers, it was confirmed that the quality of NERICA rice had improved. Therefore, it was judged that, before this Project was completed, the project purpose could be fully achieved.

1.3.2 Achievement Status of Overall Goal at the Terminal Evaluation (Including other impacts.)

It is difficult to predict whether the condition for self-sufficiency in rice will be satisfied in 3 to 5 years after the completion of this Project, because rice production is significantly affected by not only the degree of dissemination of rice cultivation techniques, but also the tariff rate on imported rice, agricultural policies of the government, and the climate. It was also pointed out that, in order to predict whether the income of rice producing farmers would increase or not, analyses of the rise in value chain and revenues from rice should be made (no description was clearly made concerning the prospects for how far the overall goal would be achieved).

Other impacts were identified, which include an increase in the cultivation of NERICA rice which was achieved through agricultural extension activities to farmers by NGOs and Japan Overseas Cooperation Volunteers (hereinafter referred to as “JOCV members”), and dissemination of NERICA rice cultivation techniques and seeds from farmers who have attended the training to other farmers, and an improvement in livelihood thanks to increased income from rice sales (being able to send children to secondary school, pay mobile phone charges and purchase medicines, construction materials such as galvanized sheet iron for roof and motorcycles and bicycles).

1.3.3 Recommendations from the Terminal Evaluation

- (1) Strengthening of operating structure of NaCRRRI through more appropriate staffing  
 It was pointed out that it was necessary to increase the number of personnel to

be deployed, including researchers, etc., specialised in rice, and to develop their skills and that it would be effective to assign a coordinator at NaCRRRI to promote linkage between rice researchers and training/extension. In addition, it was recommended that, as a centre for rice research and extension, NARO should cooperate with MAAIF in order to strengthen human resources for rice research.

## (2) Securing of budgets for continuing project activities

In order to continue to implement research and extension activities that are ongoing when the project was completed and evaluated, it was pointed out that securing financial resources would be necessary and that it would be practical to secure budgets in cooperation with the Agricultural Technology and Agribusiness Advisory Services Project (ATAAS<sup>4</sup>) which is a national project to improve development and extension of agricultural techniques as well as other government bodies such as the National Agricultural Advisory Services (hereinafter referred to as “NAADS”) which is an organization to carry out extension service.

## (3) Collection of reliable data on the rice value chain

The agricultural statistics of the Ugandan government is in an immature state. In order to conduct policy making and effective monitoring, collection of accurate and useful data on the rice value chain is necessary. To this end, it was recommended that MAAIF should advance the construction of a data collection system in cooperation with international organizations such as the International Rice Research Institute (IRRI<sup>5</sup>), Africa Rice Center, and the Food and Agriculture Organization (FAO) of the United Nations.

## **2. Outline of the Evaluation Study**

### 2.1 External Evaluator

Isao Dojun, Chuo Kaihatsu Corporation

### 2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: September 2016 – January 2018

Duration of the Field Study: January 15, 2017 – March 3, 2017, and May 1, 2017 – May 14, 2017

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<sup>4</sup> A project financed by the World Bank

<sup>5</sup> One of agricultural research organizations under the supervision of the Consultation Group on International Agriculture Research (CGIAR) to conduct research and provide education related to rice. The headquarters are located in the Philippines.

### 2.3 Constraints during the Evaluation Study

In order to evaluate how far the project purpose and the overall goal are achieved using numerical data, it is necessary to have data on the amount of production of both NERICA rice and rice as a whole. However, although Uganda has statistics data on the annual total amount of rice production of the country, no statistical data is available on the amount of production of NERICA rice or upland rice and on the amount of production by district<sup>6</sup>. In addition, according to the results of interviews made to officials of MAAIF, data on the annual total amount of rice production is not actually reliable<sup>7</sup>. Therefore, it was difficult to numerically determine the degree of achievement of the project purpose and the degree of contribution this Project made to self-sufficiency of rice in Uganda.

## **3. Results of the Evaluation (Overall Rating: C<sup>8</sup>)**

### 3.1 Relevance (Rating: ③<sup>9</sup>)

#### 3.1.1 Consistency with the Development Plan of Uganda

At the time that this Project was planned, national strategies aiming at modernisation of agriculture and creation of employment and the poverty eradication action plan were presented in the revised Poverty Eradication Action Plan<sup>10</sup> (hereinafter referred to as “PEAP”) (for the period 2004/5-2007/8) and it was also targeted to increase income of poor farmers and improve their livelihood in the Plan for Modernisation of Agriculture (PMA) (2000) which was formulated based on PEAP. At the time of completion of this Project, rice had been positioned as a strategic crop in the Development Strategy and Investment Plan (DSIP) (2010-2014) and the Uganda National Rice Development Strategy (hereinafter referred to as “UNRDS”) (2009-2018) was also under implementation. Furthermore, in the National Development Plan (2010-2014), which is the subsequent plan of PEAP, agriculture was recognized as one of the most important sectors and modernisation of agriculture and productivity improvement were greatly emphasized. In light of the above, it can be said that the purpose of this Project was consistent with the Ugandan government’s development policies, etc., that were in place when this Project was both planned and completed.

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<sup>6</sup> Production data by district are collected only when the agricultural census is conducted. In Uganda, the agricultural census was conducted on 3 occasions in the past (2008, 1991 and 1963).

<sup>7</sup> This is because data on rice cultivation area and production are not collected nationwide and some data are collected from only a small part of areas of a few districts (about 3 districts) as samples, and based on which, national production data are estimated.

<sup>8</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>9</sup> ③: High, ②: Fair, ①: Low

<sup>10</sup> The first edition was issued in 1997.

### 3.1.2 Consistency with the Development Needs of Uganda

At the time of planning of this Project, both rice consumption and production were increasing every year and farmers were highly motivated to be engaged in rice cultivation. In addition, rice cultivation was promoted in line with the then-current state of water resources of the country. At the time of completion of this Project, however, the rice self-sufficiency rate had not shown improvement (75.5% at the time of project planning in 2008 and 74.2% at the time of project completion in 2011) and import of rice was on the increase (63,000 tons in 2008 and 92,000 tons in 2011). In addition, by then, rice had become an important crop for farmers as a cash crop. In light of the above, it can be confirmed that, at the time of planning and completion of this Project, the project purpose to promote rice cultivation was consistent with the development needs of the country.

### 3.1.3 Consistency with Japan's ODA Policy

At the time of planning of this Project, in Japan's country assistance policy for Uganda (2008), agricultural development was considered to be a high priority for assistance. In particular, importance was given to the promotion of rice cultivation and increasing value-added agricultural products, etc. Therefore, this Project aiming at promotion of rice cultivation had consistency with Japan's ODA policy. Furthermore, the 4th Tokyo International Conference on African Development (TICAD IV in 2008), as one of its objectives, proposed to "Increase rice production through developing capacities to adopt systematic crop management, and new methodologies including wider use of NERICA rice, aiming at doubling the rice production in African countries in ten years." In addition, JICA launched an initiative known as the "Coalition for African Rice Development (CARD)" in partnership with other donors in 2008 and provided assistance for the preparation of national rice development strategy by CARD member countries (23 countries<sup>11</sup> in total including Uganda) and for increasing rice production in accordance with their respective strategy, with a goal to double the rice production in Africa from 14 million tons to 28 million tons by 2018. Therefore, it can be said that this Project was highly consistent with Japan's ODA policy at the time of its planning.

This Project was highly relevant to the country's development plan and development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

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<sup>11</sup> The 1st group composed of 12 countries including Cameroon, Ghana, Guinea, Kenya, Madagascar, Mali, Mozambique, Nigeria, Senegal, Sierra Leone, Tanzania and Uganda. The 2nd group composed of 11 countries including Benin, Burkina Faso, Central African Republic, Cote d'Ivoire, Democratic Republic of the Congo, Ethiopia, Gambia, Liberia, Rwanda, Togo and Zambia. The 1st group are countries recognised as having a high potential for rice production increase and the 2nd group are countries recognised as taking time to expand the plan, although they have a potential for rice cultivation.

### 3.2 Effectiveness and Impact<sup>12</sup> (Rating: ②)

#### 3.2.1 Effectiveness

##### 3.2.1.1 Project Output

The major pillars of this Project were to strengthen agricultural research institutes and other relevant organizations' research and extension capacity for NERICA rice and to disseminate NERICA rice cultivation techniques to farmers. Figure 1 shows a flow of activities related to research and extension.



Figure 1: Workflow of Research and Extension Activities in this Project

#### (1) Achievement status of Output 1

A total of 4 indicators have been set for Output 1: “Research and extension capacity of NERICA (upland and lowland) in NaCRRI and ZARDIs is enhanced”. As shown in Table 1, at the time of completion of this Project, all these indicators were achieved. It was found from the result that research and extension capacity of NERICA rice at NaCRRI and ZARDIs was improved as targeted under this Project, which indicates that Output 1 was achieved.

Table 1: Achievement Status of Indicators for Output 1

Output 1	Indicators for Output 1	Achievement status of indicator at the time of project completion	Achievement status
Research and extension capacity of NERICA (upland and lowland) in NaCRRI and ZARDIs is enhanced.	Indicator 1: The results of researches in each selected subject at NaCRRI are compiled.	Results of rice cultivation experiments and collected data were compiled and analysed by researchers of NaCRRI. The results and data, however, have not been published by compiling along with other related data. Since researchers had a large burden as they had other tasks, the editing process was delayed to some extent. It was expected that the publication would	Achieved

<sup>12</sup> Sub-rating for Effectiveness is to be put with consideration of Impact.



		be carried out after completion of the editing process.	
	Indicator 2: The results of researches to meet regional characteristics at ZARDIs and NaSARRI are compiled.	At 9 ZARDIs and NaSARRI, rice cultivation experiments were conducted utilizing demonstration farms that had been already prepared respectively. 25 or more reports were prepared on the rice cultivation experiments. Valuable scientific data that could clearly identify regional characteristics of respective eco-regions in Uganda were obtained.	Achieved
	Indicator 3: The training in appropriate NERICA rice cultivation aiming at farmers and supporting actors is conducted by NaCRRRI, ZARDIs, and NaSARRI in accordance with the training module.	For NERICA rice cultivation, two different training modules were developed. One module was for a training targeted at agricultural officers and representatives of farmers. The other is for a training targeted at ordinary farmers. As for the training for agricultural officers, etc., could be managed independently by staff members of NaCRRRI, while the training for ordinary farmers could be managed independently by staff members of ZARDIs and NaSARRI.	Achieved
	Indicator 4: The training in post-harvest processing aiming at rice millers is conducted by AEATREC in accordance with the training module.	Trainings on post-harvest processing targeted at rice millers were conducted by AEATREC in accordance with the training modules. This training course was developed in March 2010 and a total of 104 trainees participated in the trainings before completion of the Project (June 2011). The target number of 100 participants expected by those who were involved in this Project was achieved by the completion of the Project.	Achieved

Source: The terminal evaluation report, and materials provided by JICA

The results of rice researches and trainings conducted at NaSARRI and 9 ZARDIs were shown in Table 2.

Table 2: Results of Rice Researches and Trainings Conducted at NaSARRI and 9 ZARDIs

	Institute	Results of research activities	Results of trainings
1	NaSARRI	- Rice cultivation tests were conducted since the first half of 2009. During the project period, tests were conducted for 4 cropping seasons. Satisfactory results were obtained from the tests.	- Starting December 2009, mainly in the Eastern Region, trainings were conducted with target farmers (456 farmers in total participated). - The training was also conducted for researchers of Nabuin ZARDI (a neighbouring research institute with NaSARRI).

2	Abi ZARDI	<ul style="list-style-type: none"> <li>- Rice cultivation tests (varieties and weeding tests) were conducted for 3 cropping seasons. Satisfactory results were obtained.</li> <li>- Seed multiplication was conducted on a 1.5 ha field and the seeds produced were delivered to farmers during the training sessions.</li> <li>- In cooperation with this Project, a rice market survey in the West Nile eco-region was conducted. It was clarified that large effects could be expected through the introduction of NERICA rice and provision of technical guidance.</li> </ul>	<ul style="list-style-type: none"> <li>- Starting November 2009, trainings for farmers were conducted and a total of 306 farmers participated in the trainings.</li> </ul>
3	Bulindi ZARDI	<ul style="list-style-type: none"> <li>- Rice cultivation tests were conducted for 5 seasons and satisfactory results were obtained. In addition, this ZARDI conducted cultivation tests by their own initiative.</li> <li>- Although it is not included in activities under this Project, seed multiplication and fertilizing tests were conducted by receiving support from the Alliance for a Green Revolution in Africa<sup>13</sup> (hereinafter referred to as “AGRA”).</li> <li>- The total land area used for seed multiplication was 1.5 ha, if combining the area used for this Project and AGRA.</li> </ul>	<ul style="list-style-type: none"> <li>- Starting November 2009, trainings for farmers were conducted and a total of 429 farmers participated in the trainings.</li> <li>- When requested by the district agriculture office located within the area in charge, support is provided in terms of upland rice cultivation techniques.</li> <li>- A total of 2 JOCV members were dispatched, who toured around to visit local farmers and provided guidance on cultivation tests in the field located in the ZARDI.</li> </ul>
4	Mukono ZARDI	<ul style="list-style-type: none"> <li>- Starting in the second half of 2008, rice cultivation tests were conducted. The tests concerned varieties, weeding, ratoon rice cultivation, and effectiveness of mixed cropping with beans.</li> </ul>	<ul style="list-style-type: none"> <li>- Training was conducted in cooperation with staff members of NAADS and district agricultural officers.</li> <li>- Starting March 2010, trainings for farmers were conducted and a total of 474 farmers participated in the trainings.</li> </ul>
5	Mbarara ZARDI	<ul style="list-style-type: none"> <li>- Starting in the first half of 2009, cultivation tests (those on varieties, weeding, and fertilizing) were conducted.</li> </ul>	<ul style="list-style-type: none"> <li>- Starting September 2010, trainings for farmers were conducted and a total of 37 farmers participated in the trainings.</li> </ul>
6	Rwebitaba ZARDI	<ul style="list-style-type: none"> <li>- As a result of cultivation tests, this area was found suitable to NERICA rice cultivation.</li> </ul>	<ul style="list-style-type: none"> <li>- Starting March 2010, trainings for farmers were conducted and a total of 106 farmers participated.</li> </ul>
7	Nabuin ZARDI	<ul style="list-style-type: none"> <li>- Starting in the first half of 2009, cultivation tests (those on varieties and weeding) were conducted.</li> </ul>	<ul style="list-style-type: none"> <li>- Starting February 2010, trainings for farmers were conducted and a total of 1,130 farmers participated in the trainings.</li> </ul>
8	Kachwekano ZARDI	<ul style="list-style-type: none"> <li>- Starting in 2010, variety tests and installation of demonstration farms were conducted in Kanungu District and Rukungiri District. Yield of 4 NERICA rice varieties was 1.5 times of that of traditional rice varieties.</li> </ul>	<ul style="list-style-type: none"> <li>- Using the demonstration farms, NERICA rice was introduced, which attracted higher attention of farmers.</li> </ul>

<sup>13</sup> Established in 2006 by the Rockefeller Foundation and Bill & Melinda Gates Foundation, it is a comprehensive partnership to provide funds for agricultural development in Africa. It aims at reducing poverty and eradicating hunger through the provision of funds for agricultural development.

9	Buginyanya ZARDI	- Since 2009, cultivation tests (those on varieties and weeding) were conducted using a branch field in Mayuge District and starting in the second half of 2010, the same tests were conducted also in Bulambuli District.	- Trainings for farmers were planned to start in the second half of 2011 (after completion of this Project). (It was deferred because of unsatisfactory results of cultivation tests.)
10	Ngetta ZARDI	- In 2008 and later, cultivation tests were conducted on two occasions. Although the results were not satisfactory, the capacity to conduct rice cultivation tests was somewhat improved through continued provision of technical guidance.	- Trainings for farmers were conducted in cooperation with local NGOs. The number of trainees since the start of this Project totalled 4,025 persons. The result of the impact survey <sup>14</sup> indicated that 66% of participants were continuously engaged in rice cultivation.

Source: Materials provided by JICA

## (2) Achievement status of Output 2

For Output 2, which was described as “appropriate NERICA rice production techniques are introduced to farmers, farmer’s groups, rice millers, etc., in the Project area”, three indicators had been set. As shown in Table 3, at the time of project completion, two indicators were achieved, while the remaining one was almost achieved. Therefore, it can be said that the expected output, the introduction of appropriate NERICA rice production techniques to farmers and farmer’s groups, etc., in the Project area has mostly been achieved.

Table 3: Achievement Status of Indicators for Output 2

Output 2	Indicators for Output 2	Achievement status of indicators at the time of project completion	Achievement status
Appropriate NERICA rice production techniques are introduced to farmers, farmer’s groups, rice millers, etc. in the Project area.	Indicator 1: A total of 12,000 persons (10,000 farmers and 2,000 others) receive training provided directly and indirectly by the Project.	Trainings were conducted for a total of 15,925 persons (13,910 farmers (note 1) and 2,015 others). “Others” include staff members of ZARDIs, staff members of NGOs, students, JOCV members, and public officials working for rice production-related organizations in African countries. The number of participants greatly exceeded the targeted number of 12,000.	Achieved
	Indicator 2: 30% of farmers who received the training produce NERICA continuously.	According to the impact survey <sup>15</sup> conducted under this Project, of the farmers that participated in the training, 64.3% were engaged in rice cultivation using knowledge learned. The targeted number of 30% was greatly exceeded.	Achieved
	Indicator 3: 70% of rice millers who received the	According to the impact survey conducted by AEATREC, all of the 37 rice millers who were the target of the impact survey were	Mostly achieved

<sup>14</sup> An interview survey (to understand whether techniques were established locally or not) was conducted among some of the farmers that participated in training into rice cultivation techniques. From September 2010 to February 2011, it was conducted through questionnaire surveys and telephone interviews. A total of 1,191 farmers responded including some farmers under the control of other ZARDIs.

<sup>15</sup> Refer to Footnote 13.

	training apply the introduced post-harvest processing techniques.	using rice milling techniques acquired through the training. A total of 55 operators of rice millers <sup>16</sup> participated in the training by the time the survey was made, which means the survey covered 67.3% of those who participated in the training.	
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Source: The terminal evaluation report, and materials provided by JICA

Note 1: There is no data on number of persons by gender.

In addition to the above, activities in cooperation between this Project and other donors were also conducted, and such activities contributed to dissemination of NERICA rice. More specifically, partnership between this Project and other donors included the following:

Table 4: Partnership with Other Donors, etc.

Organization	Details of cooperation
Sasakawa Global 2000 <sup>17</sup>	A technical manual developed under this Project was provided to Sasakawa Global 2000 so that they could use the manual in their extension activity. Additional cooperation was made also in relation to the provision of rice-milling machines to farmer's groups. In addition, since Sasakawa Global 2000 was one of the organizations to which JOCV members were dispatched, the JOCV members participated in the training of this Project and disseminated NERICA rice cultivation techniques to farmers after having learned the techniques.
World Food Program (WFP) of the United Nations	WFP printed the training materials that were developed under this Project to use such materials in their extension activities. WFP was one of the organizations to which JOCV members were dispatched, and therefore NERICA rice cultivation was promoted.
Food and Agriculture Organization (FAO) of the United Nations	Training materials developed under this Project were provided to FAO. In addition, when rice seeds were delivered to the Northern region of Uganda with Japanese funding (Ministry of Agriculture, Forestry and Fisheries and Ministry of Foreign Affairs of Japan), experts dispatched by JICA provided technical guidance on cultivation.

Source: Interview surveys conducted with Japanese experts

### 3.2.1.2 Achievement of Project Purpose

The purpose of this Project has been defined as follows: "NERICA rice production is improved in its quantity and quality in the target area." Indicators for degree of achievement are shown in Table 5.

Specific numerical targets for Indicator 1 of the project purpose (upland rice production of 140,000 tons/year) were set for consistency with the target rice

<sup>16</sup> Participants in training were 55 operators who belonged to 25 organizations/rice millers. Of those 55 operators, the interview survey was conducted with 37 (questionnaire survey). (Source: Materials provided by JICA)

<sup>17</sup> An agricultural program conducted by the Sasakawa Africa Association (an NGO for agricultural development) which has operated in 14 countries in Sub-Saharan Africa. At the time of ex-post evaluation, it operates in 4 countries of Ethiopia, Nigeria, Mali and Uganda. In 1986, the association was established in Switzerland jointly by Dr. Norman Borlaug, a Nobel-Prize winner, Ryoichi Sasakawa (the first chairman of the Nippon Foundation), and former President of U.S. Jimmy Carter. (The headquarters is in Tokyo at the time of ex-post evaluation.)

production in UNRDS<sup>18</sup> (at the time of the mid-term review). The target values of UNRDS were very ambitious (to increase annual upland rice production by a factor of 3.4 from about 59,000 tons/year in 2008 to 200,000 tons/year in 2018) and they were set to maintain consistency with the target to increase nationwide rice production in Uganda. As a rule, project purpose should be established within the range that can be achieved as a direct outcome of project activities. It can be considered, however, that the establishment of this project purpose was unreasonable, since it was established within a wider scope of activities not directly related to this Project. Specifically, it was extremely difficult to achieve an increase of 140,000 tons/year in upland rice production only with the increase in production effect to be achieved by farmers that participated in the trainings under this Project. On the other hand, the number of farmers that participated in the trainings reached the figure of about 13,910 within a period of about 3 years, which is a large number (corresponding to 13% of the total rice farmers of 103,579 in 2008 in Uganda) and hence, it can be said that they have built a certain solid foundation to contribute to an increase in NERICA rice production in Uganda. It is difficult, however, to clearly show how far the numerical targets of the project purpose was appropriate in terms of increase in NERICA rice production, based on well-grounded data, and therefore, it is not easy to conclude that the target production was achieved.

With respect to Indicator 2 of the project purpose, 55 operators from 25 rice millers participated in the training into rice milling techniques and they acquired rice milling skills that could satisfy quality standards of Uganda.

Table 5: Degree of Achievement of Project Purpose

Project Purpose	Indicator	Achievement status of indicators at the time of project completion	Achievement status
NERICA rice production is improved in its quantity and quality in the target area.	Indicator 1: The production of upland NERICA rice reaches 140,000 tons.	- As mentioned above, an unreasonable and not easy-to-achieve target values were set for Indicator 1 and it is considered inappropriate as an indicator. Since it is difficult, however, to clarify what kind of indicator should be considered appropriate, it cannot be said that the objective was achieved. - On the other hand, a total of 13,910 farmers participated in the trainings, which led to an	The contribution to increase in upland rice production was sufficient. It is difficult, however, to consider that

<sup>18</sup> In UNRDS, rice production targets for 2013 and 2018 are prescribed along with upland rice production targets. Using annual upland rice production in 2008 and the annual upland rice production target for 2013 in Uganda as a whole, the production target for 2011, when this Project was completed, was calculated to be 137,600 tons. It is presumed that this value was rounded to an estimate of 140,000 tons.

		<p>increase in upland rice production of 7,155 tons/year<sup>19</sup> and hence contributed to increased rice production (total rice production of Uganda increased by 55,143 tons/year from 177,857 tons/year in 2008 to 233,000 tons/year in 2011).</p> <p>- The increase of 7,155 tons/year achieved by the farmers that participated in the trainings under this Project accounts for 13% of the increase of 55,143 tons realized for the period from 2008 to 2011.</p> <p>Based on information<sup>20</sup> indicating that the percentage of NERICA rice cultivation in 2008 was 7.7% of the total rice cultivation, production of NERICA rice in 2008 is estimated to have been 13,695 tons. Based on the contribution of this Project to the increase in NERICA rice production of 7,155 tons, this Project certainly contributed to an increase in NERICA rice production by a factor of 1.5 at least. In this way, this Project can be said to have contributed to a certain amount of increase in rice production.</p>	the project purpose was achieved.
	<p>Indicator 2: NERICA rice which passes the quality standard of the Project is increased.</p>	<p>- Although the number of samples was not sufficient (those involved in this Project collected samples of polished rice from 8 rice millers and examined the samples at an analytical laboratory of NaCRRI), rice millers having satisfied quality standards<sup>21</sup> established by the Uganda National Bureau of Standards accounted for over 80% (87.5%), and based on this, it can be said Indicator 2 was achieved.</p>	Achieved

Source: The terminal evaluation report, and materials provided by JICA

Research and extension capacity for NERICA rice (upland and lowland) at NaCRRI and ZARDIs in general improved, and appropriate rice cultivation

<sup>19</sup> 7,155 tons/year is estimated amount. Estimation method is as follow. Total number of trained farmers in this Project was 13,910. Of these, assuming that 64.3% of the trained farmers started upland rice (indicator 2-2 of Output 2), in average about 0.4 ha of farm land used for upland rice cultivation per a trained farmer, and rice yield per hectare is about 2.0 tons/year, the following figure can be estimated. 13,910 (farmers) x 0.643 x 0.4 (ha) x 2.0 (tons) = 7,155 tons. (An estimation method used in the terminal evaluation report of this Project is applied.)

<sup>20</sup> The Development of Agricultural Markets in Sub-Saharan Africa: The Case of Rice in Uganda, 2012

<sup>21</sup> Success or failure is determined depending on grades established based on the shape, degree of damage, colour, mixing in of foreign substances, etc.

techniques were disseminated to farmers, etc., in the target areas. On the other hand, with respect to quantitative and qualitative improvement of NERICA rice production in the target areas, although there was a certain favourable result as quality improved and production increased, the indicator on production was not achieved. Therefore, it can be judged that the project purpose itself has not yet been fully achieved.

### 3.2.2 Impact

#### 3.2.2.1 Achievement of Overall Goal

The overall goal of this Project is to ensure that “Rice is produced adequately for self-sufficiency and farmers’ income is increased through the increased production and productivity of rice in Uganda.” Note that specific numerical targets have not been set for when and to what extent the Project will contribute to achievement of self-sufficiency in rice, and the improvement in incomes of farmers. In addition, in the ex-post evaluation, there were no statistical data on the production quantities specifically for NERICA rice, therefore, it was difficult to judge the extent of achievement quantitatively, and it was not able to determine the achievement status of the indicators for the overall goal.

If the self-sufficiency rate in rice in Uganda is calculated using the statistical data for rice production (milled rice) and supply of rice within the country (milled rice), then the self-sufficiency in 2013 was 76% (see Table 6), which does not reach the UNRDS self-sufficiency target value in 2013 (82%). Also, the self-sufficiency rate in the year 2008, the year in which this Project started, was 75.5%, but the self-sufficiency rate in the year 2013 was 76%, therefore, there was no improvement in self-sufficiency rate (virtually unchanged). The quantity of rice production in Uganda was unchanged from 2011 to 2014, and there was no rising trend. However, from the results of interviews with agricultural officers, etc., from the district agricultural offices of 10 districts<sup>22</sup> regarding recent trends in the area of rice under cultivation and number of rice producing farmers, it was found that in 9 out of the 10 districts there is a trend towards increasing rice cultivation area and number of rice farmers (in Wakiso District, there was an increasing trend until around 2012, but then this reversed into a decreasing trend as a result of the progress of urbanization). Also, as a result of interviews with rice millers at 8 locations in 8 provinces<sup>23</sup> regarding recent trends in rice production and number of farmers engaging in rice cultivation, it was found that at all 8 locations the trend is towards increasing production quantity and increasing number of farmers engaging in rice cultivation. In view of the results of these interviews, there is a possibility that the actual rice production quantity is greater than that indicated by the national statistical data. Therefore, it is considered

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<sup>22</sup> Amuru, Dokolo, Hoima, Kakumiro, Kole, Luwero, Masindi, Mukono, Nakaseke Wakiso

<sup>23</sup> Dokolo, Hoima, Kakumiro, Kole, Luwero, Masindi, Mukono, Nakaseke

that there is a possibility that the rice self-sufficiency rate may be somewhat higher.

Table 6: Data on Rice Production in Uganda

Item	Unit	Source	2008	2009	2010	2011	2012	2013	2014
Rice production (un-hulled rice)	Ton	FAOSTAT (Note 2)	177,857	205,765	218,111	233,000	212,000	214,000	237,000
Rice production (milled rice)	Ton	FAOSTAT	118,631	137,245	145,480	155,411	141,404	142,738	158,079
Rice imports (milled rice)	Ton	FAOSTAT	63,545	79,962	77,271	92,329	133,640	115,780	132,316 (Note 4)
Rice exports (milled rice)	Ton	FAOSTAT	25,030	37,818	39,792	38,187	70,853	70,742	70,659 (Note 4)
Domestic supply of rice (milled rice)	Ton	FAOSTAT	157,145	179,389	182,959	209,553	204,190	187,775	219,736
Rate of rice self-sufficiency	%	Calculated value	75.5	76.5	79.5	74.2	69.3	76.0	71.9
Total population in Uganda (Note 1)	1,000 persons	UBOS (Note 3)	29,430	30,298	31,165	32,032	32,900	33,767	34,634
Rice consumption per person	kg/person	Calculated value	5.3	5.9	5.9	6.5	6.2	5.6	6.3

Note 1: In the numerical values of the total population, the value for 2014 is from UBOS data. The values from 2008 until 2013 are values calculated by evaluators using the 2002 UBOS data and the 2014 data, assuming a constant rate of population growth.

Note 2: FAOSTAT = Online statistical database for food, agriculture, and fishery production operated by FAO.

Note 3: UBOS = Uganda Bureau of Statistics

Note 4: The numbers within the thick box in the 2014 data are provided by MAAIF.

Regarding the income of the rice farmers, from the results of a beneficiary survey<sup>24</sup>, it was found that there is an increase in the income of the farmers' household that have attended trainings, therefore, generally it can be said that the degree of achievement is high.

After completion of this Project, a technical cooperation project called the "Promotion of Rice Development Project" (hereinafter referred to as "PRiDe Project") (2011-2018) was started as a subsequent project, in which technical training in rice cultivation including NERICA rice (training for farmers) is being carried out in about half of the districts of Uganda. It can be said that this technical cooperation project also contributes to an increase in rice production and an increase in income for farmers in Uganda.

<sup>24</sup> In the beneficiary survey, from the districts where training for farmers was implemented (22 districts were identified from documents such as reports, etc., prepared in this Project), 12 districts were selected for which information on the villages where the training was implemented was provided in the documents (1 village was selected per district) (Mukono, Nakaseke, Nakasongora, Luweero, Wakiso, Amuru, Dokolo, Gulu, Kole, Hoima, Kamikuro, and Masindi) (incidentally, the total number of districts in Uganda as of 2010 was 111). An interview survey was carried out for farmer household who attended the training in this Project (the communities that received the training were visited, and interviews were conducted with trainees who were able to spare time for an interview on the day of the survey after explaining to the key person in the community the purpose of the interview). The number of farmers interviewed was 163. The number of males was 95 (58%), and females 68 (42%).



Table 7: Degree of Achievement of the Overall Goal

Overall Goal	Indicator	Achievement status of indicator at the time of project completion
Rice is produced adequately for self-sufficiency and farmers' income is increased through the increased production and productivity of rice in Uganda.	Indicator 1: Self-sufficiency rate of rice in Uganda	- There is no reliable data on the self-sufficiency rate in rice in Uganda, which is the indicator for the overall goal. Also, specific numerical target and target year for achievement of the indicator have not been set, therefore, it was impossible to confirm the achievement status of indicator 1. Note that according to the statistical data shown in Table 6, self-sufficiency in rice was not achieved as of 2014 (71.9%). The UNRDS aiming at the achievement of self-sufficiency in rice by the year 2018, set the target value for self-sufficiency in the year 2013 as 82%. According to the calculation made by the evaluator using the statistical data, the self-sufficiency rate in 2013 was 76%, which shows that the UNRDS target value was not reached. However, from the overall results of interviews at rice millers and with agricultural officers at the district agricultural offices, etc., it is judged that there is a possibility that the actual rice production is greater than the statistical values (there is a possibility that the self-sufficiency rate is somewhat higher).
	Indicator 2: Household income of farmers who engage in rice cultivation.	- According to the results of the beneficiary survey, the income that can be obtained from rice cultivation is greater than for other products (maize, etc.), and, the income from sale of rice by farmers that have attended the training seminar is about half of the total income of their households. In addition, an income of about 48,000 yen <sup>25</sup> per cultivation season can be obtained (from sale of rice), therefore, it is considered that household incomes of farmers are increasing. - Note that from the results of the beneficiary survey regarding the change in rice production at trained farmers, the quantity of rice production increased after attendance at the training compared with prior to the training. Specifically, an increase from 798 kg per season to 988 kg per season per farmer in average was seen, or an increase of about 190 kg per season per farmer. - Although it is difficult to clearly determine the degree of achievement due to absence of numerical target, it is considered that the Project contributed to increase income of farmers' household, therefore, it is judged that the degree of achievement of indicator 2 is generally high.

Source: Terminal Evaluation Report and materials provided by JICA.

In light of the above, it can be judged that the overall goal has mostly been achieved.

### 3.2.2.2 Other Positive and Negative Impacts

#### (1) Positive Impacts

##### (i) Improvement in rice quality

<sup>25</sup> Value calculated from the price in local currency and the JICA average currency conversion rate for 2016 (1 Uganda shilling = 0.03189 Japanese Yen).

According to interviews with rice millers<sup>26</sup>, the quality of the rice brought by the farmers has increased, and the main reason for improvement in the rice quality is that the process of drying the rice after harvesting is more appropriately carried out. Specifically, by drying on vinyl sheets rather than on the ground, mixing of foreign matter such as stones and other is reduced (note that this appropriate method of drying was learned by the farmers at the trainings in this Project).

(ii) Women's empowerment

According to the results of the beneficiary survey, the percentage of farm-works for rice cultivation, which is carried out by both men and women, varies depending on the type of farm-work<sup>27</sup>, but on average is 51.5%. This percentage greatly exceeds in which men only make decisions (27.8%) and also women only make decisions (20.8%). Regarding decision-making on how to use the income obtained from rice sales, the percentage in which the decision-making is made by both men and women was 59.3%, the percentage where the decision-making is made by men was 18.6%, the percentage where the decision-making is made by women was 20.0%, and the percentage where the decision-making is made by other members of the family was 2.1% (number of respondents 145). According to interviews with farmers cultivating NERICA rice, the following explanation was received regarding the cause and effect relationship between men and women jointly carrying out farm-works and the increase in the right of women to have a voice. "Compared with cultivation of other crops, rice cultivation requires more labour. If this labour is provided by employing external labourers, the labour costs will increase, therefore, farmers use family labour as much as possible. Therefore, women and other family members are jointly involved in farm-works associated with rice cultivation. The income obtained as a result of farm-works carried out jointly by women and men is property of both sides, and this leads to an increase in the right of women to have a voice in decision-making on how this income is used." Based on this information, it is judged that work carried out jointly by men and women leads to an increase in decision-making by women regarding how the income obtained from rice sales is used. Uses of the income include school fees for the children, nutritional improvement for the family members (purchase of foods), purchase of livestock or land, etc. Also, there are examples (6 cases) in which some women have started small scale businesses (retail of products, etc.) using the income obtained from rice production. This type of women's

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<sup>26</sup> Interview surveys were carried out with 9 rice millers in 9 districts, from among the districts where training for farmers were conducted in this Project and the beneficiary survey was carried out (1 rice miller in each district, and the interviews were carried out with all male operators (there were virtually no female operators)). The district agricultural offices introduced to us about rice miller that could potentially be interviewed, and locates along the road were selected.

<sup>27</sup> Land preparation, seeding, applying fertilizer and agricultural chemicals, weeding, harvesting, and sales. (Supplementary explanation: As for post-harvest in Uganda, threshing and drying are conducted at each household. After that individual farmer transports harvested rice to rice miller for milling.)

empowerment has been confirmed.

(iii) NERICA rice as a stable source of income

According to interviews with district agricultural officers, rice is a cash crop, and the potential yield (quantity produced per unit area) is high compared with other crops, and the price of rice is stable. Therefore, rice is a stable income source for many farmers (see Table 8).

Table 8: Profitability of Crops (an Example of the Northern Region in Uganda)

Units: Ugandan shillings/acre

Crop	District		
	Amuru	Nwoya	Otuke
Maize	536,000	391,000	---
<b>Rice</b>	<b>655,000</b>	<b>732,500</b>	<b>417,500</b>
Groundnuts	483,000	718,500	58,500
Sunflower	---	---	158,500
Sesame	---	---	122,500

Source: Agricultural Value Chain Analysis in Northern Uganda: Maize, Rice, Groundnuts, Sunflower and Sesame, March 2014, Action Against Hunger

Note 1: The above numerical data has been calculated based on information obtained in a field survey (interviews with farmers and those engaged in distribution and processing) conducted in 2013.

Note 2: “---” means that there is no data.

(iv) Use of increased income obtained (livelihood improvement)

The main uses for the income obtained from rice cultivation are expenditure on children’s education (109 out of 152 households (71.7%)), repair or construction of house (46 out of 148 households (31.1%)), purchase of durable goods such as bicycles, etc. (45 out of 152 households (29.6%)), purchase of foods (39 out of 149 households (26.2%)), etc., and there were also cases of purchase of livestock (16 out of 155 households (10.3%)). In this way, NERICA rice production contributes to livelihood improvement (results of the beneficiary survey).

(v) Effect of creation of employment

Although there was no specific numerical data, the interview survey conducted at rice millers (one location in each district of a total of 9 districts in the Northern, Western, and Central regions of Uganda) revealed that the number of rice millers has increased in recent years (see Table 9). Of 9 rice millers that were interviewed, 4 rice millers started business since 2014 (44%). The districts where the number of rice mills has increased since 2012 were at 8 of the 9 locations, therefore, it can be said that there is a certain level of increase in the number of farmers producing rice and the quantity of rice being produced. The increase in the number of rice mills in rural

areas close to the rice production areas shortens farmers' traveling distance to the rice mill, and reduces the transportation cost of harvested rice.

Furthermore, it is considered that the rice production increase and the increase in the amount of rice being transported to rice mills generated income opportunities for persons who provide transport service (rice is transported by truck or by motorbike). In addition, the increase in the number of rice mills means that there is an increase in employment opportunities as operator at rice millers.

Table 9: Results of Interviews Regarding the Change in Number of Rice Millers and the Improvement in Rice Quality

	District (Note 1)	Location of rice miller	Year of commencement of operation	Number of nearby rice millers	Change in the number of rice millers in recent years (in last 5 years)	Improvement in rice quality (Note 3)
1	Kole	Ayer S/C	2014	1	Increased	Improved
2	Dokolo	Town Council	2016	1	Increased	Improved
3	Amuru	Pabbo S/C	2015	5	Increased	---
4	Kakumiro	Bugangaizi West S/C	2010	4	Increased from 2 to 4 in the past 3 years	Improved
5	Hoima	Hoima town	2004	25	Increased from 10 to 25 since 2004	Improved
6	Masindi	Pakanyi S/C	2014	3	Increased (first rice miller installed in 1990)	Improved
7	Nakasongola (Note 2)	None	None	0	None	---
8	Luwero	Zirobwe S/C	2005	4	Increased (to increase by 1 more location in 2017)	Improved
9	Wakiso	---	---	2	Decreased	---
10	Mukono	Nakisunga S/C	2008	6	Increased	Improved
11	Nakaseke	Semuto Town Council	2007	3	Unclear (operating at 2 rice millers)	Improved

Source: Interviews with staff at rice millers. In Wakiso district only, an interview was conducted with staff of the district agricultural office.

Note 1: Rice millers No. 1 to No. 3 are located in Northern Region, No. 4 to No. 6 in Western Region, and No. 7 to No. 11 in Central Region.

Note 2: There is no rice miller in this district (because the rainfall is low, rice cultivation is difficult).

Note 3: At 8 out of 9 rice millers, the rice mill staff replied that the quality of the rice brought by the farmers has improved.

(vi) New commencement of rice cultivation by nearby farmers

From the results of the beneficiary survey, it was found that 16 households (on average)<sup>28</sup> near the trained farmers under this Project commenced rice cultivation. It is considered that this was because the farmers recognize higher profitability of rice cultivation compared with that of other crops in general, and, the trained farmers were

<sup>28</sup> In the beneficiary survey, the farmers that had attended the training seminar were asked how many nearby farmers newly commenced rice cultivation after the completion of this Project, and responses were obtained from 140 farmers (farmers that had attended the training). The average value of the numbers obtained was 16 households.

instructed at the training to transfer acquired skills on rice cultivation to the other farmers. Therefore, it can be said that NERICA rice cultivation is extending naturally to the nearby farmers.

## (2) Negative Impacts

From the results of the beneficiary survey and interview surveys, there was no information regarding negative impacts (natural environment or resident resettlement) directly caused by this Project.

On the other hand, according to interviews with district agricultural officers, information was received that rice cultivation can be seen in some part of wetlands or along rivers in the project target area, and development of wetlands, which are subject to conservation, has started to expand, therefore, there is a fear that degradation of wetland environment progresses.

In Uganda, a National Policy for the Conservation and Management of Wetland was enforced in 1995 regarding the use of wetlands, and, there are guidelines regarding the conservation and management of wetlands. Conservation and sustainable use of wetlands in accordance with the policy and guidelines are being carried out mainly by the Ministry of Water and Environment. It is possible for wetlands to be sustainably used for rice cultivation and fisheries. However, conservation and orderly use are necessary, therefore, it is necessary to carry out awareness-raising activities toward the farmers, etc. Note that an environmental officer is assigned in the natural resource department in each district, who is engaged in environmental conservation of the wetlands.

In addition, the “Wetland Sector Strategic Framework” (2011-2020) has been formulated as a 10 year-plan for wetland management. Its strategic objectives include a legal framework for effective management of wetlands, strengthening fairness, improving productivity of wetlands, etc. Also, in 2011 an environmental conservation team was established within the Ministry of Water and Environment that carries out controls and monitoring of wetlands, etc., based on the laws and regulations, and is carrying out work to clarify the boundary lines of the wetlands<sup>29</sup>.

In light of the above, it can be seen that a certain level of effect has been realized through implementation of this Project, and that its effectiveness and impact are fair. “NERICA rice production is improved in quantity and quality in the target area”, which is the project purpose, has not necessarily been sufficiently achieved. On the other hand, some of the indicators of the overall goal of the Project are not necessarily appropriate, and specific numerical targets have not been set, therefore, although it is difficult to evaluate the degree of achievement by comparison with the target values, the Project has contributed greatly to the increase in income of rice

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<sup>29</sup> Source: Ministry of Water and Environment, Advertiser Supplement, February 2, 2016

farmers, therefore, it can be said that the overall goal has more or less been achieved.

**Box: Operation of a Rice Mill by a Group of Farmers Cultivating NERICA Rice**

In 2009, some farmers from Pakanyi Sub-county in Masindi District attended the training on NERICA rice cultivation of this Project, and received training from staff members of NaCRRRI and Japanese experts. The number of farmers cultivating rice in a part of the area within Pakanyi Sub-county was 28 in 2009, but by 2017 this had increased to about 250. It can be seen that there is interest in rice cultivation among the farmers, and, that the increase in the number of farmers cultivating rice is due to the fact that farmers who had already commenced rice cultivation are transferring acquired rice cultivation techniques to the other farmers.

The local government management and services delivery project<sup>30</sup> is considered to be one of the approaches to rural development. With support from this Project, in 2014, a farmers' group within this sub-county purchased rice mill machinery. Initially, the farmers' group rent the land for installation of the rice mill, and provided the rice milling service, but they saved jointly their earnings to invest for construction of a building for installing rice mill machine. At the time of the ex-post evaluation, one rice milling machine had been installed within the constructed rice milling house, and one operator employed by the farmers' group was working there. The number of members of this farmers' group which is operating rice mill is 32, the majority of members cultivate rice.

During the interview with members of the farmers' group carried out by the external evaluator at the rice mill, by coincidence, a rice farmer brought rice (unhulled) that had been dried. As far as the external evaluator could see, there was no dirt, etc., mixed with the unhulled rice before milling. Inspection of the rice after milling showed that virtually almost none of the rice grains were broken, and that the milled rice had extremely good quality. It also appears that there was no mixing of rice varieties. According to the interview with the members of the farmers' group, the members of this group provide instruction to rice farmers on the appropriate rice drying methods after rice harvest. It is considered that this kind of instruction has resulted in producing good quality rice.

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<sup>30</sup> Project implemented by the Ministry of Local Government, with assistance from the World Bank



Rice milling machine installed in the building



Rice after milling

Note that almost all the rice produced in this area is consumed within the area. According to interviews with a shop owner, for about 3 months after the rice harvesting season, locally produced rice is available in the shops, but thereafter purchased imported rice is sold. From this, it can be seen that the number of farmers producing rice in this area has increased and the amount of rice production has also increased. On the other hand, it can also be seen that the demand for rice in this area greatly exceeds the quantity of rice produced in the area, and that the demand for rice in the rural areas has greatly increased.

### 3.3 Efficiency (Rating: ②)

#### 3.3.1 Inputs

The planned and the actual inputs on Japanese and the Ugandan sides to this Project are shown in Table 10.

Table 10: The Main Planned and Actual Inputs for This Project

Inputs	Plan	Actual
(1) Experts	The long-term and short-term deployment plan for experts is unclear. (Chief advisor, rice cultivation techniques/training, dissemination, upland rice irrigation technology, post-harvest processing, etc.)	3 long-term experts (82.4 MM*) 30 short-term experts (33.5 MM)
(2) Trainees received	As necessary	8 persons (training in Japan)
(3) Equipment	Vehicles, agricultural machinery, laboratory equipment	Vehicles, tractors, office equipment, agricultural machinery
(4) Operational Cost	Including day-to-day work cost, training cost, cost of field preparation	130 million yen
Japanese Side Total Project Cost	330 million yen	385 million yen
Ugandan Side Total Project Cost	(Not stated)	0.8 million yen

\* MM stands for man month.

Source: Prepared by the external evaluator based on the ex-ante evaluation document of this Project, the terminal evaluation report, and materials provided by JICA.

#### 3.3.1.1 Elements of Inputs

In November 2010, construction of the “Rice Research and Training Centre” financed by a grant aid project was completed. Thereafter, research and training for rice cultivation were carried out using the centre buildings, the rice experimental fields, workshops, etc., and as a result, the activities of this Project were smoothly carried out.

In this Project, equipment was provided not only to NaCRRI, but also to ZARDIs. Also, development of rice fields at ZARDIs was carried out. The costs of installing fences around the Rice Research and Training Centre (within NaCRRI) that was constructed by the said grant aid project were also included in the expenditures. In addition, the number of short-term experts dispatched was 30, a large number<sup>31</sup>. According to interviews with Japanese experts, these factors resulted in an increase in the project cost.

Equipment including office equipment such as computers and printers, vehicles, agricultural equipment such as threshers and tractors, and research equipment such as leaf area meters was procured in this Project. On the other hand, the grant aid project intended to procure equipment that is directly connected to the facilities to be constructed, therefore, it can be said that the equipment procured in the grant aid cooperation project and the equipment procured in this Project were complementary to each other.

#### 3.3.1.2 Project Cost

The planned project cost on the Japanese side was about 330 million yen, but the actual cost exceeded the planned amount at 385 million yen (117% of the planned amount). The main reasons for this were the large number of short-term experts dispatched, the necessity of providing equipment, and developing the rice fields at ZARDIs.

#### 3.3.1.3 Project Period

The planned project period was 36 months from August 2008 until July 2011. The actual project period was 35 months from August 2008 until June 2011, which was within the planned period (97%).

Although the project period was within the plan, the project cost exceeded the

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<sup>31</sup> According to interviews with Japanese experts, researches on NERICA rice in Uganda was still in the initial stage, and it was necessary for specialized and academic researches to be carried out such as pest and disease control, the relationship between the soil moisture content and NERICA rice growth, etc. Therefore, it was necessary to dispatch many researchers from Japanese universities, so the number of experts dispatched became large.



plan. Therefore, efficiency of the project is fair.

### 3.4 Sustainability (Rating: ②)

#### 3.4.1 Related Policy and Institutional Aspects for the Sustainability of Project Effects

Increase in rice production and improvement in productivity, and strengthening of the dissemination capabilities and extension system are considered to be important in the Second National Development Plan (2015/16-2019/20) and the Agricultural Sector Strategic Plan (2015/16-2019/20) of Uganda. Also, the Directorate of Agricultural Extension Services was established within MAAIF, the National Agricultural Extension Policy was formulated in 2016, and strengthening of the agricultural extension system is in progress. Under these circumstances, NaCRRI and ZARDIs play important roles in implementing research and training in rice cultivation.

In light of the above, it is judged that the Ugandan government and MAAIF maintain policies and institutional structures in order to actively promote agriculture and rice production in the future, therefore, there are no problems regarding the policy and institutional aspects for this Project.

#### 3.4.2 Organizational Aspects for the Sustainability of Project Effects

At the time of the terminal evaluation, it was pointed out that there was a shortage of research personnel in the field of rice cultivation. The number of researchers and technicians<sup>32</sup> in NaCRRI at the time of completion of the Project (2011) was 8, but according to the data obtained at the time of the ex-post evaluation, this number had increased to 18 (2016). The rice researcher personnel have been strengthened. Note that the rice researchers from NaCRRI have been busy because they have been involved in so many research activities like research provided by the JICA technical cooperation project, or other research activities financed by the Government and donor assistant projects. However, according to the interviews with the Japanese experts, the activities in this Project had been carried out so far under the leadership of the Japanese side, in order to realize the outcome of the Project. Therefore, there is a necessity to further increase the personnel of NaCRRI in order to improve their initiative for the research activities in the JICA technical cooperation project.

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<sup>32</sup> Research staff that carry out research based on instructions from researchers

Table 11: Trend in the Number of NaCRRI Research Staff (2009 to 2016)

Unit: persons

Year	2009	2010	2011	2012	2013	2014	2015	2016
Research staff engaged in research and training regarding rice cultivation	2	2	2	3	3	3	5	5
Technicians engaged in the same (research staff that carry out research based on instructions from the researchers)	2	2	2	4	4	4	6	6
Other support staff connected with rice research	4	4	4	7	7	7	7	7
Total	8	8	8	14	14	14	18	18

Source: NaCRRI

Although the status of implementation of research and training into rice cultivation by ZARDIs and NaSARRI, which are regional research institute, differs somewhat depending on each organization, basically these organizations have researchers into rice cultivation (about 5 to 7 researchers per organization), and research and training into rice cultivation continues to be carried out at least a 7 ZARDIs out of 9 ZARDIs (there are 9 ZARDIs in whole country), and at NaSARRI. Table 12 shows the number of researchers working on rice cultivation at the time of the ex-post evaluation.

Table 12: Number of Rice Researchers at ZARDIs and NaSARRI (as of May 2017)

Unit: persons

	Institute	Number of persons involved in rice research			
		Researchers	Technicians	Support staff	Total
1	NaSARRI	3	2	2	7
2	Abi ZARDI	3	3	2	8
3	Bulindi ZARDI	3	2	2	7
4	Mukono ZARDI	---	---	---	---
5	Mbarara ZARDI	3	2	2	7
6	Rwebitaba ZARDI	2	2	1	5
7	Nabuin ZARDI	---	---	---	---
8	Kachwekano ZARDI	1	2	2	5
9	Buginyanya ZARDI	3	1	3	7
10	Ngetta ZARDI	1	2	2	5

Source: Hearing from each ZARDI

Note: It was not possible to contact the relevant persons at Mukono ZARDI and Nabuin ZARDI, therefore, information could not be obtained.

In the field of training and extension, the extension officers working at NAADS were dismissed in 2014 due to the reorganization of NAADS, which was one of the organizations providing agriculture extension services (the agricultural extension service was eliminated from the roles of NAADS). On the other hand, the extension officers (agricultural officers) belonging to the district agricultural offices continued to be employed. Thereafter some of the extension officers that had been dismissed from NAADS were employed by the district agricultural offices. In addition, number of agricultural officers (newly employed) at the district agricultural offices is increasing, in accordance with a new agricultural extension policy. There is no difference in the contents of the extension activities undertaken by the NAADS extension officers and the extension activities undertaken by the agricultural officers belonging to the district agricultural offices. Therefore, it is considered that the increase in the number of agricultural officers will result in strengthening the extension structure, and in terms of institutional aspects it can be said that recovery is in progress. Note that there is no change in the necessity for improvement in promotion of cooperation between the research institutions and the extension organizations. At the ex-post evaluation, discussion on creation of a training unit at NaCRRI is underway in NaCRRI. If this training unit is established, this unit takes roles to communicate and coordinate with agricultural extension implementing institutions for arranging trainings. Therefore, it is expected that a role on promotion of linkage between research institutions and extension institutions is added for the training unit.

In summary, the research and extension structure for rice cultivation promotion is being improved, and although there are no major problems with the organizational aspect of research, there are some issues regarding strengthening the extension system and the linkage between research and extension. Therefore, the sustainability of this Project in the organizational aspect is partially satisfactory.

#### 3.4.3 Technical Aspects for the Sustainability of Project Effects

After completion of this Project, the capability for research into rice cultivation has been continuously strengthened at the research institutes such as NaCRRI, etc., through a technical cooperation project called PRiDe Project (2011-2018) (including an extended period) which was being implemented at the time of the ex-post evaluation. Research reports relating to rice are continuously prepared, and the number of reports and papers produced by NaCRRI is maintained at a certain constant level, and therefore it can be said that the technical level of NaCRRI is being maintained (Table 13). Note that the number of researchers involved in rice research at NaCRRI is steadily increasing as shown in Table 11, but it is necessary to further increase the number in order to develop the young researchers, and for the Ugandan

researchers to take the initiative in proceeding with the research.

Table 13: Trend in the Number of Rice Related Research Reports and Papers Produced by NaCRRRI

Year	2009	2010	2011	2012	2013	2014	2015	2016
Number of research reports (No.)	2	2	2	2	2	2	2	2
Number of papers (No.)	2	2	3	3	4	4	4	3
Total	4	4	5	5	6	6	6	5

Source: NaCRRRI

Research and training in rice cultivation is continuously carried out at almost all of the ZARDIs and at NaSARRI. There are also institutes where rice seed multiplication is carried out. Table 14 shows the status at the time of the ex-post evaluation. At all of the 8 institutes for which information was obtained, rice research is carried out, and, training in rice cultivation is continuously implemented for farmers. In 6 out of the 8 institutes, rice seed multiplication is carried out. Regarding the research and training capability of the researchers in the field of rice belonging to ZARDIs and NaSARRI, it is said that there are differences in the level of capability depending on the researcher<sup>33</sup>, and there is a necessity to further strengthen capabilities in accordance with the research implementation capability.

Table 14: Status of Rice Cultivation Research, Rice Seed Multiplication, and Training on Rice Cultivation at ZARDIs and NaSARRI

	Institute	Continuation on Rice Cultivation Research		Rice Seeds Multiplication		Implementation of Training on Rice Cultivation for Farmers	
		Yes	No	Yes	No	Yes	No
1	NaSARRI	○		○		○	
2	Abi ZARDI	○		○		○	
3	Bulindi ZARDI	○		○		○	
4	Mukono ZARDI	---	---	---	---	---	---
5	Mbarara ZARDI	○			○	○	
6	Rwebitaba ZARDI	○		○		○	
7	Nabuin ZARDI	---	---	---	---	---	---
8	Kachwekano ZARDI	○			○	○	
9	Buginyanya ZARDI	○		○		○	
10	Ngetta ZARDI	○		○		○	

Source: Information obtained through hearing to each ZARDI (May 2017)

Note: It was not possible to contact the relevant persons at Mukono ZARDI and Nabuin ZARDI, therefore, information could not be obtained.

In addition, capacity development (trainings) on rice cultivation techniques for agricultural officers at the district agricultural offices has been continuously implemented through PRiDe Project. Recruitment of new agricultural officers will

<sup>33</sup> Information obtained from the interviews with the Japanese experts at the time of the ex-post evaluation.

continue in the future, therefore, the need for training to the newly employed agricultural officers will continue. In addition, it will be necessary to improve the capabilities (carry out refresher training) for those agricultural officers that already have some knowledge of rice cultivation techniques.

Regarding manuals relating to rice cultivation, a technical manual (Rice Cultivation Handbook) produced in this Project has been revised in PRiDe Project. In addition, training posters have been produced (seeding, weeding, post-harvest processing, etc.), and are used in the trainings for agricultural officers and/or farmers. The necessary manuals and training materials have mostly been prepared.

Regarding operation and maintenance of the equipment used at NaCRRI, almost all the equipment is being used well, and the necessary spare parts are being procured and replaced, therefore, the technical level is appropriate. However, in the future, the service life will be exceeded depending on the type of equipment (for example tractors<sup>34</sup>), therefore, it is necessary to prepare an equipment maintenance and replacement plan, taking into consideration the condition and replacement time for each item of equipment.

In light of the above, it is judged that it is necessary to further strengthen the extension capacity (*e.g.* training of the newly employed agricultural officers), and the sustainability of this Project in the technical aspect is partially satisfactory.

#### 3.4.4 Financial Aspects for the Sustainability of Project Effects

As stated in “3.4.3 Technical Aspects for the Sustainability of Project Effects”, the technical cooperation project “PRiDe Project” was being implemented at the time of the ex-post evaluation. Therefore, the majority of the budget necessary for research and training on rice cultivation and seed multiplication at NaCRRI depended on JICA’s expenditures for project activities. The degree of dependence on the JICA project was high, and as a result, there were cases in which the budget necessary for facility and machinery maintenance (troubleshooting and replacement) was not sufficiently provided at an appropriate time (there was a delay in the arrival of the budget, and in some cases the amount spent was less than the amount budgeted.). However, a constant level of budget is being provided for the operation and maintenance of the Rice Research and Training Centre (see Table 15).

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<sup>34</sup> In Japan, the service life of a tractor is normally taken to be 8 years. This Project was completed in 2011, so about 2018, the tractors procured in this Project will come to the end of their service life.

Table 15: Revenue of NaCRRI (past 3 years)

Units: Ugandan shillings

Revenue		2014/15	2015/16	2016/17
1	Revenue from the Ugandan government	1,235,049,600	1,262,438,357	1,222,845,303
2	Revenue from other donor organizations	6,284,075,703	8,642,318,116	10,942,445,361
3	Revenue from research institutes, universities, etc.	5,593,860,812	5,354,138,450	4,111,114,379
4	Others	47,368,200	32,500,600	169,982,000
Total		13,160,354,315	15,291,395,523	16,446,387,043

Source: NaCRRI

Note: Calculated with JICA's rate for fiscal year 2016 (annual average: 1 Ugandan Shilling = 0.03189 Yen)

Table 16: Expenditure of NaCRRI (past 3 years)

Units: Ugandan shillings

Expenditure		2014/15	2015/16	2016/17
1	Staff salaries	2,478,718,429	2,446,416,819	3,588,115,459
2	Research and training costs	6,040,539,835	6,245,106,149	7,582,824,337
3	Maintenance cost	4,526,069,401	5,033,959,057	4,223,460,177
4	Equipment procurement cost	69,725,000	1,291,559,469	925,000,000
5	Externally commissioned research costs	45,301,650	274,354,029	126,987,070
Total		13,160,354,315	15,291,395,523	16,446,387,043

Source: NaCRRI

Table 17: NaCRRI's Budget for Cereal Program and Maintenance of the Centre

Units: Ugandan shillings

Budget item		2014/15	2015/16	2016/17
1	Rice research and training budget	916,500,000	746,000,253	985,000,000
2	Maize research and training budget	174,984,138	1,025,626,075	1,675,721,100
(1+2)	Total of the above (cereal research program)	1,091,484,138	1,771,626,328	2,660,721,100
3	Operation and maintenance budget for the Rice Research and Training Centre	1,025,789,265	1,260,720,000	1,437,225,000

Source: NaCRRI

Table 18 shows the budget for rice research in ZARDIs and NaSARRI at the time of the ex-post evaluation. Budget information was obtained from 8 out of 10 institutes. Budget for rice research is appropriated for 4 out of the 8 institutes. The amounts converted into dollars range from \$3,300 to \$14,400. Although this is not necessarily a large amount, budget is allocated for research into rice cultivation, therefore, the sustainability of research on rice cultivation is ensured. At the other institutes, the budget is not officially appropriated for research on rice cultivation, but budget from other projects, etc., is used.

Table 18: Budget for Rice Research in ZARDIs and NaSARRI

Units: Ugandan shillings

	Institute	Whether or not there is budget for rice research (fiscal year 2016/17) and amount	
		Yes/No	Amount
1	NaSARRI	N	Depends on budget of various projects
2	Abi ZARDI	Y	25,000,000
3	Bulindi ZARDI	N	Relies on PRiDe Project
4	Mukono ZARDI	---	---
5	Mbarara ZARDI	N	Depends on various projects
6	Rwebitaba ZARDI	N	Requested after implementation of the activity
7	Nabuin ZARDI	---	---
8	Kachwekano ZARDI	Y	52,000,000
9	Buginyanya ZARDI	Y	12,000,000
10	Ngetta ZARDI	Y	30,000,000

Source: Hearing from each ZARDI (May 2017)

Note 1: the Ugandan fiscal year is from July 1 to June 30 of the following year.

Note 2: “---” means it was not possible to obtain information.

Regarding the budget for the district agricultural offices, according to interviews at MAAIF and district agricultural offices, the activity expenses for the district agricultural office headquarters corresponds to about 63,000 yen per year, and, there is almost no activity expenses that can be used by the agricultural officers belonging to the sub-county offices, therefore, the budget for the extension activities is extremely insufficient. However, the National Agricultural Extension Policy of Uganda indicates that there is an intention to greatly increase the amount of budget for extension activities, and MAAIF has indicated an intention to increase the amount of budget for extension activities in fiscal year 2017/2018<sup>35</sup>.

In light of the above, the sustainability of this Project in the financial aspect is not necessarily sufficiently ensured, and there are some problems. According to interviews with the MAAIF staff and the National Agricultural Extension Policy of Uganda formulated in 2016, MAAIF intends to increase the amount of budget for extension activities. Therefore, the amount of budget for extension activities will increase, and it is expected that the sustainability of this Project in the financial aspect will improve.

Some minor problems have been observed in terms of the organizational, technical, and financial aspects. Therefore, sustainability of the project effects is fair.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

This Project was implemented with the project purpose of improving NERICA

<sup>35</sup> The Ugandan fiscal year is from July 1 to June 30 the following year.

rice production (upland rice and lowland rice) in its quantity and quality in the target area, and with the overall goal of contributing to improved rice production for self-sufficiency of Uganda, and increasing farmers' incomes, at NaCRRI and ZARDIs under supervision by NARO, acting as the project implementing agency. NARO is a research institute directly controlled by MAAIF of the Republic of Uganda.

At the time that this Project was planned and at the time of its completion, modernisation of agriculture and promotion of rice production had high importance in the Ugandan development policy, plans and development needs. Furthermore, at the time of planning, the Project was highly consistent with the Japan's ODA policy. Therefore, the relevance of this Project is high. The capabilities of NaCRRI and ZARDIs for research and dissemination of NERICA rice (upland rice and lowland rice) have generally improved, and the appropriate rice cultivation techniques are being transferred to farmers, etc. in the target areas. On the other hand, regarding improvement of NERICA rice production in its quantity and quality in the target area which was a purpose of this Project, although the result of improvement in quality and quantity has been produced, the indicator for the production quantity has not been achieved. Some of the indicators associated with the overall goal are not necessarily appropriate, and specific numerical targets have not been set, therefore, although it is difficult to evaluate the degree of achievement by comparison with the target values, it can be said that the overall goal has been mostly achieved, as the Project has contributed greatly to the increase in income of rice producing farmers. Other impacts of the Project include contribution to improvement in the livelihood of rice producing farmers, improvement of the status of women within the household, etc. In light of the above, effectiveness and impact of the Project are fair. Although the Project was implemented according to the predetermined schedule, the project cost exceeded the planned cost, therefore, efficiency of the Project is fair. As for sustainability of the Project, although no particular problems are observed in the policy and institutional aspects, there still remain some issues regarding organizational aspect, such as the number of extension officers (agricultural officers), linkage between research and extension. In the technical aspect, some problems remain to be solved in terms of improvement of rice cultivation skills of the agricultural officers, and there are also some problems in the financial aspect, the sustainability of the effects generated by this Project is therefore fair.

In light of the above, this Project is evaluated to be partially satisfactory.

## 4.2 Recommendations

### 4.2.1 Recommendations to the Implementing Agency

#### Recommendations for MAAIF, NARO and NaCRRI

##### (1) Promotion of appropriate use of wetlands

Development of the low-lying wetlands in the Eastern Region of Uganda is a



major problem from the viewpoint of conservation of the natural environment. In contrast, NERICA rice cultivation in upland fields does not cause many problems to wetlands. However, NERICA rice can also be cultivated in wetlands, and there is information that rice cultivation has started in some wetlands in the project targeted area. The Ugandan government has prepared the National Policy for the Conservation and Management of Wetland Resources (1995), a Wetland Sector Strategic Framework (2011-2020), and has elaborated guidelines regarding the conservation and management of wetlands, and activities to promote conservation of the wetlands and its proper use have been carried out. Under these circumstances, “Guidelines for Irrigation Development Process in Wetlands” were produced in the JICA Technical Cooperation for Development Planning Project named “Project on Irrigation Scheme Development in Central and Eastern Uganda” (2014-2017). Therefore, it is desirable that when irrigation development to which these guidelines can be applied is being implemented, the use of these guidelines should be promoted, and awareness-raising activities should be carried out among the farmers in cooperation with the other relevant central government organizations and district governments, in order to achieve both conservation of wetlands and their sustainable use.

#### (2) Promotion of “farmer-to-farmer” extension

It was found from the results of the beneficiary survey that technology transfer from the rice farmers that have attended the trainings to the neighbouring farmers is being carried out. It is considered that it would be effective to further strengthen this community-based technology transfer (technology transfer from practicing key farmers to other farmers). The National Agricultural Policy of Uganda recognizes the necessity of “farmer-to-farmer” extension. Also in PRiDe Project (technical cooperation project) which was being implemented at the time of the ex-post evaluation, the method of extension being tried was technology transfer from a core farm group to other farm groups, utilizing demonstration farm. Based on these circumstances, it is desirable that trials and establishment of the systems and methods of extension of rice cultivation techniques to farmers should proceed, and thereafter a method should be established incorporating the “farmer-to-farmer” extension approaches within the extension system of rice cultivation techniques.

#### (3) Community support for creation of added value

According to the beneficiary survey, among the farmers that have attended the trainings and within some rural communities, there are those that wish to participate in the subsequent stages after the stage of production, namely processing, packaging, and marketing, which are part of the value chain. For farming groups that are functioning well, it is necessary to provide support and strengthen capabilities

regarding processing machinery and marketing aspects, in order to create further income.

#### 4.2.2 Recommendations to JICA

It is considered desirable that in future when JICA is carrying out cooperation regarding rice cultivation, including NERICA rice cultivation, awareness-raising activities regarding the conservation and use of wetlands should be included in the contents of the training for the farmers, so that degradation of the wetland environment is not caused. Also, in order to promote the “farmer-to-farmer” extension, it is considered desirable that methods of “farmer-to-farmer” technical transfer be constructed and verified, and activities to apply these methods be included within the project activities.

#### 4.3 Lessons Learned

##### (1) Improvement in reliability of statistical data regarding rice production and set up of appropriate indicator

To date, trainings on rice cultivation techniques have been carried out for many farmers through JICA assisted projects, which have contributed to increasing the rice production. However, in Uganda, there is no reliable statistical data regarding quantity of rice produced, therefore, it is difficult to accurately determine the magnitude of the increase in rice production, the quantity of rice consumed within the country, and effects of rice promotion activities (including the impact of JICA cooperation). MAAIF is increasing the number of staff in charge of statistics, but in the future it will be necessary for them to strengthen the collection of statistical data relating to crop cultivation such as cultivation area and production, etc., in cooperation with the staff of the district agricultural offices, etc. In particular, regarding rice production statistics, it is desirable that activities be incorporated into project activities, in order to appropriately evaluate the outcome of a project, and, to increase the reliability of the rice production related statistical data. For example, periodically carrying out sample surveys, or preparation of records at rice millers, etc., can be considered.

In addition to incorporating project activities for improving reliability of statistical data, setup of indicators that can measure direct impacts of a project is important. Therefore, setup of appropriate indicators should be well considered at the time of planning for similar project or revision of PDM (project design matrix).

##### (2) Detailed agreement regarding financial commitment and roles of the implementing agency

During the progress of JICA cooperation projects, the Ugandan government

side tended to rely on JICA for financial matters (rice research, training activities, seed production, etc.), and, according to the interviews with the Japanese experts, the project activities proceeded under the leadership of the Japanese side, in order to realize the outcome of the project. At the time of the ex-post evaluation, the technical cooperation project “PRiDe Project” (successor project of this Project) was being implemented (activities in this project were being carried out with coordination and cooperation between the Ugandan side and the Japanese side on funding and personnel aspects, and specifically if there were financial aspects or personnel aspects that the Ugandan side could not sufficiently deal with, it was supported from the Japanese side). Therefore, although there are no problems with respect to implementation of activities related to research, training, and seed multiplication, there is partial problem from the viewpoint of sustainability. In order to improve these points, efforts are being made in above mentioned PRiDe Project to establish a new training unit within NaCRRI, and generate revenue through seed multiplication and sales, and create a system for the use of earnings (this activity was started from latter half of the project period). In the future, when JICA cooperates project, it is desirable that a project plan be prepared and agreed indicating detailed financial allocation and roles of both implementing institution and JICA sides, including a process so that the counterpart institution takes a more leading and autonomous role. It is considered that in this way the sustainability after completion of a project will be increased in both financial and organizational aspects.

End