

REPUBLIQUE DU CAMEROUN
Paix – Travail - Patrie

REPUBLIC OF CAMEROON
Peace – Work - Fatherland

MINISTERE DE L'AGRICULTURE ET DU DEVELOPPEMENT RURAL

MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

NATIONAL STRATEGY FOR RICE GROWING IN CAMEROON

(MILLING) III

March 2009

TABLE OF CONTENTS

SUMMARY.....	4
I. INTRODUCTION.....	4
Global and National context	4
National production and consumption trends: importance in rural earnings, economic growth and food security	4
II. REVIEW OF THE NATIONAL RICE SECTOR.....	5
The place of rice in national policies.....	5
Preferences and projections of demand.....	6
Typology of players in the sector.....	7
The Gender question in production, processing and marketing.....	8
The comparative advantage of domestic production.....	8
III. CHALLENGES AND OPPORTUNITIES RELATED TO DEVELOPMENT OF THE RICE SECTOR.....	8
Potential of local rice in poverty reduction and economic growth...	8
Land tenure system.....	9
Transborder/regional issues.....	9
Lessons learned from previous Research/Development.....	9
Human and Institutional capacity.....	9
IV. PRIORITY AREAS AND APPROACHES	10
Ranking of ecological areas with regard to their production potential.....	10
Identification and ranking of ecological opportunities	11
Identification of challenges and institutional and policy opportunities	12
V. VISION AND SCOPE OF THE NATIONAL DEVELOPMENT STRATEGY.....	12
Aims and objectives.....	12
Acreage, yields and production in 2008. Target by ecological area.....	13
Number of researchers, technicians and extension officers in 2008 ; Future objectives...	14
Long term price strategies.....	14
Institutional aspects of the NSDR.....	14
Government commitment in human and financial resources.....	14
National actors, links with regional and trans-border initiatives. Building partnerships	15
• Key interventions (innovations, technologies, policies, institutions, capacity building).....	
VI. STRATEGY FOR THE SUB-SECTOR.....	16
Seeds.....	16
Marketing and distribution of fertilizers.....	16
Irrigation and investments in water technologies and management.....	16
Access to agricultural equipment and their maintenance.....	17
Research, distribution technologies and capacity building.....	17
Access to loans/agricultural funding.....	17
Post harvest and marketing activities	18
•	
VII. CONCLUSION.....	18
APPENDIX	19

SUMMARY

The so-called “high living cost ” crisis of the first quarter of 2008 brought social backlash in several African countries, among them Cameroon. Yet Cameroon had attained relative food self-sufficiency in the 1970s, producing 80% of the rice consumed in 1975. However, the severe economic crisis of the mid-1980s coupled with lack of investment or maintenance of basic infrastructure resulted in production falling to the point where it triggered rice importation. By 2006, these imports amounted to 429,864 tons, accounting for FCFA 87 billion of budget allocation.

The state is dependent on international markets for the rice sector while, paradoxically, potential for domestic production is huge. There are, specifically, favorable natural conditions that are yet to be tapped; indeed rice can be grown in practically all natural regions of Cameroon. Moreover, local populations in the Great North, Northwest and West have a long tradition of rice growing. The relatively cheap manpower available in the country could make the rice produced in Cameroon competitive on the world market.

Although there is a rapidly growing domestic market that constitutes an immediate market opportunity for national production, rice production continues to fall due to several constraints including: (i) the difficulty of access to inputs (fertilizers and pesticides); (ii) lack of or insufficient improved seeds; (iii) weak organization by producers; (iv) high post-harvest losses; (v) dilapidated or low output husking equipment; (vi) poor funding of agricultural activities; and (vii) the isolation of major production areas.

Consequently, the strategy for the development of rice production in Cameroon seeks to improve the productivity and competitiveness of local rice by mitigating these constraints to production. The strategic options spelt out within the framework of the National Strategy for the Development of Rice Growing include: (i) support for the acquisition of agricultural inputs; (ii) basic planning of irrigable areas and the rehabilitation of infrastructure and agricultural equipment in the large rice irrigation schemes; (iii) support to structuring and professionalizing producers; and (iv) support for processing and marketing of rice. The inherent cost for their implementation was estimated at FCFA 191 billion, translating to US\$ 382,000. The aim was to write off imports by increasing national production from 65,000 tons in 2008 to 627,250 tons of milled rice by 2018 and to build up safety stocks.

I. INTRODUCTION

Global and national context

The strong global demand for food brought about by the sustained growth of Asian economies and skyrocketing and unstable petrol prices led to a grain shortage and an increase in cereal prices on the world market. Indeed, global stocks have experienced their lowest level in a quarter of a century. This resulted in the crisis of high living costs which manifested in social upheavals in Cameroon during the first quarter of 2008. Despite the current petrol prices, many analysts are of the opinion that cereal prices will remain high for a long time.

Faced with this situation, the meeting of the Council of Ministers of the Africa Rice Center (WARDA) member states held in Abuja, Nigeria in September 2007 sounded the alarm by drawing the attention of the international community to the fact that Africa, in spite of being home to just 12% of the world population, draws in 32% of world rice imports and has a high growth rate of consumption at 4.5% per annum. The Council also stated that in Central Africa rice imports increased 14-fold between 1961 and 2007, rising from 32,100 to 470,974 tons while cereal production per inhabitant reduced from 157 to 84.9 kg. The Council recommended that an urgent special program be implemented; the program is called the Coalition for African Rice Development (CARD). The National Strategy for the Development of Rice Growing (NSDR) was also developed in response to this concern.

National production and consumption trends, their importance in rural earnings, economic growth and food security

Rice is the staple food for rural and urban populations in Cameroon. National demand was estimated at 300,000 tons in 2009, essentially covered by imports. According to the latest household consumption survey (ECAM 3, 2008), average rice consumption per head in Cameroon in 2007 was worth FCFA 11,180 in urban areas for towns with more than 50,000 inhabitants; FCFA 5,817 in rural areas; the national average was FCFA 7,709 FCFA. Taking an average price of FCFA 300 per kilogram, this consumption would be around 37.3 kg in urban areas, 19.4 kg in rural areas and 25.7 kg per inhabitant for the national average. According to the same survey, around FCFA 138 billion were devoted to the purchase of rice in the food budget for households against FCFA 112 billion in 2001, representing an increase of about 4% per year.

National production is estimated at 100,000 tons of paddy grown on 44,000 ha each year. Most of this production comes from irrigated schemes in the Northwest and Far North which are well away from the centers of consumption in the south of the country (Yaoundé and Douala). About 145,000 farmers are involved in producing rice, which is mainly exported to neighboring countries (Nigeria, Chad and the Central African Republic (CAR)).

The Far Northern region produces around two-thirds of the country's rice. It is estimated that the number of people directly living off rice growing activities is 180,000, with 27,000 households and 3000 other actors (agricultural workers, business people, retailers, hauliers, husking machine operators, suppliers of inputs, sellers of packaging material, etc.).

The current strategic directions of Cameroon are as follows: (i) rehabilitation of irrigated schemes; (ii) development of lowland and flood plains; (iii) introduction of rice growing around proposed dams; and (iv) the diversification of production systems with special emphasis on rainfed and lowland rice growing, especially in the northern areas with high rice potential.

As a result, the NSDR hopes to merge the efforts of different partners to increase national rice production substantially. The strategy is essentially founded on a feasibility study of a support program for the development of rice production conducted by MINADER in 2004 and updated in 2008. This study formed the basis of training projects already developed and those being developed with the financial assistance of the International Fund for Agricultural Development (IFAD) and the World Bank.

II. REVIEW OF THE RICE SECTOR

The place of rice in national policies

Development policies for the rural sector in Cameroon have undergone several changes dictated by the economic conditions that have affected the country. The five-year plans gave way to the New Agricultural Policy (NAP) in 1999. The NAP was then reviewed in 2004 to align agricultural policy directions with overall government intent. Nowadays, these ambitions have been nipped in the bud by the global food crisis.

Faced with these new conditions the rural sector development strategy aims at ensuring sustained, sustainable and equitable growth for the sector. The strategy revolves around four points of intervention: (i) modernization of production equipment; (ii) restructuring the institutional framework; (iii) construction of an incentivizing environment; and (iv) sustainable management of natural resources. Shortage of resources allocation for the last three years has hindered its implementation, but this is likely to improve with the need to boost production in the context of the global food crisis.

Cameroon intends, in this regard, to support the development of strategic sectors by intensifying production systems that consolidate the majority of farms. This support is both short- and long-term and the vision embraces strategic cash crops as well as food crops with a strong stake in food security such as rice.

To mitigate food insecurity in marginalized high-density population areas between 1970 and 1990, Cameroon voluntarily encouraged irrigated rice as the most productive form of rice at the expense of rainfed production. Three development companies were founded, namely: the *Société d'Expansion et de Modernisation de la Riziculture de Yagoua* (SEMRY) in the far North, the Upper Noun Valley Development Authority (UNVDA) in the North West and the *Société de Développement de la Riziculture dans la Plaine de Mbo* (SODERIM) to the West. These companies benefited from substantial funding from within and outside the country (more than FCFA 40 billion for SEMRY for the 1979–1988 period and close to FCFA 7.1 billion for SODERIM for the period from 1976 to 1987 and close to FCFA 7 billion for UNVDA for the period between 1981 to 1987).

Despite the magnitude of the investment, production of rice in Cameroon only meets 20% of domestic demand. Several factors can help explain this situation including:

- High cost of production of rainfed rice which requires considerable investment for the development of production basins.
- Location of three major production facilities far from the major urban centers (Yaoundé and Douala) and close to border markets (Nigeria, Chad and CAR).
- Preference by consumers in the southern regions for imported rice because of its superior quality.
- Lack of promotion of other types of rice production, especially in the southern parts of the country. This is despite the progress registered by research since the mid-1990s with the creation of new technologies, notably the NERICA rice varieties that are suitable for rainfed and lowland rice production with minimal production costs.

Currently, the rice sector covers 18,420 ha of irrigated schemes (13,820 ha planned in the SEMRY scheme in the Far North, 2,900 ha for UNVDA to the Northwest, 200 ha to the West and 1,500 ha of small traditional schemes) and around 22,000 ha of upland and lowland (Mbaw plains, Mount Mbapit, Ntui, Ebolowa, Akwaya, Tonga-Makénéné, etc.) that were not previously given much value. Rainfed rice production employs women and youth in about 50,000 households for paddy production activities. Processing and marketing is carried out by factories and business middlemen.

Overall, the production capability established by the State, coupled with strong mobilization by farmers, led to remarkable growth of paddy production between 1970 and 1986, moving from 13,200 tons to close to 120,000 tons per year. Subsequently, production declined to the current 100,000 tons of paddy per year, of which 50,000 tons is rainfed upland or lowland rice.

Preferences and projections for demand

Before 1970, rice consumption in Cameroon was limited to between 15,000 and 20,000 tons per year supplied by traditional production of rainfed crop by SEMRY and by imports.

A steady advance began in the 1970s linked both to external rice purchases and to the development of rice production. Changes in imports were significant and were influenced by the changes in prices and customs regulations.

The rice market grew from 15,000 to 60,000 tons between 1975 and 1980. This progression can be explained by rice imports and the establishment of agro-industrial projects: SEMRY I, Ndop Plains (Upper Noun Valley Development Authority) and Mbo Plains (SODERIM).

Subsequent years saw a recorded drop in national production caused by economic crisis and rapid urbanization which grew from 37% to 47.2% between 1987 and 1997, and gave rise to new eating habits. Urban consumers quickly adopted rice and food made from cereals as being more practical for their way of life. As a result, there has been an increase in imports of rice and other cereals over the years.

Currently, the ratio of imports/food production stands at around 25%. Wheat/maslin and rice are the main import products for Cameroon, with 32% and 19.4% respectively of total imports. Imports of rice alone in 2007 stood at 429,864 tons, according to statistics from the INS, and represented CAF imports spending worth 72 billion FCFA.

The volume of annual imports of cereals, which experienced heavy growth due to changes in eating habits in urban areas and the limited possibilities of growth in national rice production, should stabilize at around 600,000 tons.

Typology of actors in the sector

Researchers

Agricultural research on rice is essentially centered on generation of knowledge and technologies; training of players in development (technicians for research and extension services, seed producers etc.); development of educational materials; and pre-foundation seed production.

Commercial multipliers

Where rainfed rice production is practiced, farmers generally home-save conservatively-bred seed.

In schemes supervised by development bodies, the varieties distributed are first multiplied through research and then by commercial multipliers on contract. However, this method produces small quantities of seeds and is expensive. This is the case with the IR 46 variety that scarcely satisfies the needs of the schemes operated by SEMRY despite it being highly appreciated by rice farmers.

Suppliers of fertilizers

Rice farmers have access to fertilizers supplied by traders. However, owing to the non-activation of the Professional Agricultural Organizations (OPA) credit scheme, some producers are forced to take loans for inputs that they have to repay in kind in the form of three bags of paddy for a bag of fertilizers.

Suppliers of equipment

These are generally local artisans who are often unable to meet local demand. Some producers also prefer to use service providers for labor, harvest and threshing. However, serious liquidity problems arise.

Producers

Before 1990, farmers in irrigated schemes used to benefit from technical guidance from rice companies. They received seed and fertilizers on loan. The farmers also benefited from various services given by the companies (development of plots of land, labor, maintenance of irrigation networks, irrigation, husking, etc.) subject to the payment of tax levied at harvest – usually an average of the monetary equivalent of 2 tons of paddy per hectare.

A majority of producers grow rice on plots with an average size of a 0.25 to 0.5 ha without technical supervision.

Management bodies for irrigated schemes

Management companies have a major role in developing the plots they run and make available for rice farmers who are expected to obtain a certain level of results and to pay for users' rights to the plots..

Processors

Since 1990, processing and marketing have been left to the private sector. The role of government corporations has been limited to: (i) supervising producers; (ii) allocation of plots; (iii) mechanized preparation of some of the land; and (iv) maintenance of irrigation canals and water infrastructure.

Private individuals process the rice using small husking machines, generally retaining one out of every 10 bags of paddy. In rainfed rice areas, the crop is preserved in containers and then processed over time using mortar and pestle when needed for domestic consumption. Marketable surplus is sold in “basins” to traders on the local market or to restaurant operators. This enterprise is run as a cottage industry.

Traders

Until 1990, management companies for large irrigated schemes held the monopoly of collection, milling of paddy and wholesale marketing of milled rice. With the advent of liberalization, producers started marketing their rice in the form of paddy or in husked form. Producers have progressively turned to farmer organizations whenever possible; this gives them more negotiating power.

Due to the landlocked nature of several rice growing areas, rice produced is often transported towards Nigeria where road infrastructure in the border regions is generally in good condition.

The gender question in production, processing and marketing

Rice production, be it irrigated or rainfed, is an activity that attracts both men and women and it requires a lot of labor. The use of labor outside the family circle is also widely practiced during planting, harvesting, transportation and threshing.

Processing is carried out on a small scale if it is intended for on-farm consumption. This type of processing is therefore carried out by women. Both men and women handle products destined for marketing.

Retailing of milled rice is done by women in rural and urban markets while sale of paddy in bags is generally done by men who are heads of households.

Comparative advantage of domestic production (farming, processing, distribution)

The devaluation of the Franc CFA in January 1994 led to an improvement in the competitiveness of local rice. This led to spontaneous development of rainfed rice production supported by incentive prices for consumption. However, it had a negative impact on production costs for development companies whose equipment and spare parts are purchased in foreign currency. Moreover, it has not promoted the resumption of production activities on large irrigated areas whose restructuring was not completed and needed substantial investment.

Compared with imported rice, local rice possesses useful advantages. Several surveys on the costs of production put average returns of rice husked by small private processing units at around FCFA 200 per kilo¹, consumer rice prices being around FCFA 300 per kg. National production of rice would therefore have a competitive edge over imported rice which has a market price of FCFA 350 per kg. This competitiveness of local rice is higher in rainfed and lowland rice due to reduced production costs, especially with regard to field preparation, sowing and fertilization.

Moreover, marketing costs for local rice can be reduced substantially by the current improvement of the roads infrastructure and the improved access for processing equipment.

¹ Similar costs are much higher for the big rice mills because of various running problems and don't therefore represent a normal situation.

III. CHALLENGES AND OPPORTUNITIES RELATED TO THE DEVELOPMENT OF THE RICE SECTOR

Potential for local rice in rural poverty reduction and economic growth

Imports of milled rice have more than doubled over the last 10 years, increasing from 175,000 tons in 1998 to more than 400,000 tons in 2008. Replacing this imported rice each year by exploiting the huge national production would create the equivalent of around 40,000 permanent rural jobs at the production and post-harvest level². This would be worth supplementary gross monetary earnings of around FCFA 50 billion as follows: close to FCFA 20 billion for producers and FCFA 30 billion for operators along the chain³ (hauliers, factories, traders).

Land tenure system

In the irrigated schemes established by the government in the Northern and Far North regions, the abundance of manpower and the enthusiasm for rice growing are such that households are increasingly squeezed on the area developed. Small-scale producers farm plots with an average size of less than a quarter hectare. However:

- For rainfed upland and lowland rice, production, land constraints are less serious due to the availability of an estimated 7,2 million hectares of cultivable land, of which only 26% of the arable land and 17% of the land that could be irrigated are being cultivated.
- With Bantu populations, the land tenure system favors the rights of the individual over collective rights. Each head of the family therefore has a piece of land on which he exercises real rights; the notion of collective ownership only applies in forests. Among these communities, each family runs its own agricultural activities while respecting fallow land without referring to any higher authority.
- In the northern region, with a strong Muslim culture, the role of village chiefs with their customary prerogatives on land (Lawan, Djaoro, Ardo, Boulama) has increased due to the settlement of herders from neighboring countries. The rights of users for pastures are only a concession of the Lamido or the suzerain who takes a fee from users. Various types of conflict are frequent in this area: (i) between farmers and nomadic pastoralists in pasturelands and on the livestock routes; (ii) between farmers and pastoralists around watering points; and (iii) conflicts between Muslims who want to spread their influence on rural land and animists or indigenous Christians. Conflict management is initially handled by traditional chiefs and, if not resolved, by various arbitration authorities created by government at the local level (sub-prefecture, police, etc.).

Trans-border/regional issues

Annual double cropping is possible thanks to the water control introduced in the implementation of the SEMRY project. Construction work carried out covered a total acreage of 5,931 ha. During the off-season work, water pumping in Logone (which serves as a natural frontier between Cameroon and Chad) is regulated by agreements between the two countries: water catchments are limited to a maximum of 10 cubic meters per second (m³/s) between December and May and 5 m³/s between January and April. Because of the crop's high water requirement it is not possible to irrigate more than 3000 ha during the dry season which is the time most favored by rice growers because of the potential high yields.

Domestic production carried out in areas in the Northwest and Far North, remote regions far from the large consumption centers of the South of the country, is in large part taken up by neighboring countries. As for imported rice, surveys on household consumption conducted in 1996 and 2001 underline the fact that close to three-quarters of this rice is destined for urban consumption in Douala and Yaoundé. Furthermore, Cameroonian membership of the Free Trade Area of the Central African Economic and Monetary Community (CEMAC) and the unilateral decision by the country to withdraw most import taxes for commonly consumed products like rice, promotes the re-exportation of imported rice from Cameroon.

² First estimate on the basis of additional production of 160,000 tons of paddy (65% for milling) on 27,000 ha of which close to half has a second rice crop, on an average yield of 4 tons/ha and on permanent jobs to the equivalent of 1.5 men per hectare developed (all activities along the chain being included).

³ Amount estimated on the basis of 12,000 tons of commercialized paddy (25% of on-farm consumption) at an average price of FCFA 150 per kg and 80,000 tons of rice sold retail at around FCFA 250 per kg.

Lessons learned from previous research/development

Research on rice is done by the Institute for Agricultural Research and Development (IRAD) supervised by the Ministry of Science, Research and Innovation.

IRAD collaborated with international partners to develop improved rice varieties and innovative growing techniques to increase rice productivity in the sub-region. Several improved varieties have been adopted by farmers, especially IR46, Tox 3145, CICA 8, ITA 222, ITA 212, Tanaivan V, etc.)

Currently, a regional project by IRAD-WARDA-CFC-FAO "Improving rice competitiveness in Central Africa—NERICA Project" destined for the CEMAC area has used participatory varietal selection to further the introduction of new technologies, especially NERICA varieties, small-scale mechanization and supplementary technologies.

Past experiences come to the fore: the promotion of diversified rice growing that is highly productive and competitive in different agro-ecological areas within Cameroon.

Human and institutional capacity

In the traditional rice producing areas, Cameroon has local populations with good experience in terms of rice production techniques, especially in the Great North, the Northwest and the West. Moreover, the country has substantial and relatively cheap rural manpower.

Many Cameroonian officials have been trained in modern rice production within the framework of international cooperation. As such Cameroon has the human and institutional capacity to support the development of rice production.

IRAD has sub-branches and research stations in all agro-ecological areas in the country. It has a team of 12 researchers and 14 technicians and a laboratory equipped to handle new biotechnology. The University of Dschang houses a Faculty of Agronomy and Agricultural Sciences that has trained dozens of agricultural experts since its inception in the 1960s. The Ministry of Agriculture is responsible for about 20 technical schools where dozens of agricultural technicians are trained every year.

The extension services and advisory support provided by the Ministry of Agriculture and Rural Development constitutes a large network covering all the country's administrative areas with 1278 extension officers, of whom about 30 work full-time on rice and around 300 are part-timers.

At the regulatory level, Cameroon has a committee for certification of varieties and pesticides for agricultural use. The country has also introduced laws on seed, plant health, bioethics and the environment.

IV. PRIORITY AREAS AND APPROACHES

Ranking of ecological areas according to rice potential

Rice growing is practiced in almost all regions of Cameroon. Other than agro-industrial development companies which have set up large managed schemes, there are several basins used for traditional rice growing.

Far North: Different sites have already been identified such as the shores of Lake Malaga, the dams of the Société Nationale des Eaux du Cameroun (SNEC) in Mokolo and Chidifi, the small schemes at Mount Mandara, the shores of Lake Serbewouel, several lowland and run-off areas.

North: The North Region has substantial water extraction potential. Around 20,000 ha of managed developments have already been carried out.

Adamaoua: This region is sparsely populated and has not yet been prospected. Its water and rice potential could be realized in the long term within the framework of the settlement of migrant populations.

West and Northwest: The main sites identified are Baigom and Tikar, the west bank of the Nkam and various small sites of several dozen hectares each.

Southwest and the Littoral: This region benefits from bimodal rainfall which is favorable to two crop cycles per year.

Centre, East and South: Rice potential is mainly found in Centre Region in the plains bordering the Sanaga and its tributaries (Djerem, Mbam). This area has the advantage of being relatively close to large consumption centers.

Potential for production of rice per zone is as follows:

Production type	Current production		Production capacity	
	Area (ha)	Production (tons)	Area (ha)	Production (tons)
Modern sector				
SEMRY project	11,000		20,000	120,000
Logone and Chari project	1,800		2,000	10,000
Lagdo project	800		5,000	25,000
UNVDA project	1,034		5,000	25,000
SODERIM	200		3,000	15,000
Total	14,000	100,000	32,200	195,000

Identification and ranking of challenges and opportunities per region

Challenges for the improvement of productivity and competitiveness of rice vary according to production system.

In irrigated and rainfed rice production, the main constraints noted are mainly on: (i) difficult access to inputs (fertilizers, pesticides and herbicides due to very high costs); (ii) lack of sufficient improved seeds; (iii) manual weeding and threshing (labor intensity and high costs of manpower); (iv) the disorganization of producers (unfavorable to marketing); (v) the lack of or dilapidation of husking machinery leading to low yields; (vi) the isolation of some production areas; and (vii) lack of funding or public support for agricultural activities.

More specifically, the constraints to production in irrigated systems are: (i) the degradation and/shortage of the hydro-agricultural infrastructure and agricultural machinery; and (ii) the low subsidies offered to management companies. In the rainfed systems, the severity of the constraints is heightened by the vagaries of the weather linked to the late arrival of rains, especially in the Far North region, and to the progressive disappearance of traditional varieties.

However, as indicated above, Cameroon is richly endowed with substantial development potential for rice production deserving better exploitation. Even though irrigated rice production is concentrated mainly in areas in the Far North and Northwest, the rest of the country also has substantial potential which includes: (i) availability of large amounts of arable land, especially alluvial plains and lowland; (ii) numerous water courses; and (iii) mangrove areas.

Yield potential from irrigated rice growing sometimes surpasses 8 tons per hectare. At the rainfed level, yields of 5 tons a hectare are harvested, especially in the lowlands.

Identification of institutional and policy challenges and opportunities

Within the emergency plan for boosting agricultural and food production initiated in April 2008, the Cameroonian Government proposed to: (i) facilitate access of producers to agricultural inputs; (ii) fully (100%) support the production of healthy and good quality plant material for strategic crops such as rice; (iii) support around 25% to 50% of the price of fertilizers and pesticides for crops in targeted areas; (iv) facilitate access to mechanization through various means of price support as well as support for the cost of purchasing small agricultural implements; (v) facilitate access to loans through improvement of interest rates which should stand at around 5% for small- and middle-level rural-based enterprises and 8% for agri-industry and large agricultural holdings; (vi) facilitate access to markets through supporting infrastructure development to open up production areas along with storage and processing infrastructure; and (vii) facilitate access to all kinds of agricultural support services, especially training.

These decisions by the government must ensure that rice farming and related investments are boosted and also favor a steady reduction of imports. Consequently, implementation of the NSDR will consolidate government efforts and create a solid basis for an enabling environment for exporting milled rice in the sub-region.

V. VISION AND SCOPE OF THE STRATEGY

The objectives of agricultural policy in Cameroon are: (i) to ensure household food security and self-sufficiency; (ii) to contribute to economic growth, especially to growth of foreign trade and job creation; (iii) to increase producers' earnings; (iv) to improve living conditions for rural populations; and (v) to ensure better use and sustainable management of the soil/water capital, the basis of agricultural production.

These ideas are contained in the Rural Sector Development Strategy (RSDR) drawn up in 2002 and revised in 2006.

The RSDR comprises five priority areas, namely: (i) modernization of production tools; (ii) restructuring of the institutional framework; (iii) sustainable management of natural resources; (iv) searching for outlets at national and international levels; and (v) championing employment and the role of rural women and youth.

In line with this strategy, NSDR operating within the framework of CARD proposes to reduce national dependence imported rice and to improve the production and competitiveness of local rice. To this end, the strategy has the following specific targets: (i) promotion of large-scale production of certified rice seed by the private sector and controlled seed production by farmers through community seed systems; (ii) modernization of production tools through small-scale mechanization and efficient use of inputs; (iii) organization of the sector through championing producer organizations and the setting up of multi-actor, multi-institutional platforms; (iv) sustainable management of water and land resources through the promotion of good crop practices; (v) coverage of national needs and capturing border and regional markets through the promotion of quality labels; and (vi) championing of jobs in rural areas, especially for women and youth.

Area, yields and production in 2007 by type of ecology

National rice production was estimated at 100,000 tons of paddy in 2007, including 65,000 tons of milled rice. The distribution of this production by type of rice growing is shown in Table 1.

Table 1: Basic data by type of ecology

Rainfed rice			Lowland rice			Irrigated rice		
Area (ha)	Yields (t/ha)	Production (tons)	Area (ha)	Yields (t/ha)	Production (tons)	Yields (ha)	Yields (t/ha)	Production (tons)
20,000	1.5	30,000	10,000	2.0	20,000	14,300	3.5	50,000

Production objectives for rice for the next decade are summarized in Table 2.

Table 2: Production perspectives and yields for the next decade

	Rainfed rice			Lowland rice			Irrigated rice			Total paddy			Total milled rice (tons)
	Area (ha)	Yield (t/ha)	Prod (tons)	Area (ha)	Yield (t/ha)	Prod (tons)	Area (ha)	Yield (t/ha)	Prod (tons)	Area (ha)	Yield (t/ha)	Prod (tons)	
2008	20,000	1.5	30,000	10,000	2.0	20,000	14,300	3.5	50,050	44,300	2.3	100,000	65,000
2013	24,000	2.0	48,000	11,000	2.50	27,500	26,000	5.0	130,000	61,000	3.37	205,000	134,000
2018	279,000	2.5	697,500	30,000	3.5	105,000	33,000	5.0	165,000	353,000	2.73	965,000	627,250

Number of researchers, technicians and extension officers: future objectives

Human resources in terms of agricultural research and extension services to accompany the implementation of the NSDR are outlined in Table 3.

Table 3: Number of researchers, technicians and extension officers for the NSDR

	Researchers with PhD			Research technicians			Extension officers		
	Total	Rice Specialists (full-time)	Rice Specialists (part-time)	Total	Rice Specialists (full-time)	Rice Specialists (part-time)	Total	Rice Specialists (full-time)	Rice Specialists (part-time)
2008	12	8	4	14	8	6	350	33	317
2013	19	10	9	28	16	12	970	520	440
2018	22	12	10	30	10	20	1197	660	537

Long-term price strategies

With regard to long-term price strategy, the objective is a reduction in the costs of production and marketing to make local rice more competitive than imported rice in large consumption centers. Intensification of rainfed rice growing is anticipated with the aim of lifting yields from 1.5 to 2.5 t/ha.

As for marketing, emphasis will be placed on lowering transport costs, especially in developing routes to production areas to reduce the estimated costs.

Institutional aspects of the NSDR

At the institutional level, implementation of the NSDR will be monitored by a steering committee set up in the Ministry of Agriculture comprising representatives of:

- Minister of Planning and Rural Development
- Minister of Finance
- Minister of Trade
- Minister of Science and Research
- Minister of Public Works
- Minister of Industry
- Companies in charge of developing irrigated areas
- Private rice companies
- Organizations of rice producers
- Input suppliers
- Factory owners
- Traders
- Labor services providers
- Technical partners and funding agencies in the sector (Japan International Cooperation Agency, World Bank, International Fund for Agricultural Development, African Development Bank, etc.)

The program coordination will be conducted by the National Coordinator, a member of the Task Force on Rice. He/she will have support units based in the production basins.

Government commitments

The government sees the implementation of the NSDR as a good opportunity to consolidate the gains from its emergency plan and to ensure the rehabilitation of agricultural production. In this regard, the government proposes to make several investments during the 2001–2015 period:

- FCFA 3,640 million in support of improved rice seed production by 3,500 producer organizations.
- FCFA 1,550 million in support to SEMRY.
- FCFA 1,800 million in support to UNVDA.
- FCFA 1,303 million to relaunch rice production in the Logone Valley.

In addition, the government put in place in 2008 a program on the improvement of competitiveness of agropastoral holdings (ACEFA) whose objective is to increase earnings for family agropastoral holdings (EFA) through:

- Improvement in skills in production techniques, in economic management and access to innovation by enterprises through an appropriate mechanism for advisory support.
- Capacity building for production and adding value to products at the level of agropastoral family holdings by supporting implementation of productive projects by producers' organizations.
- Improvement of services rendered by the PO to the EFA, especially in supply and marketing.

The government has, in conjunction with the World Bank, committed to the formulation of another program for the improvement of competitive agriculture (PACA) intended to complete the ACEFA program, on a spatial level as well as through intervention tools.

Consideration of strategies of national actors and relations with the sub regional initiatives

The NSDR is a sectoral strategy which modifies the Strategy for Development of the Rural Sector (SDRS). Its implementation falls within the general framework of the Sectoral Program for Livestock Rearing (SPLR) currently being formulated. The SPLR sets out to be a unique unified program framework leading to: (i) efficient implementation and updating of the agriculture-livestock component of the NSDR; (ii) formalization of the coordination and harmonization of interventions; (iii) optimizing of the use of resources; and (iv) overall monitoring and evaluation.

VI. STRATEGIES FOR THE SUB-SECTOR

Towards implementation of the NSDR in consistency with the government's economic and social policies, several strategies per sub-sector were identified. They all fall within the global framework of the Strategic Document for Poverty Reduction (SDPR) that provides for, among others, wealth generation for local populations, employment of women and youths and for the repositioning of Cameroon on the sub-regional and regional stages.

Seed

Lack of selected seeds constitutes one of the major constraints to development of rice production in Cameroon.

To meet this challenge (which was aggravated by the 2008 crisis) and to restore food security in Cameroon, several actions are planned with the aim of covering the needs for quality seed at the level of producer organizations. With this aim in mind, loans will be given to IRAD (for pre-foundation seed) and to seed multipliers (for foundation and commercial seed). The seed obtained will then be distributed freely to producers during the first season of the project. For subsequent seasons, partners will have to be self-supporting by forming a "revolving fund". NSDR will support the process by conducting the following actions:

- 1) Training of seed multipliers with an emphasis on the gender approach. Young graduates from agricultural schools and women's organizations will be specially targeted.
- 2) Extension of current projects, especially the NERICA rice project and the National Food Security Agency (PNSA).
- 3) Collection, multiplication and availing traditional varieties to interested producers. These varieties will also be characterized and conserved in gene banks.
- 4) Breeding of improved varieties adapted to the main agro-ecological areas and to production systems.
- 5) Developing appropriate technical guidelines intended to make rice growing profitable.
- 6) Support in organizing actors in the seed sector with the development of platforms.
- 7) Structuring the seed sector, including the formation of rural enterprises and seed companies.
- 8) Development of an information system called "Cyber-seeds" to accelerate trade in seed and other agricultural products.
- 9) Decentralization of quality control with mandatory certification of pre-foundation and foundation seed and establishment of a mechanism for production of quality declared seed in the irrigated areas and seed of controlled quality in rainfed rice production.

Marketing and distribution of fertilizer

Access to fertilizers is one of the fundamental conditions for ensuring an appreciable increase in yields and in the productivity of agricultural holdings. The strategy to be developed in this field mainly consists of: (i) ensuring capacity building for production and marketing of fertilizers at the national level; (ii) improving the legislative and regulatory

framework and ensuring its enforcement; (iii) finding alternative techniques for mineral fertilization; and (iv) a three-year reducing subsidy for fertilizer purchases backed by the strong involvement of farmer organizations in debt recovery

Irrigation and investment in water control

The problem common to all irrigated areas since the disengagement of the government is bad management of water and the water works. Production in the lowland is plagued by specific problems such as iron toxicity.

In addition, development of new production areas has become such a necessity that three priority actions will be undertaken by the NSDR: (i) support to organize producers to manage developments; (ii) rehabilitation of old irrigation schemes to make better use of infrastructure; and (iii) opening up new developments. These new developments will be done by taking into account: (i) population density in the area and current rice growing practices as described in Section IV on the potential of rice by area; (ii) initiatives already put in place by farmers in regard to rice growing and development; (iii) capacity for direct management of water by users in the design of the schemes; (iv) the need for progressive installation of irrigated areas according to user ability in their control and management; (v) the presence of gravity-fed water and the availability of participation by local populations; (vi) the existence of several initiatives already put in place by producers; and (vii) the level of development of the private sector, especially in the field of mechanization.

Access and maintenance of agricultural equipment

Access to appropriate production equipment and adapted processing form the pillars of promotion of middle size companies and the modernization of family holdings. Mechanization must be compatible with the technical and economic level of producers. To this effect, the NSDR will work mainly on: (i) ensuring capacity building for artisans and local entrepreneurs to manufacture and maintain agricultural material (small tools for land preparation, shelling machines, parboilers, stone removers, etc.); (ii) ensuring capacity building for maintenance of agricultural equipment; (iii) facilitating access by users to imported equipment through tax incentives and adapted modes of funding; (iv) ensuring capacity building for supervision of technicians with regard to agricultural mechanization; and (v) promoting the role of service provider regarding maintenance of agricultural materials through the creation and equipment of pools of machines stationed in the main rice producing areas in the country.

Distribution of research findings and capacity building

Research will be conducted in close collaboration with extension services and producers, including new screenings on the NERICA rice varieties in order to identify the most productive and the most adapted to different agro-ecological areas. This work will be done through local adaptation trials and participative varietal selection with the aim of distributing at least six varieties, among them:

- Two NERICA rice varieties for the high altitude areas (Ndop and Dschang).
- Two NERICA rice varieties for irrigated areas of Lagdo, Maga, Yagoua and Kousseri.
- Two NERICA rice varieties adapted to lowland areas.

Screening of NERICA rice varieties for biotic and abiotic stresses (tolerance to cold and to iron, resistance to yellow mosaic and to foliar diseases) will be carried out.

The process will be supported by the project on the improvement of rice competitiveness in Central Africa (the NERICA Project) which provides for the establishment of community seed systems, the creation of quality centers for rice at the local level and platforms for various actors united at the national level: the producers' organizations, research, extension services, processors, input sellers, microfinance organizations, transporters, etc.

Support for structuring

This activity will consist of training and skill building for rice farmers and extension officers through production of data sheets for rice growing in different ecologies, short-term training for 'contact farmers' or long-term training for extension officers. The activity will also consist of training in support of the creation and institutionalization of rice growers' groups (identification of existing common initiative groups (CIG) and support for the constitution of unions, federations and cooperatives).

Professionalism will be a key target. This will be encouraged by contributing the necessary support for marketing products and by-products and to developing temporary contracts and other economic partnerships between rice farmers/producers' organizations and other actors in the sector.

Support for structuring also comprises support to developing processing capacity, storage and preparation for milling, capacity building with regard to health security and respect to quality standards required on the national, sub-regional and international markets, and the establishment of an ongoing information system on prices and domestic and foreign markets.

Access to suitable credit financing

National rice production is faced with a lack of suitable financing tools. However, loans from a number of microfinance institutions are available in some areas. Moreover, the government has initiated supporting action for financial advice within the framework of new programs for the improvement of competitiveness within family holdings. They are the Improving the Competitiveness of Agropastoral Families (ACEFA) and the Common Agricultural Program for Africa (PACA) programs whose missions are: (i) to provide advisory support to family holdings through producers' organizations, thus leading to better control of their production and management; (ii) to provide financial support to group or individual investment projects owned by families and led by producers' organizations on strategic enterprises such as rice production; and (iii) to provide advisory support to the producers' organizations through specialist advisors with expertise in funding profit generating activities and capacity building.

The NSDR will essentially focus on the creation and/or follow up of economic partnerships already set up between actors on the basis of shared costs for the acquisition, operation and maintenance of production infrastructure (hydro-agricultural works and equipment) and marketing (packaging, storage and processing infrastructure). Young graduates leaving agricultural schools and people/groups with projects in the sector will be given priority.

Post-harvest operations and marketing

For post-harvest operations, priority actions for the NSDR will be setting up processing units such as threshers and husking machines and supporting the construction or repair of communal storage.

The NSDR will also help set up credit lines for funding of production activities and marketing of rice. A marketing fund for rice in Cameroon that will also act as an equalization fund is under consideration. The mission of this fund will include: (i) establishment of a viable information system; (ii) organization of marketing; and (iii) quality control for imports.

Proposals were put forward to remove a number of measures which were reducing the competitiveness of local rice. These include an exemption for rice imports from VAT (value added tax) which is nevertheless applied to local processing units.

Environmental management framework

The implementation of the NSDR must conform to the environmental policies and regulations of Cameroon, especially as fixed by Law No 96/12 of 5 August 1996 on Parent Act on environmental management, Law No 94/01 of January 1994 on forest plan, wildlife and fishing, Law No 98/005 of 14 April 1998 on water planning and the Law of 21 April 2003 on security of new biotechnologies in Cameroon. Activities likely to affect the environment include: rehabilitation works on large irrigated schemes, developing lowlands, clearing wooded areas, soil compaction by heavy machinery, and use of fertilizer and pesticides in cultivated areas. Their main positive impact is the improvement of productivity and competitiveness of family holdings and household incomes. However, several elements of the biophysical environment will be negatively affected: air, soil, water, vegetation and wildlife. Also, to ensure sustainability of agricultural activities and minimize the negative impacts there should be: (i) identification of alternative techniques to slash-and-burn; (ii) evaluation of effects of agricultural activities on the accumulation of sediment and nutrients in watercourses and ways of reducing these effects; and (iii) promotion of rice by-products.

Other cross-cutting sectors

The NSDR will also be involved in setting up critical investment of a structural nature (track building to open up production basins, infrastructure for storage or grain conditioning leading to economies of scale), and related institutional reforms such as market liberalization of agricultural inputs and land rights.

VII. FUNDING

The estimated cost stands at FCFA 191 billion divided as follows:

- FCFA 49 billion for the basic development of 309,000 ha for irrigated and lowland rice growing.
- FCFA 13,950 billion for the rehabilitation of 9,300 hectares of old schemes.
- FCFA 27,060 billion for research-associated activities.
- FCFA 41,715 billion for inputs support for the first crop cycle on the newly-developed 309,000 ha,
- FCFA 43,920 billion for production, storage and processing equipment.
- FCFA 15,360 billion for other activities comprising support to structuring and capacity building for rice farmers, studies, coordination and monitoring of the implementation of the NSDR.

NSDR funding must be a planned intervention by the government and partners. The government will contribute 20% of required funding, external partners 75% and national private actors and beneficiaries 5%.

VII. CONCLUSION

The promotion of rice growing is part of an agricultural policy initiated by the country in the 1970s. Despite substantial potential and a promising beginning, rice production collapsed towards the end of the 1980s due to a number of constraints. Yet, rice constitutes one of the basic foods for rural and urban populations in Cameroon. Its consumption is growing at an annual rate of 4% and was estimated at 25.7 kg per inhabitant per year in 2008.

This situation calls for a boost in rice production to reduce dependence on external sources for national demand. This objective is achievable if the major constraints identified in this project are lifted as part of well-targeted measures.

Priority actions enshrined in the NSDR are aimed at creating a climate of sustainability for the actions and investments undertaken, and the achievement social objectives (food security, job creation, rural poverty reduction) and economic viability (i.e. competitiveness of local rice in the domestic market).

APPENDICES

Appendix 1: BASIC ASSUMPTIONS FOR CALCULATIONS

- Rehabilitation of an old abandoned managed scheme: FCFA 1,500,000 (US\$ 3000 per hectare)
- Support for basic development of one hectare for rainfed rice growing : FCFA 160,000 (US\$ 320) per hectare
- Acquisition of motorized tillers: a hand-guided tiller can work 10 hectares of rice fields
- Rate of annual population growth: 25 for 1000
- Per capita rice consumption: 25.7 kg/ha/year
- Import trend: the gap between national production and requirement reduced by imports
- Safety stocks: difference between production with the project and national consumption demands
- Milled rice yield from paddy: 65%

Appendix 2: REHABILITATION OF OLD SCHEMES

SCHEMES	Area under production in 2008 (ha)	YEAR 2013	YEAR2018
		Cumulative area under production	Cumulative area under production
SEMRY I	1,700	4,200	5,300
SEMRY II	3,200	5,200	6,200
UNVDA	1,150	2,350	2,900
LOGONE AND CHARI	800	1,300	1,500
Ex-SODERIM		1,000	3,000
TOTAL	6,850	13,050	18,900

Appendix 3: COST OF RESEARCH ACTIVITIES LINKED TO NSDR IMPLEMENTATION

Activity	Quantity	Cost estimate (FCFA)
Production of pre-foundation seeds	80,000 tons	2,400,000,000
Production of foundation seeds		12,000,000,000
Storage and conditioning of foundation seeds		2,400,000,000
Training of supervisors		6,500,000,000
Continuous training for supervisors		2,000,000,000
Coordination and monitoring of activities		1,500,000,000
Other		260,000,000
Total		27,060,000,000

Appendix 4: COST OF SUPPORTING INPUTS

After rehabilitation, 50% support for agricultural inputs appears necessary to guarantee an increase in rice production. Estimates will be made on the basis of:

Inputs	Quantity/ha	Unit price	Total cost (FCFA)
NPK	300 kg	500 F/kg	150,000
Urea	100 kg	500 F/kg	50,000
Enhanced seeds	50 kg	500 F/kg	25,000
Insecticides	2 liters	15,000 F/liter	30,000
Herbicides	3 liters	5,000 F/liter	15,000
			270,000
Sum total	309,000 ha	270,000	83,430,000,000

Appendix 5: COST OF OTHER SUPPORT FOR IMPLEMENTATION OF NSDR

Basic name	Quantity	Unit cost (FCFA)	Total cost (FCFA)
<i>Equipment</i>			
Hand-type motorized tillers	3200	4,000,000	12,800,000,000
Tractors	80	150,000,000	12,000,000,000
Threshers/winning machines	400	4,000,000	1,600,000,000
Tarpaulins	2400	300,000	720,000,000
Husking machines	400	17,000,000	6,800,000,000
Grain stores	500	20,000,000	10,000,000,000
<i>Equipment sub total</i>			<i>43,920,000,000</i>
<i>Other</i>			
Training	10*40	2,000,000	800,000,000
Marketing	80	10,000,000	960,000,000
Structuring support	80	25,000,000	2,000,000,000
Refined technical studies	80	20,000,000	1,600,000,000
Coordination, management and monitoring			10,000,000,000
<i>Sub total</i>			<i>15,360,000,000</i>
Total			59,280,000,000

Appendix 6: CONCEPTS FOR QUALITY SEED

Three concepts for quality seeds are used:

- certified seeds
- acceptable quality seeds
- controlled seeds

Certified seeds

Certified seeds are seeds that have been granted certification and which therefore have satisfied different quality control operations (crop control, laboratory control, phytosanitary control).

Certification aims at guaranteeing:

- a varietal identity and varietal purity
- technological quality (minimum germination capacity, specific purity etc.)
- health quality

In the case of the joint scenario being used, the pre-foundation and the foundation seed will be certified.

Each lot of certified seed has an official control certificate. The tolerance levels for certification of pre-foundation and foundation rice seed are as follows:

Factors	Pre-foundation
1) Specific purity % min.	98
2) Varietal purity % min.	99.9
3) Moisture level % max.	12–14
4) Germination rate % min.	98
5) Other crop seeds % max.	0.01
6) Inert matter % max.	2
7) Weed seeds % max.	0
8) Off-type seeds	0

Source: Technical standards, ADRAO (1985).

Seed of acceptable quality

Seed of acceptable quality come from multiplication of foundation seeds. They can be produced by any willing farmer. Practical advice is available to limit the risk of contamination seeds with foreign bodies and through declining germination capacity.

The concept of acceptable quality seed gives scientific and technical substance to farmers' seed often called personal reserves or farm-saved seed.

- germination capacity: >80%
- varietal purity: >90%

The seed must be monitored by technicians from development agencies.

Controlled seed

Controlled seed is a more advanced stage than that of seed of acceptable quality and is bound to a concept of quality control imposed by farmers who are also quality assurance officers.

Seed produced under the supervision of these farmer-officers is called "controlled seed". The standards retained for quality control are:

In the field:

- Noxious weeds: ≤ 2 per m^2
- Off-type plants: ≤ 5 per m^2
- Sick plants: ≤ 5 per m^2

In the store:

- rate of germination: >80%
- varietal purity : >90%
- moisture content: $\approx 13\%$

In these three cases (certified seed, controlled seed and seed of acceptable quality), traceability must be ensured .to give farmers a sense of security since they will know the origin of their seed. It also encourages the establishment of seed companies.

However, an information mechanism known as "cyber-seed" will be introduced in large seed cooperatives. The cyber-seed systems are linked to a central "Observatory" computer.

The creation of the cyber-seed network is a response to the need to bring family-run agriculture closer to the national or regional markets. It demonstrates the desire by national authorities to promote the development of marketing activities of food products in general and seed and plants in particular through exchange of information.

The specificity of the new tool resides in the fact that it is managed by farmer organizations/cooperatives which can thus give viable information at every step of the chain—from production, harvesting, conditioning and storage to distribution of seed and plants, and quality control. To do this, Farmer-Agents for Quality will be trained. They will be responsible for regular monitoring of seed parcels and stocks in conjunction with the seed department and the regional agricultural directorates. Through this process, the NSDR brings a significant contribution to the research of appropriate solutions for the improvement of productivity and competitiveness of African agriculture. The expected results are: (i) the implementation of a simple and efficient mechanism for collection and distribution of information at village level; (ii) better control of sown areas; (iii) broader adoption of improved technologies and methods; (iv) promotion of local varieties and the accompanying endogenous knowledge; (v) promotion of farmer organizations/cooperatives and rural-based companies; and (vi) promotion of traceability and quality labeling and, consequently, marketing.

Cyber seed systems constitute an ideal framework for practical education of producers and rural populations in the seed sector. They also offer a channel of communication for farmer organizations/cooperatives to gain a better understanding of local situations such as diversification and crop association. These specificities of African agriculture have never been integrated into seed programs and neither have local varieties that could make a more valuable contribution if they were subjected to ethnobotanical studies and production of quality seed.

Appendix 7: SIMULATION OF THE EFFECTS OF NSDR ON THE RICE SECTOR IN CAMEROON

Key elements	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Population	14,704,632	15,081,673	15,468,363	15,865,008	16,271,803	16,689,029	17,116,953	17,555,849	18,005,999	18,467,692	18,929,384	19,402,618	19,887,684
Production of paddy without a project (tons)	24,842	39,721	42,065	44,546	47,175	49,958	84,197	89,249	98,334	100,000	105,000	110,000	115,000
Production of milled rice without a project (tons)	16,147	25,819	27,342	28,955	30,664	32,473	54,728	58,012	63,917	65,000	68,250	71,500	74,750
Production of paddy with project (tons)	-	-	-	-	-	-	-	-	-	-	275,740	286,430	367,120
Production of milled rice with project (tons)	-	-	-	-	-	-	-	-	-	-	133,731	186,179	238,628
Demand in milled rice (tons)	377,909	387,600	397,537	407,731	418,185	428,908	439,906	451,185	462,754	474,620	486,485	498,647	511,113
Difference linked to project on milled rice	-	-	-	-	-	-	-	-	-	-	65,481	114,679	163,878
Import trends (tons)	-	-	-	-	-	-	-	-	-	-	352,754	312,464	272,485
Safety stocks (tons)	-	-	-	-	-	-	-	-	-	-	-	-	-

Key elements	2012	2013	2014	2015	2016	2017	2018
Population	20,384,876	20,894,498	21,416,860	21,952,282	22,501,089	23,063,616	23,640,207
Production of paddy without a project (tons)	120,000	125,000	130,000	135,000	140,000	145,000	150,000
Production of milled rice without a project (tons)	78,000	81,250	84,500	87,750	91,000	94,250	97,500
Production of paddy with project (tons)	447,810	567,500	647,000	726,500	806,000	885,500	965,000
Production of milled rice with project	291,076	368,875	420,550	472,225	523,900	575,575	627,250
Demand for milled rice (tons)	523,891	536,989	550,413	564,174	578,278	592,735	607,553
Difference linked to the project	213,076	287,625	336,050	384,475	432,900	481,325	529,750
Import trends (tons)	232,815	168,114	129,863	91,949	54,378	17,160	-
Safety stocks (tons)	-	-	-	-	-	-	19,687