

REPUBLIC OF GUINEA

Labor–Justice–Solidarity



MINISTRY OF AGRICULTURE AND LIVESTOCK

NATIONAL STRATEGY FOR THE DEVELOPMENT OF
RICE GROWING

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LIST OF ACRONYMS AND ABBREVIATIONS

AfDB	African Development Bank
AGRA	Alliance for a Green Revolution in Africa
ANPROCA	Agency for the Promotion of the Countryside and Agricultural Advice
ARI	African Rice Initiative
BADAM	Bank for Agricultural and Minerals Development
CAADP	Comprehensive African Agricultural Development Policy
CARD	Coalition for African Rice Development
DNGR	National Directorate of Agricultural Engineering
DYNAFIV	Project for Invigorating the Food Chain
ECOWAP	Agricultural Policy of ECOWAS
ECOWAS	Economic Community of West African States
FAO	Food and Agriculture Organization of the United Nations
GNF	Guinean franc
IRAG	Agronomic Research institute of Guinea
MAE	Ministry of Agriculture and Livestock
NEPAD	New Partnership for African Development
NERICA	New Rice for Africa
ODRIK	Operation to Develop Rice Farming at Kouroussa
PADER-HG	Rural Development Project for Upper Guinea
PASAL	Project to Attain Food Security
PDRI-GM	Development Project for Irrigated Rice in Guinea Maritime
PDRS – II	Development Project for Rice Cropping at Siguiri (2 nd phase)
PNDA	National Agricultural Development Policy

SUMMARY

International rice prices have continued to increase since December 2006, creating supply difficulties for markets in developing countries such as Guinea and limiting access to rice for populations, most of which already suffer from food insecurity. This situation, which has been felt globally, is not yet at the point of wiping out the growth in imports but there is very limited availability of rice in the exporting countries. It is possible that international rice prices may undergo new upheavals in future.

In spite of previous efforts to achieve food security in Guinea, rice production is yet to meet demand. In the last few years per capita rice consumption rose from 92 kg in 1992 to 100 kg in 2008. These changes can be explained by the position that rice occupies as food for the masses. Its importance is due to the weak productivity of other food crops and to low tariffs for imported rice. Several other constraints also play a part, especially: lack of water control, the weakness in the supply system for inputs and agricultural materials, difficulties in access to credit, etc. However, the country has an estimated 364,000 ha with the potential for rice growing, abundant rainfall varying between 1500 mm and 4000 mm per year and enough sunlight to favor rice growing.

It should be remembered that the contribution of the rice sector to gross domestic product (GDP) is continually improving, reaching 5.2% in 2000 and expected to reach 6.2% by 2018. This represents GNF 320.3 billion in value terms in 2000 and GNF 487.7 billion in 2008. The CIF (cost, insurance and freight) value of imported rice was 5.4% of all imports in 2000 and 11.3% in 2008.

With average imports of 300,000 tons of rice, representing around 26% of national requirements, the major aim of the strategy for the development of rice production is to ensure medium-term food self-sufficiency in rice for the country and to export production surplus in the sub-regional, regional and international markets in the longer term in accordance with the objectives of ECOWAS' regional agricultural policy (ECOWAP) and the Comprehensive agricultural development program (CAADP) of the African Union.

Taking both these policies and the objectives of the Coalition for African Rice Development (CARD) into account, the national strategy for rice is aimed at self-sufficiency by 2018 with

any surplus exported into subregional and international markets. This means producing rice of sufficient quantity and quality to be financially worthwhile for producers. This will mean going from a production level in 2008 of 1,206,915 tons of paddy to 2,726,460 tons in 2018 while at the same time increasing average yields of rice from 1.43 t/ha in 2008 to 2.75 t/ha in 2018.

The lines of intervention of the strategy will revolve around: (i) the creation of two big centers for development in Lower and Upper Guinea with the aim of bringing 160,000 ha under management with total water control in 40% of the mangrove plains and fresh water area in Lower Guinea, and 40% in Upper Guinea on the alluvial plains along the Niger River and its tributaries; (ii) support to lowland rice growing within the framework of diversification, with particular emphasis on fish farming and low season market gardening; (iii) support for upland rice production through large-scale dissemination of NERICA; and (iv) access to agricultural inputs and equipment.

The overall estimated cost of the strategy is US\$ 1.3 billion comprising: US\$ 488,850,000 for inputs; US\$ 520,000,000 for water control; US\$ 17,500,000 for buying production and post-harvest equipment; US\$ 8,000,000 for access roads; US\$ 675,000 for restoring seed and agricultural research centers; and US\$ 6,000,000 for agricultural research, advice, monitoring and evaluation.

Carrying out this strategy will have enormous socioeconomic and environmental impact:

- added value of GNF 1500 billion (US\$ 300 million) to the GDP of which 40 to 50% will go to producers;
- 320,000 jobs created by bring the 160,000 ha under management (offsetting the rural exodus);
- double cropping and managed water use will bring in 200,000 ha not previously used for growing rice;
- setting up more than 500 production and service cooperatives (young farmers and women's groups);
- production of 1,500,000 tons of straw for use as livestock feed and in supporting transhumance;
- production of 550,000 tons of bran for animal and poultry feed;
- production of 260,000 tons of chaff for fuel in milling and husking plants;
- production of 500 tons of fish in Forest Guinea and 800 tons of market garden produce.

I. INTRODUCTION

The recent changes in the global economy, especially the skyrocketing of food prices and world prices of petrol coupled with the international financial crisis, constitute a major preoccupation for the Government of Guinea which has had to cope with a reduction in the availability of rice on world markets, an increase in world rice prices (which stood at US\$ 600 per metric ton in March 2008) and the continuous rise in the price of a barrel of crude oil which rose from US\$36 to US\$140 between 2006 and 2008. This trend could intensify if the US dollar continues to weaken in relation to currencies in the major exporting countries.

It is within this context that Guinea has implemented several initiatives to improve production and productivity of rice, the staple food for the local population, with the aim of limiting dependence on imports. Accordingly, rice production rose significantly from 775,700 tons in 2000/2001 to 1,465,700 tons in 2008/2009. This was possible due to the increase in the surface area sown, capacity building, etc. and incentive prices for production and for marketing.

It is noteworthy that the contribution of the rice sector to gross domestic product (GDP) is continually improving, reaching 5.2% in 2000 and expected to reach 6.2% by 2018. This represents GNF 320.3 billion in value terms in 2000 and GNF 487.7 billion in 2008. The CIF (cost, insurance and freight) value of imported rice was 5.4% of all imports in 2000 and 11.3% in 2008.

In the light of this and the CARD initiative, the government has the declared aim of reducing imports by 15% in 2009. Looking ahead to 2013, production equivalent to 111% of the anticipated national requirement will release a surplus of 113,886 tons into the subregional market. Production is then expected to settle at 109% of national requirement giving a surplus of 153,993 tons.

In 2003, the local rice sector generated an added value of around 340 billion GNF, representing 5% of the gross domestic product (GDP). Consumption rose from 70 kg per

year in 1989 to around 90 kg in 1995, and currently stands at 100 kg. On that basis, demand for white (milled) rice will stand at 1,354,197 tons by 2018 for an estimated population of 13,541,968.

The figures for the campaign show that over the last eight years, rice production has been complemented by imports to cover the deficit in demand. Imports grew from 275,000 tons on average between 1992 and 1996 to 200,000 tons between 1997 and 1999 whereas world rice prices fell from US\$ 300 per ton to US\$ 200 per ton for the same period. On the contrary, from 2001 the situation changed completely. Imports rose from 153,000 tons in 2000 to 330,000 tons in 2002. This tendency to rise was confirmed in 2003 (with the importation of around 325,000 tons despite the increase in rice prices on the global market and the depreciation of the Guinean franc in relation to the dollar.

This increase is likely to worsen poverty levels and food insecurity in the country. Funding to boost the agricultural sector remains below the expectations of the population and the deficit in annual food production stands at around 300,000 tons of rice.

This is the reason the National Agricultural Development Policy (PNDA) Vision – 2015 envisages the development within a framework of sustainable food production of around 25,000 ha of large and medium plains in the major centers of rice production in Lower and Upper Guinea with the objective of producing 2.5 million tons against 1.37 million tons in 2007.

II. REVIEWING THE RICE SECTOR

Analysis of the assessment of Guinea's food balance sheet for the 2007/2008 agricultural year shows rice as the major food produced in the country, accounting for 61% to 69% of available cereals. The goal of self-sufficiency in rice by 2005 was not achieved despite the investment to that end. This can be put down to a rise in consumption of rice and failure to control imports (imports were tax-free and probably re-exported to neighboring countries in crisis).

2.1. The policy position of rice

Rice has been a key factor in the battle for food security

The development of food crops, particularly rice, remains a strategic arm of the NADP designed to produce food security in Guinea. This is based on the importance of rice as a staple food in Guinea and the need to safeguard those rural populations subject to food insecurity.

The Ministry of Agriculture and Livestock, with the help of development partners, has put several programs in place for the development of rice growing, the leadership of which is mainly underpinned by French overseas aid, particularly in Coastal Guinea and Forest Guinea which are currently the main rice producing areas. These include the project for developing mangrove swamp rice production (PDRI-GM) and the project (PDRI-GF) for developing lowland rice growing in Forest Guinea. The African Development Bank (ADB) is the second most important source of funding, particularly for expanding rice production in the alluvial plains of Upper Guinea with the establishment of successive projects (ODRIK, then PADER-HG) in Kouroussa prefecture and Siguiri prefecture (PDRS-II, then PADER-HG). Projects (PASAL and then DYNAFIV) have also increased the volume of rice being marketed.

Production targets for rice within the PNDA for the 1998-2005 period were 95% achieved at 1,207,956 tonnes against a forecast of 1,272,415 tonnes.

2.2 Preferences and demand estimates

Local parboiled rice is preferred for its tastiness, which is reflected in a price 20–30% higher than that for imported rice.

2.3 Typology and number of rice farmers, processors and marketers

About 675,200 holdings or about 80% of all farm holdings in Guinea grow rice. If each of these holdings has an average of five active workers then the total agricultural population involved in rice production is close to 3,336,000 people out of a total population of nine million (National Population Census, 2001).

- **Rainfed rice**

Traditional rainfed rice farming is still known as dry rice farming and is by far the most widespread (65% of the cultivated area at around 1 ton/ha). It is carried out on hillsides, in the mountains, and on cleared forest areas after recent burning. Cultivation is done by hand and no fertilizer is used. Yields (500 to 900 kg/ha) vary in relation to natural fertility and the regularity of the rains. The short-cycle varieties (90 to 110 days) are the most commonly used.

However, with the dissemination of the NERICA (New Rice for Africa) varieties, there are real prospects for the development of this crop ecology as shown by the yields of improved rice between 2 to 4 tons per hectare (t/ha). In Forest Guinea the surplus generated by the new varieties led to the establishment of a local rice chain supplying the capital Conakry through the market at Tanènè-Aviation. At the same several groups and unions, of which the strongest are the Union of parboilers and collectors at Gouéké (N'Zérékoré) and the Union of women rice sellers at Seinko (Beyla), came into being.

The mobile nature of this system (1–2 years of growing rice followed by 5–7 years of bare fallow) poses serious problems for soil conservation and the environment.

- **Lowland rice farming**

This system accounts for 10% of land under rice. Yields range between 1.5 and 2.5 t/ha. Forest Guinea accounts for the largest stretch of lowland, compared to the country's other natural regions. According to the National Directorate of Agricultural Engineering (DNGR), the overall potential of the region should be around 121,760 ha but just 5% of the surface area has been developed.

Despite the investment in development schemes, rice productivity has failed to match the expectations of producers and decision makers, mainly because of the low soil fertility and the arrival of caterpillars and rice yellow mosaic virus.

However, there have been technical and economic successes in the project zone operated by SOGUIPAH (Guinea Palm and Rubber Tree Company) due to the improved management of the lowland ecosystem and the integration with fish farming. The FAO project for the development of village fish farming in Forest Guinea also confirms there is substantial potential in the lowlands, particularly where the most suitable improvements to water management result in:

- 1.150 tons of paddy per ha in rainfed rice growing
- 1.380 tons of paddy per ha in the undeveloped lowland
- 3.120 tons of paddy per ha in developed lowland
- 25 tons of eggplant per ha in the developed lowland
- 4 tons of fish per ha in village fish farming

- **Upland rice growing**

This system is most widespread in Upper Guinea and in the Gaoual/Koundara areas. This system accounts for 9% of the surface area and its yields vary between 500 kg and 2 t/ha depending on the water levels of the Niger and its tributaries. The surface area of developed upland is estimated at around 120,000 ha (of which 80,000 ha are in Upper Guinea).

It depends on weather factors (too little or too much rain, date of arrival or recession of water levels) and a low level of intensification. It has been the only system trading grain for a long time with 40% of production reaching the market.

Development projects funded by the African Development Bank (ADB) over the last 10 years have led to the formation of producer groups and unions which have recently

merged into a federation of rice producers of Upper Guinea. The technical guidelines distributed by these projects have lifted yield from 800 kg/ha to 3.5 t/ha with capacity improved by more than 90%.

- **Mangrove rice growing**

Mangrove rice takes around a 16% share of the total rice growing area and yields vary from 1.5–3.5 t/ha.

Between 20% and 60%¹ of the production is marketed depending on the system. Soil fertility can be maintained if sea water rich in sediment is allowed into the parcels during the dry season.

This is a traditional system for the Baga people from the lower coastal areas who zone off mangrove areas with dikelets or small bunds separating the rice growing parcels and stopping salt water from seeping in. During the colonial period, development plans of the lower coast envisaged 40,000 ha of mangrove rice fields, 8,000 ha of which had actual work carried out (primary and secondary canals).

Because of the help given for processing and marketing, several groups and unions of women parboilers and collectors now have suitable equipment (600 huskers and 300 parboilers). A powerful men's union – Union Boora Malé – specializing in marketing has also been created and markets rice under its own label. The establishment of this organization means that producers receive 75-80% of the contract sale price for around 4000 tonnes of rice delivered to the Bauxite Company of Guinea at Kamsar, worth an estimated 7.7 billion GNF (US\$ 1.2 million).

2.4. Gender dimensions

Women play a major role at the production level in activities such as soil preparation,

¹ 60 % in the schemes within the Project for the Development of Rice Growing in Guinea Maritime (PDRIGM)

sowing, weeding and harvesting. In Forest Guinea gender equality is most marked during soil preparation; in Guinea Maritime the women undertake transplanting and weeding for mangrove rice growing; in Upper Guinea where draft animals are more used for cultivation, women are most in demand for weeding. Women and women's groups are also likely to invest in their own family holdings.

Women are at the forefront of processing and marketing, i.e. the collector/parboilers. These women take most of the rice marketed by the producers and parboil it before husking. The good quality rice obtained then gives a yield of more than 70% at husking and attracts a quality premium in the market.

2.5. Comparative advantage of national rice production

A workshop held in Kindia in 2008 by the National Council of Farmers' Organizations (CNOP-G) indicated that production costs for the major crop systems stand at between FCFA 30 and 50 per kilo of paddy. This is way below the lowest production cost of rice farming in Mali (FCFA 65 to 70 per kilo of paddy in the Office du Niger area) or in Senegal (FCFA 60 to 65 per kilo in the zone controlled by the Senegal valley irrigation authority SAED). This competitiveness is due to low-input rice growing and to the depreciation of the Guinean Franc compared to other currencies, which has lowered the cost of labor relative to neighboring countries.

III. CHALLENGES AND OPPORTUNITIES

3.1. The potential of local rice for rural poverty reduction and economic growth

In 2003, the local rice sector generated an added value of around GNF 340 billion, equivalent to 5% of GDP. The sector sends around 120,000 tons of clean rice to the market each year, of which around 65,000 tons is traded between prefectures.

The workshop on the rice sector organized by DYNAFIV in November 2003 in Conakry highlighted the following assets:

- Favorable conditions for rice growing in all natural regions.
- A strong preference by consumers for local rice despite its high price (65% higher than imported rice in 2003 in Conakry).
- Progressive development (a trend to be confirmed in the long term) of two distinct markets for local and imported rice, the latter being consumed by less affluent consumers.
- The existence of specialized markets for local rice (Tanéné, Matoto, Enta, Boussoura, etc.).
- The emergence of 'identity' for local rice: rice from Sinko, from Lola, mangrove rice, from the bowé or bauxite uplands...
- Potential for exports of organic or high quality rice, provided health and other norms related to this kind of trade are respected (which is currently not the case).

The major challenges fall into three categories:

- To intensify and develop local production so that the trend to import rice to deal with short term demand is reversed.
- Generate sustainable economic growth from the intensification of production in a public–private partnership.
- Diversifying food production (cassava and maize) to reduce the pressure on rice.

3.2. *The land system*

The government approved a Declaration of Land Policy in Rural Areas (DPFMR) in 2002 which gives authority to rural development communities (CRD) to formalize land transactions.

To encourage private investment in the sector, the Ministry of Agriculture issues land occupation titles in the form of long leases.

Since the statutory provisions for the application of the Land Declaration are still being finalized, the land problem remains a major constraint to the achievement of productive and sustainable investments. The degradation of natural resources, mainly soil, is increasing due to population increase, the massive arrival of refugees in Guinea, and displacement of people due to rebel incursions.

3.3. *Social issues*

The major constraint to development in rural areas is the increase in poverty levels among producers. The consequence is rural–urban migration and illiteracy.

3.4. *Trans-border and regional issues*

Issues associated with inputs markets (fertilizers, pesticides, agricultural equipment, enhanced seeds) must be handled at subregional and regional levels (ECOWAS, Mano River Union, etc.). Production forecasts for the country must also take into account the needs of the subregional market.

3.5. *Knowledge and lessons learnt from R&D in rice*

The most important knowledge gains are in the field of varietal enhancement. Since its inception the Kilissi ARC has developed 67 improved rice varieties (lowland and rainfed). They are the result of cross-breeding between varieties introduced by specialized international institutions and local varieties.

The CK series of enhanced varieties, especially for the lowland, are widely grown in Guinea and the West African subregion. The most widely distributed in Guinean rural areas are: CK4, CK21, CK3, CK73, CK90, CK92, CK211 and CK801 for lowland rice and four for rainfed rice (CK5, CK7, CK71 and CK40). The average potential yield for these varieties is around 5 to 6 t/ha for lowland rice and 3–4 t/ha for rainfed upland rice, but the

average yield achieved at farm level is 3–4 t/ha for lowland rice and 2–2.5 t/ha for rainfed upland rice.

VI. PRIORITY AREAS AND PERSPECTIVES

4.1. Ranking by order of priority in terms of potential contribution to national production

In order of importance of their potential, the following regions can contribute to improved national production:

Lower Guinea, with its huge potential in land suitable for rice growing, contributes 27% of national production. The region has many fertile clay soils (mangrove soils, saline in places). The potential for tidal flooding is estimated at 160,000 ha of flatland (SOFRECO, October 2001).

This region is characterized by different types of hydraulic systems and levels of development depending on whether the land is estuary plain or fronting the sea. Special intervention was carried out on these plains to rehabilitate production because of the high population density and the need to intervene to safeguard the land capital of rice growers threatened in the medium term by the advance of the sea in these areas.

The DNGR developed a Plan for the Development of Rice Producing Plains (PAPR) in 2001. This plan forms a techno-agro-socioeconomic and environmental base for determining the feasibility of any irrigated rice growing development on around 69,700 hectares. The area involved in the PAPR covers the prefectures of Boffa with a resident population of 156,558 and Boké with 293,917 inhabitants. There are 47 schemes spread out between 12 plains and covering a surface area of 19,110 ha.

Upper Guinea contributes 25% of national production due to its immense potential in land suitable for rice growing. The development of irrigation will thus be able to contribute significantly to increasing agricultural added value and earnings while sustaining productive capital and conserving ecosystems. Upper Guinea also has enormous potential in the alluvial plains (80,000 ha) and in surface water. It is an essentially agricultural region entirely in basin of the Niger and its tributaries. Different successive projects financed by the African Development Bank (AfDB) have led to the improvement of annual yields which rose from 800 kg/ha to 2.5 tons/ha, of which 80% is marketed.

Forest Guinea has a reputation as a major rice producer and supplies 38% of national production. It has potential for about 6310 ha of lowland rice cultivation and for 11,720 ha in the upland. Agricultural activities are centered around the lowland and poor water control is the major constraint to agricultural intensification.

Middle Guinea could grow rice on 20,000 ha of upland. It already contributes 10% of national production. This region is essentially made up of the Fouta Djallon mountains with a rugged terrain and poor soils. It has its own 'Foutanian' climate where temperatures can drop to 8°C; it is an excellent area for the development of market gardening (potatoes, onions, large red peppers, eggplant, etc. The area best suited to rice growing is located in the plains of the prefectures of Gaoua and Koundara with a potential for rice growing estimated at 12,000 ha.

4.2. Identification and ranking specific environmental challenges and related opportunities by order of priority

The PNDA Vision - 2015 has responded to the ecological challenges of increasing national rice production by deciding in October 2007 – and unanimously confirmed by a workshop on the rice sector on 17–18 February 2009 – to favor developing irrigated rice in the natural regions of Lower Guinea and Upper Guinea. Lower Guinea has the potential for 250,000 ha of mangrove and inland plains to be brought into rice cropping together with a further 69,580 ha of lowland, while Upper Guinea has about 120,000 ha of alluvial plain along the River Niger and its tributaries as well as another 108,600 ha of lowland.

Irrigation schemes are a sustainable alternative which can help preserve the fragile mangrove ecosystem in Lower Guinea and reduce the pressure on resources from fishing, salt production and deforestation.

Investing in the alluvial plains of Upper Guinea is a viable and sustainable strategy both for the country and for this Sudanian region suffering from drought and the long-lasting environmental consequences of bush clearance by fire, of deforestation and mining activity.

Between them these two regions have enormous potential for sustainable development of rice growing thanks to:

- Existing resource potential in both water and cultivable land
- Opening up of national and subregional routes – Boké-Conakry, Kankan-Bamako
- Importance of rice growing in the farming system
- achievement of development projects since colonial times
- continuing development under the 1st and 2nd Republics
- Good knowledge of the rice sector within existing projects
- Successful, functioning and economic projects in both regions
- Very strong professional agricultural organisations covering production, marketing and processing
- Major opportunities for improving mechanisation in the rice chain and developing bulk shipment
- Existing potential markets.

Forest Guinea provides about 40% of national production but ranks third for production potential because most of the rice production is from rainfed upland based on a slash-and-burn system with harmful effects on the forest and the environment. Nevertheless, diversification-oriented investment is planned for the lowland (121,760 ha) in the form of rice-fish culture and the development of off-season market gardening. Further major investment is planned for perennial crops such as oil palms (a key crop to success), coffee, rubber trees and cocoa.

The low temperatures from the 'Foutanian' climate found in Middle Guinea mean there is weak potential for rice growing and there has been little investment as a result. However, the region features in the national development plan for horticultural crops such as potato, onion, tomato, eggplant, orange trees, etc.

4.3. Identification of policy challenges/opportunities

4.3.1. Policy challenges

Policy challenges include mobilization of financial resources needed to develop the huge agricultural potential for rice self-sufficiency. The fight for food security in Guinea has been about rice above all other crops. The main issues are: (i) meeting increasing national requirements for rice; (ii) reducing rice imports; and (iii) exporting surplus rice on to the subregional and international markets (i.e. organic rice or branded Boora Malé rice). The government's willingness to give priority to investment in rice as a strategic commodity was reaffirmed in the second version of the Poverty Reduction Strategy document ratified by the government in 2007.

These aims are in line with the joint agricultural policy of ECOWAS (ECOWAP) and the Comprehensive African Agriculture Development Program (CAADP) of the African Union's New Partnership for Africa's Development (NEPAD).

The main challenges fall into three categories:

- reversing the upward trend of rice imports in the short term by intensifying and improving local production
- generating sustainable economic growth through a public-private partnership for intensification
- diversifying production of food crops, including manioc and maize, to take some pressure off rice.

4.3.1. Opportunities

The continuing food and financial crises should be seen as opportunities to strengthen public and private investment in rice growing to attain independence and security in food supply.

The presence of a fluid market in the country and sub region underpins the re-energizing of the national rice chain.

V. VISION AND FRAMEWORK OF THE NATIONAL RICE STRATEGY

5.1. Objectives of rice production

5.5.1. Overall target:

The overall objective of the strategy is to ensure self-sufficiency in rice in the medium term and to export to the subregional and international markets in the long term. The aim is to achieve this by 2018.

In this context, it will be important to ensure that there is enough rice available both in quantity and in quality, providing income to producers and affordable by the poorest consumers.

5.5.2. Quantified objectives:

- to increase production of rice paddy from 1,206,915 tons in 2008 to 2,726,460 tons of rice by 2018. Increase average rice yields from 1.43 t/ha in 2008 to 2.75 tons by 2018.
- bring under total water control by 2015 at least 90,000 ha of large and medium rice plains in Lower Guinea, 90,000 ha in Upper Guinea and 20,000 ha of lowland in

Forest Guinea.

- Support diffusion of NERICA rice in the four natural regions. Strengthen capacity for husking to cater for 600,000 tons of production (70% industrial and 30% cottage).

Table 1: The 2008 baseline

Cropping zone	% total area	2008		
		Hectares	Yield	Production (t)
Alluvial plains	9.00%	74,912	1.50	112,368
Mangroves	16.00%	133,177	2.50	332,942
Lowland	10.00%	83,236	2.00	166,471
Upland	65.00%	541,031	1.10	595,134
TOTAL	100.00%	832,355	1.45	1,206,915
NET RICE				820,702

Table 2: Production forecasts by agroecological zone (2009–2013 phase)

Cropping zone	2013 without the project			2013 with the project			Production (t)
	Hectares	Yield	Production (t)	Hectares	Yield	Production (t)	
Alluvial plains	54,521	1.50	81,782	40,000	3.50	140,000	221,782
Mangroves	118,037	2.50	295,094	50,000	3.50	175,000	470,094
Lowland	95,023	2.00	190,047	10,000	4.00	40,000	230,047
Upland	382,652	1.10	420,917	300,000	2.00	600,000	1,020,917
TOTAL	650,234	1.52	987,839	400,000	2.39	955,000	1,942,839
NET RICE				1,050,234			1,321,131

Table 3: Production forecasts by agroecological zone (2013–2018 phase)

Cropping zone	2018 without the project			2018 with the Project			Production (t)
	Hectares	Yield	Production (t)	Hectares	Yield	Production (t)	
Alluvial plains	49,263	1.50	73,895	70,000	4.50	315,000	388,895
Mangroves	142,023	2.50	355,058	70,000	4.00	280,000	635,058
Lowland	112,515	2.00	225,029	20,000	4.00	80,000	305,029
Upland	361,344	1.10	397,479	500,000	2.00	1,000,000	1,397,479
TOTAL	665,145	1.58	1,051,460	660,000	2.54	1,675,000	2,726,460
NET RICE				1,325,145			1,853,993

5.2.3. Strategy development phase

The objectives of the strategy will be achieved in three phases

Phase 1 due in 2009: This will involve support for local production on 150,000 ha (83% rainfed and 17% in lowland and plains). It envisages the supply of 9,600 tons of improved seed of which 7200 tons will be NERICA varieties, 13,000 tons of urea, 19,500 tons of NPK fertilizer and 530,000 liters of herbicides at a total cost of US\$ 38.71 million. The research goal is to reduce the rice deficit by 15% by an additional production of 45,000 tons net.

Phase 2 due in 2013: Envisages the development of 50,000 ha of mangrove, 40,000 ha of alluvial plains and 100,000 ha of lowland with total water control where possible. For this to happen needs inputs of: 28,000 tons of improved seed and 87,500 tons of mineral fertilizer and 1,600,000 liters of herbicide. The total cost of these inputs comes to US\$ 108 million. Estimated production is for 1,949,839 tons of paddy, net yield of 1,321,000 of

cleaned rice. This will be 735,924 tons above reference year production – a 61% increase.

Phase 3 due in 2018: The aim during this phase is to develop 160,000 ha (70,000 ha mangrove and associated plains, 70,000 ha alluvial plains and 20,000 ha of lowland) with total water control. This will require 46,400 tons of improved seed, 59,000 tons of urea, 88,500 tons of NPK and 2,600,000 liters of herbicides at a total cost of US\$ 130 million. The expected rice production is for 2,726,460 tons of paddy or 1,853,992 net tons of rice. This corresponds to an additional production of 1,519,446 tonnes of paddy – an increase of 125%.

It is clear that the CARD objective for Guinea will be well exceeded and the surplus generated will be marketed in the subregion.

5.2.4. Key interventions

These will revolve around:

- Concentration of rice investment in two large development centers situated in the mangrove plains in Lower Guinea and in the alluvial plains of Upper Guinea along the Niger River and its tributaries;
- Development of mangrove rice production by emphasizing schemes with water control with the aim of double cropping;
- Pursuing development of lowland rice growing with the aim of diversifying, including rice–fish farming and off-season market gardening;
- Support for upland rice growing through diffusion of NERICA varieties together with an intensive sustainable system related to soil fertility management and the availability of credit financing for agricultural inputs purchase;
- Strengthening post-harvest activities by the diffusion of husking machines and parboilers, particularly to women;
- Private sector support for marketing infrastructure (storage, development of regional and cross-border markets together with a wholesale market in Conakry);
- Strengthening research and agricultural advisory services needed to improve agricultural productivity;

- Widespread use of improved varieties by producers;
- Building food security stocks based on the locally produced rice surplus.

5.2.5 Scientists, technicians and agricultural advisory agents in 2008 and beyond

	Agricultural scientists with Masters degrees or Doctorates.			Research technicians			Agricultural advisers		
	Total	Rice growing (full time)*	Rice growing (part time)*	Total	Rice growing (full time)*	Rice growing (part time)*	Total	Rice growing (full time)*	Rice growing (part time)*
2008	4	2	2	10	6	4	125	100	25
2013	6 (MSc)	6	0	6	6	-	200	180	40
2018	3	3	0	9	5	4		250	70

5.2.6. Governance of the Rice Growing Development Strategy

Due to the strategic nature of the rice sector, this initiative must be implemented under the auspices of the National Council for Food Security (CNSA) chaired by the Prime Minister. To begin operations, it is planned to set up the institutional mechanism for the construction of development centers in Upper and Lower Guinea following the agency example which has been successful for the Office du Niger (Niger Agency) in Mali.

A mission charter for the rice sector will be drawn up every five years to serve as the preliminary conditions to investment in the rice sector. The objective of this charter will be to determine the required investment; the management systems of the sector with the definition of the roles of the different actors (government, producer organizations; private players); the support to be put in place for a sectoral body; the results expected from agreed investment; the modalities for management and maintenance of facilities and infrastructure; and the protection system for the sector. The aim of the charter is to have a document that delineates the commitment between the government and its partners (funding donors, sectoral bodies, private importers of inputs, rice importers and local

traders in rice) renewable for a specified period. All parties agree to respect the provisions of the charter, which will be subjected to periodic joint evaluation.

Steering coordination and strategy monitoring committees will be set up at national, regional, prefectorial and local (Rural Community Development if possible) levels. This will be reinforced by a decentralized monitoring and evaluation system. The strategy will be implemented across programs and projects developed by the government and professional bodies and embodied in all agreements, service contracts and subcontracted arrangements.

5.2.7. Government financial and manpower commitments

Currently, the contribution of the government to the agriculture sector stands at around 3.5% of the national budget against the 10% provided for in the declaration of Heads of State of the African Union in Maputo in 2003.

In order to significantly improve this contribution, the government has initiated an Agricultural Support Fund. A Fund for the Development of Rice Growing is expected to be formed following a proposal from the Economic and Social Council and the 2009 national rice workshop, and this will be set up through the assignment of 10% of mining revenues and taxes on imported food products and on the exports of food products.

5.2.8 National stakeholders and links to crossborder/regional initiatives and strengthening of partnerships

5.2.9. Main interventions

Technological innovation

It will be necessary to reinforce the financial, staff and equipment capacities of the Guinea Institute of Agricultural Research (IRAG) and the National Agency for Promotion of the Countryside and Agricultural Advice (AMPROCA) to enable the generation and diffusion of innovations and technologies adapted to the strategies of producers and other actors in

the rice chain.

Policies

Strong agricultural policies geared to improving producers' access to agricultural inputs (quality seed, fertilizers and pesticides) through the introduction of low-cost credit. Finance lines favoring fertilizer professionals are necessary to guarantee production, import and distribution as close as possible to the end users. As far as general financing for the sector and agricultural credit in particular, it will be necessary to reinforce the system with the help already proposed through the Bank for the Development of Agriculture and Minerals (BADAM) and also to have the support of the Central Bank for lower rates of interest charged by financial institutions.

At the same time the government will continue its policy of helping the rice chain, including support for the private sector, with moderate and degressive subsidies for inputs and farm equipment.

Markets

It is vital to develop a strategy for the marketing of local rice and for rice imports. A totally-free market introduces serious problems that distort the market. The government must put in place a transparent price policy that guarantees producers a substantial share of returns enabling them to reinvigorate national production.

Capacity building

Weight needs to be given to getting youths and women into the rice chain if the strategy is to work. Installing irrigation works on nearly 160,000 ha will create around 320,000 new jobs, which should considerably reduce the rural exodus.

It is also desirable to drive the creation of service cooperatives in all layers of the rice chain but particularly those leading to better integration of agriculture and livestock by adding value to harvest by-products (chaff, bran, etc.)

Capacity building for the broad range of private and public actors will be stressed so help in setting up rural businesses is necessary to guarantee rice sector productivity.

VI. Strategies for the sub-sectors

6.1. Seed systems

6.1.1 Vision for production of rice seed/distribution system

According to the latest estimates by the Kilissi seed center, the current use of improved seeds could be less than 1000 tons, covering somewhere between 8% and 12% of the total area sown. An increase of the order of magnitude of 31,000 tons could be needed to cover 50% of the surface area under rice and 62,000 tons for 100% coverage.

It has been recommended that an integrated national strategy be developed for research, production, distribution and promotion of improved seeds embracing both the community system of seed production and the private sector. There is already a quality control system which needs to be strengthened.

For this to happen, three strategic options have been adopted for the development of seed companies:

- Promoting the involvement of international companies in national supply. Promoting the involvement of national suppliers in production and marketing of seed at the same time as fertilizers, pesticides and equipment; this requires technical assistance. Promoting pioneer farmers so that they can specialize in seed production and turn it into a complementary occupation to their food production.
- Support for setting up a decentralized efficient network for getting inputs closer to producers.
- Support for an injection of working capital to help producers acquire inputs.
- Support for setting up a packaging plant for fertilizers and pesticides before the end of the first phase.

While the strategy is being introduced, a system of degressive subsidies for fertilizers is proposed to stimulate the seed market.

6.2. Marketing and distribution of fertilizers

6.2.1. Marketing vision and distribution of fertilizers

One of the major constraints to the development of agriculture in Guinea is the low usage rate for agricultural inputs (fertilizers, plant health products, improved seed) which is one of the lowest in sub-Saharan Africa. In fact the average fertilizer use across Guinean agriculture is just 5 kg/ha compared to an African average of 10 kg/ha, 60 kg/ha in the Middle East, 130 kg/ha in Asia and 90 kg/ha at global level. The National Agricultural Census for 2001 shows that in the country as a whole organic manure was applied to 14% of fields with annual crops and mineral fertilizers to 2% of plots. However, it should be noted that 29% of the plots cultivated by women received organic manure compared to 5.9% of plots farmed by men.

As far as rice is concerned, the correct use of fertilizers can double or triple production. With an estimated fertilizer requirement of 87,500 tons in 2013 and about 140,000 tons in 2018, it seems vital to introduce a coherent supply and distribution strategy for producer access to fertilizers.

Strategic options:

- To use apex organizations of producers to pool fertilizer and seed requirements. While fertilizer demand is relevant to importers and private distributors, that for seed will be directed at seed farmers. Indeed, seed farmers become middlemen in a closed or semi-closed system. Strengthen cooperation between research and production by involving producers, seed multipliers and distributors in the development of a seed system.
- Strengthen cooperation with international research centers.

- Formulate a plan for certification of quality control and a body for implementation.

6.3. Marketing and processing strategy for rice

6.3.1. Vision for post-harvest procedures

This strategy should focus on the benefits from the Project for Invigorating the Food Chain (DYNAFIV) in terms of processing, marketing and structuring of operators involved along the rice chain.

The post-harvest strategy comprises:

- Obtaining harvester-threshers to improve harvesting in the major rice production areas of Upper and Lower Guinea;
- Helping farmers access small harvest tools, particularly sickles;
- Helping farmers with drying areas and tarpaulins, and applying technical innovations to drying and conditioning of paddy.

6.3.2. Vision for processing

The strategy will concentrate on two main activities:

Improving parboiling

- Putting efficient equipment for improved parboiling at women's disposal;
- Developing technological innovations for cleaning rice before and after husking.

Processing

- Promoting the introduction of mini rice mills and huskers depending on their relative importance in the major rice production zones;
- Promoting the local manufacture of huskers;

- Setting up multifunctional platforms in the major rice zones;
- Capacity building operators to maintain equipment for parboiling and processing.

6.3.3. Vision for marketing

- Promoting the know-how of DYNAFIV in terms of involving the private sector at different levels of marketing local rice;
- Reinvigorating the grain gathering, storage, transport and distribution network by establishing rice buying and other professional agencies;
- Favoring rice grain banks and exchanges to help build food security stocks.
- Ensuring the promotion of local rice by improving its competitiveness with incentive prices to encourage various actors;
- Using quality to promote rice (branding and labeling);
- Helping operators with packaging and accurate weights and measures;
- Building grain stores in the major rice production zones in Lower and Upper Guinea and also in Conakry, the major point of consumption;
- Capacity building of operators in simple management of rice marketing;
- Setting up a support fund for marketing local rice;
- Exploiting rice by-products (straw, chaff, bran and other residue);
- Establishing an appropriate information system for actors in the rice sector.

6.4. Irrigation and investments in water control technology

Irrigated rice growing allows both very high yields (3–4 times higher than for rainfed rice) and double cropping.

6.4.1. Rehabilitation and modernization of existing programs

These activities will center on the rehabilitation of old managed irrigation schemes by: (i)

rebuilding bunds, (ii) rebuilding hydraulic works and components (valves, etc.), cleaning canals and main and secondary drains.

6.4.2. Developing existing irrigation programs

1. Water management

Water management is founded on the exploitation of surface water for agricultural needs and livestock rearing through the construction of facilities for water control and rational use.

The strategies used for the different types of rice growing are discussed below.

- Mangrove plains:

For mangrove areas bordering the sea, the facilities to be constructed include: (i) machinery for regulation of sea water and fresh water; (ii) irrigation and distribution networks; and (iii) drainage networks.

For the inland mangrove areas, the facilities to be constructed include: (i) irrigation and drainage networks (irrigation canals and drainage and internal works: plots); and (ii) storage facilities (water reservoirs: dams and small dams, spillway crests and retaining banks).

- Alluvial plains:

The infrastructure required includes pumping stations, dams for simple or multiple distribution, irrigation and drainage networks (canals for distribution, irrigation and drainage, control devices).

- Lowland: The principle behind developing facilities is founded on the construction of irrigation infrastructure and drainage (lowland) and controlled flooding (small alluvial plains). The unit may be completed through the construction of water retention banks.

Three types of construction were developed: (i) management of the lowland using retention banks, (ii) management using a water inlet, and (iii) management using a water evacuation system for groups of lowland plots.

The sizing of the rice plot grids will take into account not only the topography but also the use of small-scale mechanization for crop operations.

2. Protection and sustainability of facilities

Protection and sustainability of facilities will be centered on proper management of water and maintenance of infrastructure and the protection of the environment. The sustainability of the program will stem from the acceptance of accountability by the beneficiaries during the planning and set-up stages for managed schemes.

3. Training and skills upgrading

Training programs containing a range of modules will be developed throughout the program to cover: (i) water management and works maintenance; environmental protection because of the seasonal nature of the works; (iii) cooperative management, business management and group leadership techniques.

6.5. Access to and maintenance of agricultural equipment

The mechanization strategy will revolve around three main axes:

- **Support for the development of draft animal cultivation:** the experience of the NGO 'Guinean Network for Draft Animals' – part of Belgo-Guinean Cooperation – shows that use of a single beast rather than two greatly improves the technique in conjunction with modern equipment suitable for all types of rice growing.

Links are needed between the processors and the livestock handlers to improve the productivity of these draft animals by feeding them with rice by-products. A financing

mechanism will be set up to help producers access the inputs they need and to help processors. Integration will be helped by encouraging cooperatives of young farmers or women, other groups and private enterprises.

- **Assistance for small-scale and conventional motorization:** the use of tractors and motorized tillers is determined by the ability of intensive and highly productive cropping systems to cover the costs. The possibilities of their introduction into high-yielding rice systems or in the largest zones of rice production will be explored. Animal traction or 15 hp motor tillers are recommended for lowland soil conditions and plot sizes. In mangrove areas or alluvial plains, more powerful 65 hp and 90 hp tractors can also be recommended.
- **Assistance with post-harvest technology:** post-harvest technology such as improved equipment for harvesting, threshing, drying, parboiling and husking can avoid losses during and after harvesting, which can cost 15–50% of the marketable value. Medium to large capacity equipment is available to suit different rice growing systems and the income of the producers. It is expected that medium capacity rice mills handling from 10-10,000 tons, mini rice mills (2–3 tons/hour) and small efficient huskers will be set up.

6.6 Capacity building, research and technology diffusion

6.6.1. Generation and transfer of technology to farmers

The Guinean Institute of Agronomic Research (IRAG) is responsible for agricultural research in partnership with other agencies in the national agricultural research system. It has regional research centers (Kankan for Upper Guinea; Foulaya for Lower Guinea; Sérédou for Forest Guinea) and two specialist centers at Kilissi, one for mangrove rice growing and the other for breeding and production of basic and pre-basic seed.

Rice research at IRAG

IRAG rice research involves several disciplines: variety improvement, technical guidelines, crop protection, etc. This research follows the following pattern:

- Identification of research themes: these are chosen by consulting with farmers, NGOs and other development partners during one-day retreats. Identified constraints are ranked and classed into two categories (researchable and non researchable).
- Drawing up research projects based on the identified constraints.
- Technology testing on station using classic techniques such as randomized complete block design (RCB).
- Test and validate technologies at farm level in Farmer Experimental Units or through participatory varietal selection (PVS) in conjunction with the extension services and farmers.
- Demonstrate and disseminate new technologies with the help of the extension services, producer organizations or individual farmers.

Research themes focus on weeds, disease and pests, variety improvement, agricultural and processing equipment, and producing impact studies.

6.6.2. Preservation and distribution of genetic resources

IRAG has a Plant Genetic Resources Program (PRPG) based at the Foulaya agricultural research center. Its mission is to characterize and conserve germplasm of existing food crops.

Guinea is a reservoir of important genetic resources in rice. These are maintained at two levels. The most important are maintained *in situ* in farmers' fields. Other genetic resources are kept *ex situ* in the living gene banks at Kilissi, Koba, Bordo and Sérédou as well as in cold chambers.

A large proportion of the varieties maintained in the living collections are improved varieties from the Kilissi research center or have been introduced from research by the Consultative Group for International Agricultural Research (WARDA, IRRI) through the INGER-Africa network. Guinea has obtained more than 1500 improved rice varieties

thanks to the INGER-Africa network, and also exchanges plant material worldwide through international networks.

6.6.3. Soil fertility management

In order to rectify the widespread decrease in soil fertility in the various rice growing systems, it would be prudent to adopt an integrated approach. The main strategic axes will involve, among others:

- Developing and distribution of integrated technologies of soil fertility management that respect the environment;
- Development of an agricultural inputs market, particularly for fertilizers and lime application;
- Building capacity for the relevant players including the Association of Producers and Importers of Agricultural Inputs (APIDIA).

6.7. Access to loans and agricultural funding

6.7.1. Farmers, processors and inputs suppliers, access to financial services

The various actors at the recent rice sector workshop urged the government and its development partners to introduce a Fund for the Development of Rice Growing in Guinea (FDRG) to be managed by representatives of farmers, processors, importers of rice, equipment and agricultural inputs, as well as consumers. The participation of the private sector will be vital for this.

At the same time the government should support the rapid roll out of the recently-approved Bank for the Development of Agriculture and Minerals (BADAM), and call for a reduction in the interest rates charged by microcredit lenders.

6.7.2. Financial management capacity

A program of capacity building in financial management is proposed to upgrade the relevant management mechanisms in the professional organizations.

VII. CONCLUSION

Promotion of rice growing is one of the priorities of agricultural policy in Guinea. The CARD Initiative fits perfectly with the objectives of the poverty reduction strategy (DSRP2), the National Policy for Agricultural Development – Vision 2015, the common agricultural policy (ECOWAP) of ECOWAS, and the Comprehensive Africa Agricultural Development Program (CAADP) initiated by the African Union.