



**REPUBLIC OF GHANA
MINISTRY OF FOOD AND AGRICULTURE**



**NATIONAL RICE DEVELOPMENT STRATEGY
(NRDS)**

Prepared by:

Ministry of Food and Agriculture (MoFA)

Coalition for Africa Rice Development (CARD)

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FOREWORD

Following the Fourth Tokyo International Conference on African Development (TICAD IV) in May, 2008, the Coalition for African Rice Development (CARD) initiative was launched. The rice development strategy is an outcome of Ghana Government subscription to the vision of the initiative to double rice production in Africa.

The Ghana National Rice Development Strategy (G-NRDS) which covers the period 2008 to 2018 is a response to forestall the effects of the global food crisis. The strategy proposes to double rice production taking into consideration the comparative production capacities of the three major ecologies (rainfed upland, rainfed lowland and irrigated) and growth of consumption. Over the last 10 years (1999-2008) per capita rice consumption increased from 17.5 kg to 26.0 kg. By 2018 it is estimated that it will grow to 63 kg as a result of rapid population growth and urbanization (JICA, 2008).

In developing the strategy, the Ministry of Food and Agriculture (MOFA) benefited from inputs of national experts with multi-sectoral backgrounds as well as other stakeholder groups operating in Ghana. Major constraints such as land development and land tenure arrangements, seed quality and availability, high cost of fertilizer, inadequate human resource capacity, inadequate harvesting and post harvest management technology, weak local rice marketing system and the role of Government and related agencies have been considered. A governance structure comprising the key actors in the rice sector has been proposed.

Seven (7) thematic strategy areas have been identified namely: Seed System; Fertilizer Marketing and Distribution; Post-Harvest Handling and Marketing; as well as Irrigation and Water Control Investment. Others are Equipment Access and Maintenance; Research and Technology Development; and Community Mobilization, Farmer-Based Organizations and Credit Management. For each of the thematic areas, some key actions have been proposed.

The role of government, public sector, private sector and NGOs have been considered crucial for the attainment of the goals of the strategy. An implementation plan which will be developed subsequent to the adoption of the NRDS will indicate the details of the action plans and funding.

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1. INTRODUCTION

Rice has become the second most important food staple after maize in Ghana and its consumption keeps increasing as a result of population growth, urbanization and change in consumer habits. Between 2008 and 2009, paddy production was in the range of 302,000 and 436,000 tons (181,000 to 262,000 tons of milled rice) with large annual fluctuations. The annual production fluctuations are largely due to the area (ha) put under rice cultivation, rather than yield variations (t/ha). Rice is cultivated in Ghana both as a food crop and a cash crop. The total rice consumption in 2005 amounted to about 500,000 tons (JICA, 2008), which is equivalent to per capita consumption of 22kg per annum. Ghana depends largely on imported rice to make up the deficit in domestic rice supply. On the average, annual rice import is about 400,000 tons. The self-sufficiency ratio of rice in Ghana has declined from 38% in 1999 to 24% in 2006 (CIRAD, 2007). It is important for stakeholders in the food and agriculture sector to ensure increased and sustained domestic production of good quality rice for food security, import substitution and savings in foreign exchange.

Global rice imports have increased by 80% - from 2.5 billion tons (grain) in the early 1990s to 4.5 billion tons in 2004. During the same period, African countries increased rice imports by 140% - from 5 million tons in the early 1990s to 12 million tons in 2004. This is equivalent to about a quarter of the world import, with an import value estimated at US\$2.5 billion. West African countries show the same increasing trend of rice import, increasing from 4 million tons (US\$ 0.8 billion) in early 1990s to 8 million tons (US\$1.6 billion) in 2004-2005, accounting for two-thirds of Africa's rice import. These imports are projected to be between 6.5 million and 10.1 million tons in 2020 (Lançon and Erenstein, 2002). According to a JICA study (2008), Ghana's annual imports over the same period exceeded an average of US\$200 million.

In recent years, rice production in Africa has been expanding at a rate of 60% per annum, with 70% of the production increase due mainly to land expansion and only 3% being attributed to an increase in productivity (AfricaRice, 2007). Much of the expansion has been in the rainfed systems, particularly in two ecosystems (the upland and rainfed lowland) that make up 78% of rice land in West and Central Africa. Africa cultivated about 9 million hectares of rice in 2006 and production, which is expected to increase by 7% per year, surpassed 20 million tons.

2.0 REVIEW OF THE NATIONAL RICE SECTOR

2.1 Status of Rice in National Policies

Policy strategies over the years, as captured in FASDEP I, GPRS I & II, MTADP, AAGDS and other MoFA policy documents, have sought to promote rice production to address food security and poverty reduction. FASDEP II, which is the current sector development policy guideline (2008 – 2010), lists rice as one of the commodities for increased food security and import substitution. Specific measures, among others, to reach this level of production are increased mechanization, increased cultivation of inland valleys and efficient utilization of existing irrigation systems. In addition, varietal improvement and increased seed production and utilization are to be pursued vigorously. These Agricultural documents, especially FASDEP II, are largely in conformity with AU-NEPAD-CAADP principles.

2.2 Rice Consumer Preferences, Per Capita Consumption and Demand Projections

There is a wide variation in rice consumer preference in Ghana on the basis of grain characteristics. However, most consumers prefer long grain perfumed rice of good taste, good appearance, and with whole grains, although broken grains have their place in specific local dishes. Health-conscious consumers patronize local brown rice while parboiled rice is preferred in the Northern regions of Ghana. Annual per capita rice consumption during 1999-2001 was 17.5 kg on average. This increased to 22.6 kg during 2002-2004. In the same period, per capita rice consumption increased to around 8.9% per annum, higher than the population growth of 2.5% per annum. Assuming the same trend continues, per capita rice consumption will increase to 41.1 kg in 2010 and 63.0 kg in 2015. Based on population growth rate alone, the current demand of about 500,000 tons per year will increase to about 600,000 tons per year by 2015. However, taking both population growth and increase in per capita consumption together, rice demand will increase to 1,680,000 tons per year by the same period.

2.3 Typology and Number of Rice Farmers

Rice producers in Ghana are categorized by agro-ecologies namely: irrigated, rainfed lowland and rainfed upland. In general, the lowland rainfed system covers 78% of the arable area and the irrigated system covers 16% while the upland system covers 6%. On the average, 118,000 ha of land are cropped to rice per year (GRIB, 2008 and JICA, 2008).

On the basis of access to resources and scale of operation, rice farmers in Ghana can be categorized as in Table 1 below:

Table 1. Typology and Percentage Proportion of Rice Farmers

Type	Main Characteristics	% Proportion
1.Resource Poor Rice Growers	1.1 Subsistence: often female headed or elderly headed households, face labor constraints, have no resources to fall on in event of external shocks.	15%
2.Marginal Rice Smallholders	2.1 Could produce a small marketable surplus, may have some resources on which to fall (i.e. greater physical strength, better health, more land, small savings etc.). Significant proportion of adult household members may migrate during off season.	25%
3. Viable Small Scale Rice Growers	3.1 Poor but potentially viable small scale farmers, not necessarily factor constrained (have land and/or labor), often have assets that are used inefficiently because of lack of access to markets, poor infrastructure or weather related risks, limited access to technologies. Willingness to take some risk.	40%
4.Emerging Commercial Rice growers	4.1 Grow rice mainly as cash crop, market oriented, could own small equipment like tractors, use hybrid seed and fertilizer, may have access to irrigation facilities, and can hire additional labour.	20%

Generally, processors and traders are quite few, compared to the number of rice producers.

2.4 Gender Dimensions of Rice Production, Processing and Marketing

Although men dominate rice production in all the ecologies, at specific locations in Ghana, women dominate. In the processing and marketing sectors, women are the major actors at the small to medium scale levels. Within the marketing chain, the main categories recognized are importers wholesalers, retailers and consumers. Generally, three categories of marketers are recognized:

Wholesalers: These are rice traders operating in large shops, selling mostly in large quantities of 25 or 50 kg bags. They operate in the big cities and function as intermediaries between importers and retailers.

Retailers: These are trader who procure rice from wholesalers and sell to consumers. They sell rice in bags of various sizes, as well as in bowls and tins.

Itinerant Rice Traders: These are traders who buy mainly paddy or milled rice from rice producing communities. The paddy is assembled and milled at central points for sale to local traders or retailers. On a relatively small scale, farmers mill their paddy and sell to traders or local retailers.

Table 2. Gender and the Rice Value Chain

Chain Stage	Description
Production Female – 40%; Male – 60%	<ul style="list-style-type: none"> • Generally smallholder • rice is a significant cash crop for many farmers • Averagely about 50% of produce are sold • About 60% store paddy for about 6 months • 50% sell half of produce at harvest time
Marketing Female – 50%; Male – 50%	<p>(a) Local traders who supply consuming centers in the surrounding of the production areas.</p> <ul style="list-style-type: none"> • Buy paddy from farmers • Process it at the local milling center • Sell it either directly to consumers or to traders - In dryer areas, local traders buy paddy, parboil it before milling <p>(b) Regional traders have similar marketing functions, but operate on larger distance</p> <p>(c) Inter- Regional Traders</p> <ul style="list-style-type: none"> • Link regions with surplus to major consuming centers • Buy, mill and organize transportation of milled rice • Sell milled rice to retailers <p>(d) Retailers</p> <ul style="list-style-type: none"> - May deal only with local rice or with both (local + imported)
Processing Female – 70%; Male – 30%	<p>Two types of milling technologies</p> <ul style="list-style-type: none"> - Small Engelberg mill (55% recovery rate) - Rubber roller technology (65% recovery rate) - Mills have an intense activity during harvest period - Besides the milling technology, know-how and post-harvest practices influence quality of milled rice

2.5 Comparative Advantage of Domestic Rice Production, Processing and Trading

With a current import levy of 20% of FOB price, imported high grade rice sells at about US\$ 650 per ton and low grade rice sells at US\$ 530 per ton. Comparatively, rice farmers in Ghana sell milled rice at an equivalent of US\$ 563 per ton. Averagely, with other distribution costs, wholesale and/or retail

price is about US\$ 626 per ton. Ghana is recorded to have comparative advantage in the production of paddy rice over other countries in the sub-region (Assuming-Brempong, 1998). However, this advantage reduces as rice is processed and distributed, due to associated high cost of processing and transportation. By increasing rice yields, introducing standard rice mills, improving parboiling equipment, providing storage facilities and drying patios, it is expected that competitiveness will be enhanced. Access into producing areas and marketing centers also need to be improved.

Furthermore, rice cultivation plays a very important role in providing employment to about 10% of farming households. With a total rice cropping area of 118,000 ha in 2008, an estimated average household holding of 0.4 ha indicates an approximate total of 295,000 households' involvement in rice cultivation.

3.0 CHALLENGES AND OPPORTUNITIES FACING NATIONAL RICE SECTOR

Ghana has a relatively long history of rice production. Despite policy interventions aimed at developing the industry, challenges and opportunities in the following key areas have been identified:

3.1 Land Tenure

The land tenure system is a constraint to rice production in Ghana because of its general effects on both access and security. The system tends to limit the size of holdings and investments towards land improvement, especially in the lowland rainfed ecology. There is general gender bias in favour of men in the allocation of land. The country has a large rainfed lowland ecology that is suitable for rice production but remains largely unexploited. Inventories will be taken of all the ecologies suitable for rice production. The Ghana National Rice Development Strategy proposes government engagement with traditional rulers and/or land owners and Metropolitan/Municipal/District Assemblies ahead of the development of the specific ecology for long term lease or using land as equity in the investment. Once secured, a joint public-private land investment partnership arrangement will be put in place to ensure security and sustainability in land use.

3.2 Socio-Cultural Issues

In communities where women are engaged in rice production as a major source of livelihood, development of the industry would improve their lot. However, gender inequalities prevent many women from accessing land and agricultural credit even though studies have shown that women are

more credit worthy. While traditional rice festivals (e.g. in parts of Volta Region) tend to promote rice production and generally low literacy rates, adversely affect technology adoption and utilization.

3.3 Trans Boundary/Regional Issues

The ECOWAS protocol allows free movement of goods and services across countries in the West African sub region. As a result, there is potential to improve trans-boundary rice trade, exchange of market information, research findings and seed varieties. The protocol could however have negative effects (e.g. phyto-sanitary problems) on food security, depending on its management. Regulated regional varietal release systems are anticipated to ensure easy access to promising seed varieties capable of contributing to food security and poverty reduction in the sub-region.

3.4 Local Rice in Rural Poverty Reduction and Economic Growth

Among the different actors identified in the rice value chain, majority of them are small holder male producers and women-dominated processors. Local rice production is characterised by low yields and poor quality, which affect its availability, marketability and returns. However, current demand levels for rice indicates that promoting the local rice industry will enhance the output and income of the small holder farmers, processors and traders, thus promoting national economic growth.

3.5 Lessons from Previous Rice R & D

The Research-Extension Linkage Committees (RELCs) ensure that constraints of farmers and processors are reviewed and prioritized during annual planning meetings between researchers, MoFA staff and stakeholder representatives at the district level. Due to inadequate funding, many research interventions are not implemented while periodic reviews are not carried out at the district level. Some inland valley sites in the Western, Volta, Upper East and Upper West regions have participated in the WARDA-funded Participatory Adaptation and Diffusion of Technologies for Rice Based Systems in West Africa (PADS) and Participatory Learning and Action Oriented Research (PLAR) programmes that brought researchers, extension agents and farmers closer. These approaches enhanced the technology transfer and diffusion processes and empowered rice farmers.

Under the National Agricultural Research Programme (NARP), the rainfed lowland system was identified as a viable and sustainable option for rice production in Ghana. It is important to identify, characterize and select suitable valleys in order to develop designs suitable for sustainable and cost effective rice production.

3.6 Human and Institutional Capacities

There is inadequacy of researchers, technicians and extension staff for effective research to generate technologies for dissemination to stakeholders along the value chain. This has been exacerbated by inadequate funds and equipment for research. Technology generation and dissemination under the RELCs have been less effective and need to be strengthened in terms of staffing and logistics.

4.0 PRIORITY ECOLOGIES AND APPROACH

4.1 Rice Ecologies in Terms of National Production Potential

Rice is cultivated in Ghana under three main production systems namely: rainfed upland, rainfed lowland and irrigation. The rainfed lowland ecology is dominant, covering over 78% of total cropped area. The irrigated ecology covers 16% of total rice area while the upland area covers 6%. Whereas it is feasible to have rice cropping intensity of 1.5 in the rainfed lowland and irrigated ecologies, an intensity of 1.0 is achieved in the uplands.

4.1.1 Rainfed Lowland Ecology

This ecology has water management problems as a result of frequent flooding from ground water and precipitation. However, when well developed (with simple water management techniques) and mechanized, its yield potential can be substantially enhanced. Studies undertaken in 1996 and confirmed in 2000 showed that the rainfed lowland ecology is the most profitable for rice production provided water management and cultural practices are improved. Ghana's strategy conforms to CARD's goal which targets this ecology for increased rice production. Conservatively, it is estimated that Ghana has over 4 million ha of unexploited rainfed lowlands.

4.1.2 Rainfed Upland Ecology

This ecology is characterized by an erratic rainfall pattern. There are also problems of weed competition, low soil fertility and pest damage. Rice varieties suitable for the ecology are short duration and drought-tolerant types.

4.1.3 Irrigated Ecology

This ecology records the highest rice yields because the levels of technology utilization are higher than in both rainfed lowland and upland ecologies (improved land preparation, improved varieties,

fertilizer application and weed control through water management). It may be suitable for rice-fish culture.

4.2 Policies and Institutional Challenges/Opportunities

The Agriculture policy of Ghana is directed by the MoFA. Over the years, MoFA has identified institutional handicaps and opportunities within the rice sector. An operating document titled FASDEP II which is consistent with Ghana's Medium Term Development Plan (GPRS II) has subsequently been developed.

The strategy objectives of FASDEP II fall in line with the Comprehensive African Agriculture Development Programme (CAADP), that has been developed to accelerate food security in Sub-Saharan Africa, as well as the joint initiative for developing the African rice sector prepared by the Japanese International Cooperation Agency (JICA) and the Alliance for Green Revolution in Africa (AGRA).

Under the FASDEP II, the policy objectives of food security and emergency preparedness, as well as improved growth in incomes, place emphasis on rice as one of the key commodities to be promoted. Intervention areas include (i) land acquisition and property rights (ii) provision of irrigation infrastructure (iii) enhancing access to credit and inputs (iv) improving access to mechanized agriculture and (v) increasing access to extension services to promote crops amongst which rice is prominent.

5.0 VISION AND SCOPE OF NRDS

Per capita rice consumption in Ghana has increased from 13.9kg to 26kg per person per year over the last decade thus increasing the rice import bill. It is desired that Ghana will double local rice production by the year 2018 so as to contribute to food security and increased income in rice production. The modalities for achieving this are guided by the following goal and objectives:

Goal:

To contribute to national food security, increased income and reduced poverty towards the attainment of self sufficiency from sustainable rice production.

Objectives:

- i. To increase domestic production by 10% annually using gender sensitive and productivity enhancing innovations for small holders, commercial producers and entrepreneurs along the value chain.
- ii. To promote consumption of local rice through quality improvement by targeting both domestic and sub-regional markets.
- iii. To enhance capacity of stakeholders to utilize rice by-products, thus contributing to sound environmental management practices.
- iv. To promote dialogue among rice stakeholders within the value chain towards building efficient information sharing and linkages

5.1 Rice Sector Projections

Projections for average rice production in the rice ecologies and human resource capacity are indicated in Tables 3 and 4 respectively. Over the ten-year period, an average yield increase of 1 t/ha in the rainfed upland and lowland ecologies and 2 t/ha in the irrigated ecology are envisaged (Table 3). Based on the assumption of expected growth rate in rice per capita consumption, population and urbanization, Ghana's rice requirement will be in the range of 1.4 – 1.6 million tons per annum by 2018 (JICA, 2008).

Table 3. Production Targets in the Rice Ecologies

Year	Rain fed upland			Rain fed lowland			Irrigated			Total/Average		
	Area ('000ha)	Yield (mt/ha)	Prod. ('000 mt)	Area ('000ha)	Yield (mt/ha)	Prod. ('000 mt)	Area ('000ha)	Yield (mt/ha)	Prod. ('000 mt)	Area ('000ha)	Yield (mt/ha)	Prod. ('000 mt)
2008	7.1	1.5	10.6	92.0	2.5	230.1	18.9	4.0	75.5	118.0	2.7	318.6
2013	30.0	2.2	66.0	150.0	3.0	450.0	25.0	5.0	125.0	205.0	3.3	676.5
2018	45.0	2.5	112.5	300.0	3.5	1,050.0	30.0	6.0	180.0	375.0	4.0	1,500.0

Source: (MoFA, 2008; CSIR, 2008)

Currently, over 50% of rice researchers and technicians are fully engaged in the rice sector and it is expected that this number would quadruple by 2018. This should be done through collaborative effort between MoFA, CSIR and the Universities (Table 4). In relation to this is the need to intensify extension work in the rice sector by MoFA.

Table 4. Human Capacity Targets for the Rice Sector

Year	Agricultural Researchers with MSc, MPhil or PhD			Research Technicians			Extension Workers		
	Total	Rice Specialists (full time)	Rice Specialists (part time)	Total	Rice Specialists (full time)	Rice Specialists (part time)	Total	Rice Specialist (full time)	Rice Specialists (part time)
2008	48	28	20	24	15	9	2757	70	2687
2013	55	50	5	110	100	10	4070	100	3970
2018	60	55	5	130	120	10	5630	300	5330

Source: (MoFA, 2008; CSIR, 2008)

5.2 Long-Term (10 Years) Target Farm Gate/ Market Price of Rice

Currently, there is no long-term data on rice prices. However, using 2007 figures, the producer and retail prices from baseline survey data is indicated as follows:

Farmers sold an 84kg bag of paddy at GH¢25.20 or GH¢28.00 per 50kg bag of milled rice, i.e. GH¢56.00 per bag of 100kg milled rice. At the wholesale level, a 100kg bag of milled locally produced rice sold at GH¢62.60. This is comparable to the average price of GH¢ 55.00 per 100kg of the imported rice. However, making a ten-year price projection remains an arduous task due to paucity of data.

5.3 Governance of NRDS

MoFA has primary responsibility of facilitating and catalyzing the operations of the National Rice Coordinating Committee. MoFA will actively involve research institutions and universities, among other state actors. Representation of farmer-based organizations, private sector, NGOs and development partners on the committee will be assured. Further to this MoFA will oversee the setting up and functioning of the National Rice Task Force which will see to the technical implementation of the strategy.

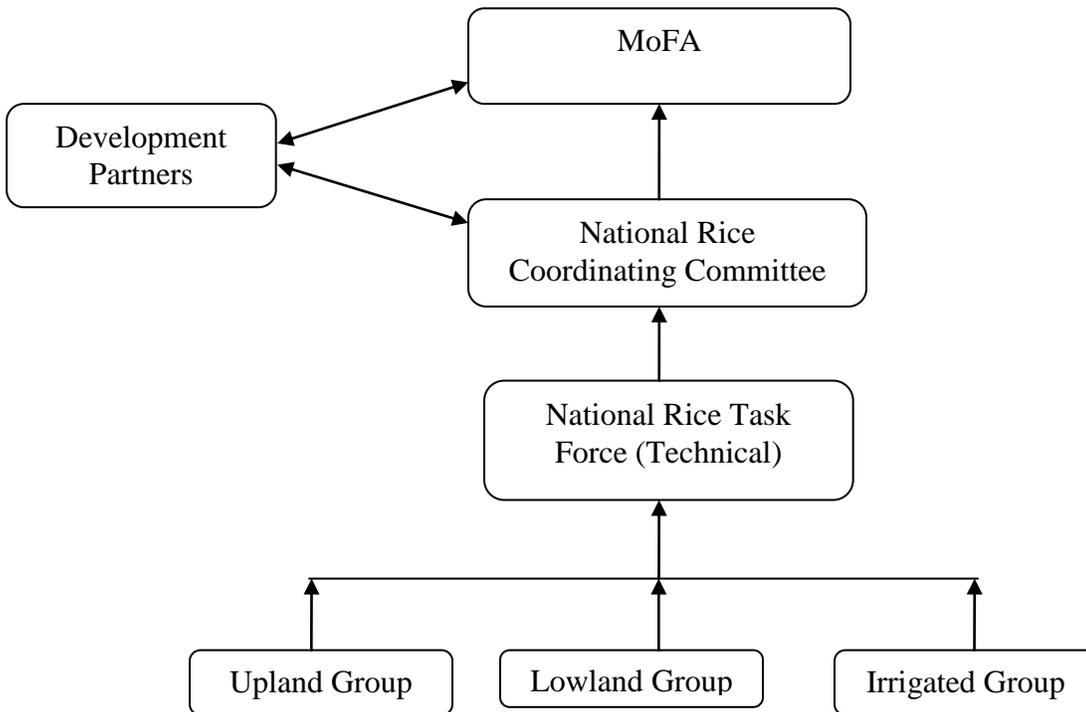


Figure 1: Governance of NRDS

5.4 Financial and Human Resource Commitment of Government

In accordance with the Maputo declaration, where every African Government is required to allocate at least 10% of national annual budget to agricultural development, it is expected that the Government of Ghana will provide counterpart support to contributions from development partners to facilitate the implementation of the strategy. It is also anticipated that, Government of Ghana (MoFA, CSIR, Universities and other allied agencies) will make available the necessary human resource to successfully implement the strategy (Section 5.1).

5.5 National Stakeholders and Linkages to Trans-Boundary/Regional Initiatives

The Ministry of Food and Agriculture (MoFA) currently collaborates with the Universities, Council for Scientific and Industrial Research (CSIR), Non Governmental Organizations (NGOs), private sector operators (farmers, processors, traders) and Ghana Rice Inter-Professional Body (GRIB). Linkages will be strengthened with other national, sub-regional, and international programmes such as WARDA-IRRI, CIRAD, WAAPP, ARI, CORAF/WECARD, WASA, ASN and FARA for implementation of the strategy. Some of the key regional activities target collaboration on market

information, germplasm exchange, seed systems management and policy review and implementation. The implementation of the strategy will seek to harmonize both on-going and pipeline programs/projects to ensure attainment of national goals, objectives and outputs in the rice sector. MoFA will continue to serve as the lead facilitator in the harmonization process.

5.6 Key Interventions of the Strategy

The strategy will focus on the following innovations and technologies: development of water control structures, integrated soil fertility management, varietal improvement and post harvest handling and value addition. With respect to post harvest technology, institutions such as GRATIS, ITTU will collaborate with CSIR-FRI, CSIR-IIR in the fabrication of equipment, branding and packaging of rice.

FASDEP II lays emphasis on the following areas: Improving research and extension delivery in the context of emerging innovative systems, promoting micro-finance for agricultural production, capacity building for rice stakeholders, improving inter- and intra-regional communication and collaboration, developing rice information system through ICT, improving seed supply, promoting public-private partnership, addressing gender mainstreaming, promoting human health, ensuring sound environment management and creation of a credible database on rice.

6.0 STRATEGIES FOR THE VARIOUS SUB-SECTORS

6.1 Seed System

In the short to medium term, public institutions (CSIR, Universities, GLDB, e.t.c) will continue to be the major facilitators and catalysts for breeder and foundation seed production and overseeing the production of certified seed by the private sector and registered seed growers. In the long term, however, seed multiplication will be ceded to the private sector and registered seed growers. The government, in partnership with actors, will continue to provide responsive regulatory regime for the seed sector. The rice seed system should be developed within the remits of the overall input needs of the rice sector.

For genetic resource development and maintenance, germplasm collection will be continued while molecular tools will be used to characterize and evaluate germplasm for the relevant ecologies. Human and institutional capacity will be developed and strengthened to meet these requirements.

The current national seed law seeks to address challenges concerning varietal release, quality control and certification mechanisms to address and take advantage of opportunities within the seed system.

In the short to medium term, newly released varieties such as *Sikamo*, *Jasmine 85*, *Digang*, *NERICA 1*, *NERICA 2*, *Bouake 189*, *Marshall*, *KRC-Baika*, *ITA 304* will be promoted for widespread adoption under suitable ecologies, whilst breeding and selection of more superior varieties will continue to address long term varietal needs.

Some of the key requirements for improvement of the seed system include rehabilitation of existing and provision of new infrastructure such as cold storage facilities and development of human capacity for breeding and seed certification.

Table 5. Projections for Seed Requirement

Year	Rainfed upland			Rainfed lowland			Irrigated			Total	
	Area ('000ha)	Seed rate (kg/ha)	Total qty rqd (mt)	Area ('000ha)	Seed rate (kg/ha)	Total qty rqd (mt)	Area ('000ha)	Seed rate (kg/ha)	Total qty rqd (mt)	Area ('000ha)	Total seed qty (mt)
2008	7.1	60	426	92.0	50	4,600	18.9	35	661.5	118.0	5,687.5
2013	30.0	60	1,800	150.0	50	7,500	25.0	35	875.0	205.0	10,175
2018	45.0	60	2,700	300.0	50	15,000	30.0	35	1,050.0	375.0	18,750

It is projected that by 2013, approximately 10,000 tons of quality seed will be required to cultivate 205,000 ha across the ecological zones and by 2018 about 19,000 tons will be required for the projected 375,000 ha.

6.1.1 Proposed Actions

1. Produce adequate quantities of breeder, foundation and certified seed from released rice varieties adaptable to rice growing ecologies
2. Rehabilitate existing cold storage facilities for seed
3. Develop an efficient system of distribution for breeder, foundation and certified seed
4. Organize and train certified seed growers

5. Sensitize farmer groups on the need to use certified seed to maintain purity of the rice crop

6.2 Fertilizer Marketing and Distribution Strategy

The African Union Fertilizer Summit of 2006, in Abuja Nigeria, called on the African Development Bank to establish fertilizer facility to enhance African member states' access to and affordability of fertilizers. It further encouraged member states to purchase fertilizer in bulk and, where possible, establish a fertilizer production facility.

In Ghana fertilizer requirement is largely met by imports, while there is also local blending of fertilizer types by the private sector using imported active ingredients. About 45% of fertilizer requirement comes from this initiative and there are plans to increase this capacity. However, the distribution of fertilizers, access and affordability by small holders remains a fundamental policy challenge.

Table 6. Projections for Fertilizer Requirement

Year	Land area (Ha) (x1000)	Nutrient Requirement (kg/ha)			Total requirement (kg) (x1000)		
		N	P	K	N	P	K
2008	118	90	60	45	10,620	7,080	5,310
2013	205	90	60	45	18,450	12,300	9,225
2018	375	90	60	45	33,750	22,500	16,875

The NRDS proposes to involve the private sector in the blending of appropriate straight fertilizers based on the ecology, soil type and variety to be adopted by farmers. Where applicable, organic sources of fertilizer will be part of the specific rice ecology. For example incorporation of rice straw and other waste farm products into soils, as an alternative to burning crop residue, will be encouraged to minimize environmental pollution. Crop rotation with nitrogen fixing plants will also be pursued.

6.2.1 Logistic Requirement for Fertilizer Use, Distribution and Marketing Strategy

There is need to improve haulage and storage facilities nationwide. Furthermore, repackaging of fertilizer into appropriate smaller packages will ensure easy access and affordability by smallholder farmers. Establishing quality control and testing facilities for fertilizer quality assurance is essential.

6.2.2 Proposed Actions

1. Develop an efficient system of storage and distribution (in affordable packages) of recommended fertilizers to enhance availability
2. Facilitate timely access to fertilizer through the provision of efficient credit systems and enforceable distribution guidelines
3. Encourage use of organic fertilizer through awareness creation, training and demonstrations
4. Government facilitating private sector investment in fertilizer production and distribution in the long term

6.3 Post- Harvest and Marketing Strategy

In order to promote and sustain profitable rice production, it is essential to minimize postharvest losses and also improve the quality of rice for the market. The use of appropriate harvesting and threshing facilities (small–medium scale harvesters and threshers) will be encouraged. Paddy will be processed into acceptable national minimum standards by providing standard rice mills (equipped with pre-cleaners, destoner, hullers, polishers, paddy separators, aspirators, and graders). Existing one-pass mills will be improved by adding attachments while processing centers will be equipped with storage facilities for paddy/milled rice. Drying patios and improved parboiling equipment will be needed to improve on the quality of parboiled rice. Brown rice and parboiled rice production will be promoted to enhance the nutritional status of rural and urban consumers.

To enhance preference for consumption of locally produced rice, the following marketing strategies will be adopted: branding and promotion, packaging, retailing in supermarkets and organisation of food bazaars. There will also be the need to establish warehouses for milled rice at central locations of major producing and consumption areas, sustain rice marketing credit lines, build capacity of marketers and processors and improve accessibility to producing areas and marketing centers. Prior to these interventions, the need to enhance other post harvest handling of rice will be necessary: timely harvesting (clean threshing), proper curing prior to milling, improved parboiling practices and appropriate haulage system. In the light of all these, collaboration with relevant agencies, notably Department of Feeder Roads (for improved farm tracks and rural road networks) and private transporters will have to be enhanced.

6.3.1 Logistics Requirement for Post-Harvest and Marketing Strategy

To enhance the competitiveness of locally produced rice it is important to improve the generally low-quality drying, storage and milling facilities by introducing standard rice mills, improved parboiling equipment, storage facilities, drying patios and warehouses. Furthermore, accessibility to producing areas and marketing centers will be also improved.

6.3.2 Proposed Actions

1. Enhance quality of milled rice to meet national/ISO standards through provision of appropriate machinery and capacity building in post harvest handling of produce
2. Provide adequate storage facilities in the major rice producing and consumption areas
3. Develop suitable packaging, labeling and branding of locally produced rice as a way of promoting its consumption
4. Develop a sustainable rice value chain by enhancing capacity of all actors to adhere to strict quality control procedures
5. Develop reliable price and market information system for use by stakeholders along the value chain

6.4 Irrigation and Water Control Investment Strategy

To expand rice production under irrigation, existing schemes will be rehabilitated while new gravity-controlled schemes will be developed. In the rainfed lowlands, communities will be mobilized to participate in the development of simple and low cost water control structures (dykes, bunding, catchment areas protection, drainage) for improved rice production. Farmers will be trained in the operation and maintenance of schemes. Water measuring devices for improved water usage under irrigation will be provided.

6.4.1 Logistic Requirements for Irrigation and Water Control Investment Strategies

It is intended to develop the skills of technicians to mobilize farmers to participate in the development of water control structures and to encourage communities to maintain these structures.

6.4.2 Proposed Actions

1. Rehabilitate and expand existing irrigation infrastructure
2. Encourage public-private partnership in developing and managing new irrigation schemes and to promote the use of small scale pumps along perennial water bodies
3. Design alternative water control systems in characterized inland valleys and lowlands for enhanced water management for rice cultivation
4. Train communities in the management and maintenance of irrigation schemes and other water control systems

6.5 Equipment Access and Maintenance Strategy

To ensure easy and timely access to improved agricultural equipment, the government in the short term will facilitate the supply of power tillers and accessories, water pumps, tractors and accessories, transplanters and seed drills. In addition, simple rice threshers, parboiling equipment, improved mills and accessories will be made accessible to rice operators along the value chain to improve upon quality and milling recovery. In pursuance of this the use of enhanced locally designed and fabricated rice processing equipment will be promoted. In the long term however, the government will encourage the private sector to play a greater role including public-private partnership ventures. Government and the private sector will empower communities in accessing and use of equipment for maintenance of irrigation systems (such as cleaning and desilting of canals and drains). Training of machinery operators, artisans, equipment fabricators and technicians will be pursued.

6.5.1 Logistic Requirements for Equipment Access and Maintenance Strategy

To implement the above strategy there will be the need to build the capacity of communities, farmers and entrepreneurs to access, operate and maintain rice production and processing equipment. At the production stage, equipment such as power tillers and accessories, water pumps, tractors and accessories, transplanters and seed drills will be made available and adequately maintained. Similarly

processing logistics such as rice reapers, rice threshers and winnowers, dryers, drying floors and tarpaulins, storage sheds, standard mills and packaging equipment will be made easily accessible.

6.5.2 Proposed Actions

1. Collaborate with the private sector in building capacity to produce or assemble appropriate agricultural machinery locally
2. Provide training in the management, operation and maintenance of agricultural machinery
3. Promote the establishment of mechanization service centres and leasing schemes, with adequate backup of parts

6.6 Research and Technology Dissemination Strategy

Lessons from previous research efforts have revealed the need for technology development and dissemination along the rice value chain. To sustain high level of rice production improved varieties will be developed and disseminated to farmers. At the farm level, the capacity of farmers will be enhanced to ensure adaptation of Good Agricultural Practices (GAPs) for rice cultivation. Furthermore, adaptation and fabrication of equipment for small and medium scale operators along the value chain will be pursued. Training manuals, videos, fact sheets and posters on the rice value chain will be developed and disseminated. There will also be training on improved processing technologies and value addition while information dissemination through ICT will be promoted. As a long term strategy, more extension staff from MoFA and NGOs with knowledge on rice and rice-based cropping systems will be progressively engaged to achieve an improved farmer-extension ratio whilst promoting farmer-to-farmer extension.

Due to the high cost and limited accessibility to fertilizers by small holders, rice yield levels are not maintained due to declining soil fertility levels. It is important to maintain and improve the fertility status of rice soils. There is need to conduct studies into land suitability, land use and delineation for rice-based cropping. It is important to conduct soil tests to establish fertility status for appropriate soil amendments. In addition, incidence of nematodes and other soil-borne diseases will be monitored while studies on soil and water management will be conducted.

6.6.1 Logistic Requirement for Research and Technology Dissemination Strategy

To effectively implement this strategy, laboratory equipment and funds are to be provided while human resource capacity is improved.

6.6.2 Proposed Actions

1. Strengthen the capacity of national research institutions through training and adequate budgetary allocation
2. Foster collaboration between national research institutions and with their international counterparts like AfricaRice Centre, IRRI and IITA
3. Enhance dissemination of research findings through strong research-extension-farmer linkages and the use of ICT

6.7 Community Mobilization, Farmer Based Organizations and Credit Management Strategy

Given the nature of the rice industry it is important that the key actors (small holder producers, processors, traders) are mobilized and animated into cohesive and well functioning groups. Farmer-farmer extension will be encouraged towards shared knowledge from participatory technology transfer approaches as a way of speeding up dissemination process. The strategy will promote linkage of farmers to credit sources and ensure easy access to inputs, equipment and market. Training of FBOs in effective management of credit will be pursued. Agricultural credit management regimes over the years will be reviewed and suitable options identified for adoption.

As part of community mobilization, the strategy will promote the involvement of the youth in rice production and processing for employment and income generation through training and access to credit, mechanized services and land. In implementing the strategy, specific gender-related issues/needs along the rice value chain will be identified and addressed.

6.7.1 Requirements for Farmer Based Organization and Credit Management Strategy

It is important to identify sources of credit for farmers and parboilers (through especially micro-finance institutions), traders and processors while training support will be provided for these stakeholders by government and NGOs.

6.7.2 Proposed Actions

1. Dialogue with identifiable stakeholders along the rice value chain to ensure their interests are well defined in the strategy implementation
2. Mobilize interest groups along the value chain in the communities where facilities or resources have been earmarked for improvement and further ensure easy access to such facilities
3. Facilitate the formation of cohesive FBOs for easy access to credit towards rice value chain activities

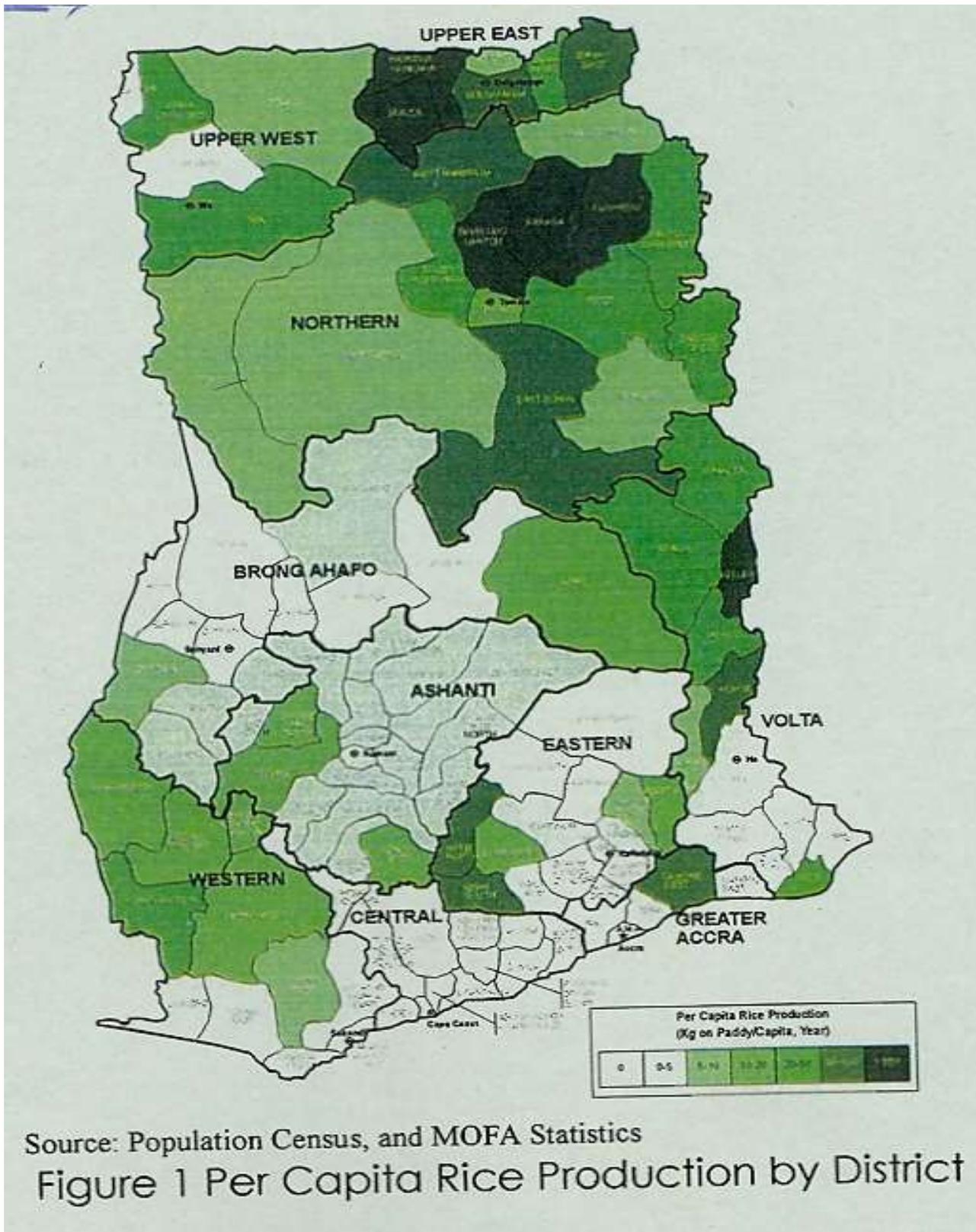
7.0 CONCLUSION

The strategy recognizes the importance of developing and sustaining rice production along the value chain. This requires a multi-sectoral approach and contributions from government and non government sources.

Growth in rice demand in Ghana is increasing at such a rate that both intensification and area expansion must be vigorously pursued to fill the demand gap. It is therefore necessary to address the challenges in this sector to ensure the effective implementation of the various strategies and policies.

These strategies and policies need the utmost attention to ensure the country's self sufficiency in rice production and also to help overcome the global food crisis that is expected to require medium to long term interventions to address. It is envisaged that set targets and milestones when vigorously pursued and monitored would be achieved.

Rice Production Capability Map



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Annex 1

NRDS Stakeholders and Responsibilities

Stakeholders/Institutions	Description	Responsibility
1. Government	MoFA, MES, MOTI, DFR, MOLG, MOFEP, ML&F etc.	Coordination, policy direction, financing and technology testing and dissemination, M&E
2. NGO's	Identifiable local and international (e.g GRIB, Amasachina, CRS, TechnoServe)	Extension, group formation and development, micro-financing, marketing, M&E
3. Public Institutions	CSIR /Universities	technology development, testing and dissemination, M&E
4. Financial Institutions	Banks, Micro-finance Institutions	Credit support (disbursement and recovery), M&E
5. Development Partners	Multilaterals/Bilaterals	Technical assistance, funding, capacity building, M&E
6. Private Sector	Investors, service providers, etc	Value chain development, investment/financing, consultant services and
7. International Institutions	Research Sub-Regional Organisations & Networks/Agencies	Technical back stopping, research information dissemination and technology sharing
8. On-going Rice Development Programmes	MoFA projects, Research projects, etc	Coherence and linkages for harmonization

Annex II

Sub-sector Intervention Element Matrices

GHANA	Policy / institutio	Infrastructure	Human resource capacity	Provision / support	Information / knowledge	Unclassified
Seed				GH6-2; GH12 *GH13-2-1	GH5; GH10-7; GH14-3	
Fertilizer				GH6-2: ⁺ GH13-2-1		
Irrigation / water management		GH2-1; GH7-1; GH8-4; GH9-4; GH10-1: aGH3-1,	GH3-3;			
On-farm technology dissemination	GH4		GH2-2,3; GH6-1,3; GH10-3; GH13-3	GH8-2, GH9-2	GH2-2,3; GH4;; GH6-1; GH7-4; GH10-3, 6; GH13-1-2,3; GH13-3,4; GH14-1,2,4, ^b GH13-3,d GH-5-1	
Mechanization				^e GH15-2, GH6-2		
Quality improvement	GH4	^f GH7-3	GH6-3; GH10-3	^f GH7-2,3	GH4; GH10-3	
Access to market	GH4		GH11-1		GH4; GH11-3; ^g GH13-2-4	
Access to credit	GH10-4			GH7-2; GH10-4		
Overall policy tools	GH1-1,2,4; GH4; GH11-2; GH13-2-3		GH1-3; GH9-3; GH10-2; GH10-5; GH11-1;	GH1-5;	GH4; GH13-1-1;	
Unclassified			GH1-6,7, GH7-3; GH8-3; ^h GH9-3	GH8-1,5; GH9-1,5;		
Out	GH6-4; GH7-5; GH8-5; GH9-5; GH13-3-1					

- Rehabilitation and improvement, no new infrastructure constructed
- Duration of project interventions for impact and sustainability
- Coverage of the intervention
- Baseline studies under the NRDS should consider impact assessment of past projects over the last 5 -10 year

Seed issues

*Gh-13 provided support for seed as part of agricultural support

⁺*GH13-2-1* – provided support for fertilizer

^a*GH3-1,2* – addressed infrastructural development

^b*GH13-3* - addressed information/knowledge

^d*GH-5-1-* addressed information/knowledge

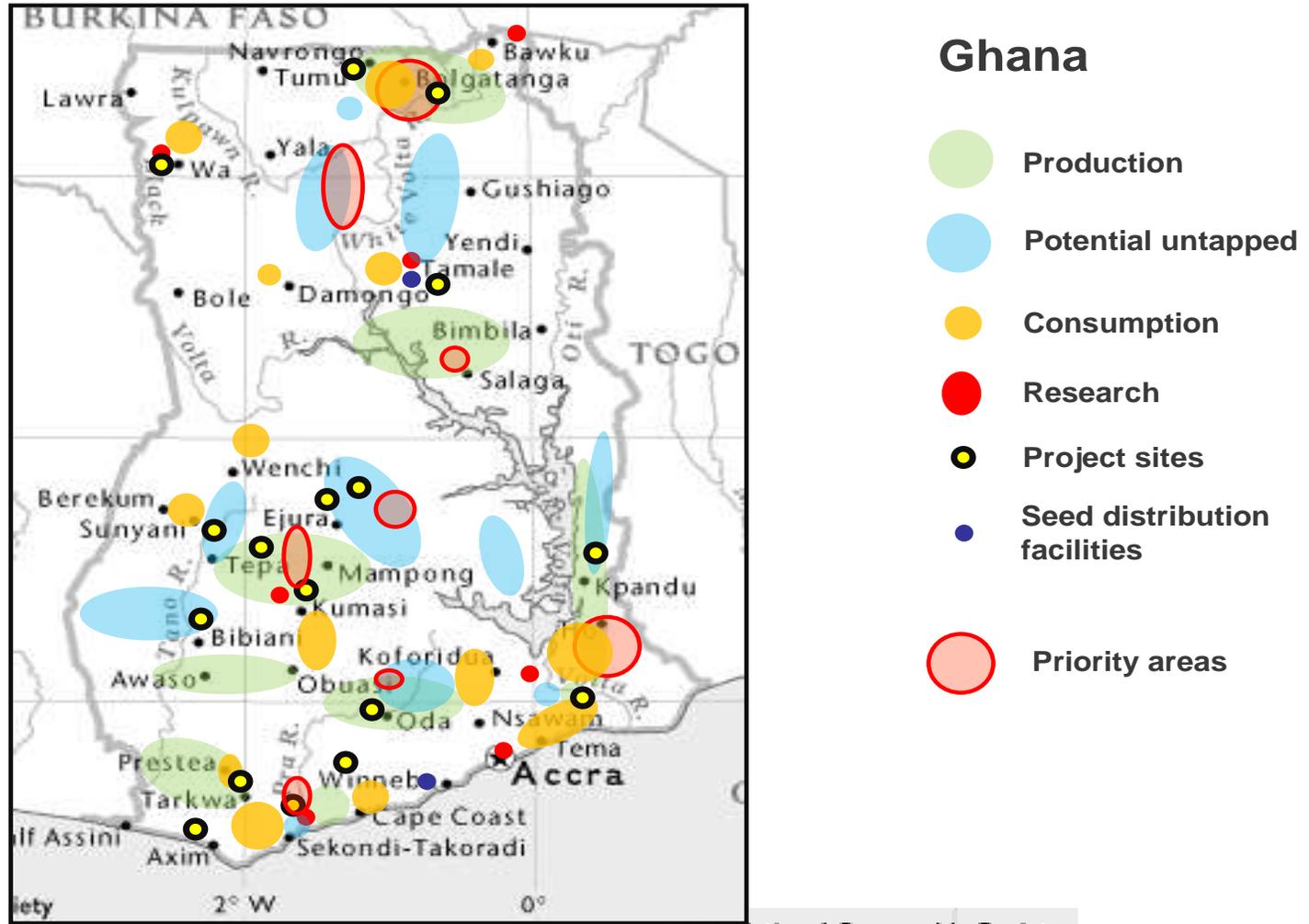
eGH15-2 – on going project but not captured earlier (2-KR)

fGH7-3, GH7-3 – addressed quality improvement

gGH13-2-4- addressed information/knowledge

^h*GH9-3* – deleted from ‘unclassified’ because it has been taken care of under overall policy

Annex III
GEOGRAPHIC PRIORITIZATION



Tracks of valley bottom for rice production:

Northern:	Katanga, Sabonjida, Gaa, Nabogo, Nasia, Yendi, Nambrugu, Yapei, Sambipga, Juni-Fuo-Tugu. They are all high potential areas, all but Nabogo are subjected to less than 50% use
Volta :	Avelavi Kpili – 950ha Chiyi –350ha Flakavi/Dekoya – 150ha Akpafu/Mempeasem - Bame Valle, 700ha, Ibayier – 500ha, Kabiti-Nkwanta – over 1000ha, Kuje-Wowura -200ha, Nkoya – 300ha, Koloenu Valley – 1000ha, Have – Andokokpe – 500ha, Kpando-Twefi Valley - 200ha
Brong Ahafo	Konkrompe, Watoro, Abua/Prang- 100 ha Bankrama-Parambo – 200ha Quarters- 200ha Akyeremade-Battor – 150ha Chiranda – 100ha Tafiano-Bodom, Pruso – 50ha Droma – 172ha, Nyinase – 94ha Norbekaw – 150ha Dadiesoaba - 100ha
Asahnti :	Subriso, Ataase-Nkwanta, Sabronum

Annex IV

THEMATIC PRIORITIZATION

	Policy / Institutional	Infrastructure/Equipment	Human Resource Capacity
Seed - breeding - multiplication - distribution			
Fertilizer - production / importation - distribution			
Irrigation / Water Management			
On-farm technology transfer - Research and extension			
Mechanization			
Quality improvement - Processing / Storage			
Access to market - Promotion of local produce / branding			
Access to credit			
Overall policy tools			

Annex V

SUB-SECTOR INTERVENTIONS

	Policy / Institutional	Infrastructure	Human Resource Capacity
Seed - breeding - multiplication - distribution			
Fertilizer - production / importation - distribution			
Irrigation / water Management		** —	
On-farm technology transfer - Research and extension			
Mechanization			
Quality improvement - Processing / Storage		** —	
Access to market - Promotion of local produce / branding			
Access to credit			
Overall policy tools			

Key

	<u>Needs urgent attention</u>
	<u>Moderate attention</u>
	<u>Substantial Progress</u>

Annex VI

Linkages between NRDS (Ghana) and other relevant Strategic Policies

CAADP	NRDS	GPRS	FASDEP (II)
<p>CP-I: Increase food supply by reducing hunger across the region by increasing smallholder productivity and improve response to food emergencies.</p>	<p>N1: Seed System Develop efficient rice seed system within the remits of the overall input needs of the rice sector</p>	<p>G 1: Re-examine existing variations in access and control over land in different communities to ensure equity. Improve the system of land registration to protect the interest of smallholders</p>	<p>F1: Introduce high-yielding and short-duration (crop) rice varieties.</p> <p>F2: Establish contingency plans and strategic stocks (of rice) to support national emergency preparedness.</p>
<p>CP-I: Increase food supply by reducing hunger across the region by increasing smallholder productivity and improve response to food emergencies.</p>	<p>N2: Community Mobilization, FBOs and Credit Management Strategy Important key actors (smallholders, processors, traders) mobilized and animated into cohesive and well functioning groups.</p> <p>Effective management of credit system put in place.</p>	<p>G 2: Access to Credit and Inputs for Agriculture</p> <p>Initiate special interventions to improve access to affordable credit by farmers (special emphasis on increasing the proportion of women to gain access to credit.-</p> <p>Promote and support the establishment of FBOs to enhance access to group credit and other inputs and significantly to domestic food security.</p>	<p>F1: Introduce high-yielding and short-duration (crop) rice varieties.</p> <p>F2: Establish contingency plans and strategic stocks (of rice) to support national emergency preparedness.</p>

<p>CP-I: Increase food supply by reducing hunger across the region by increasing smallholder productivity and improve response to food emergencies.</p>	<p>N2: Community Mobilization, FBOs and Credit Management Strategy</p>	<p>G4: Agriculture Mechanization Promoting increased mechanism in large agriculture, with emphasis on the development and use of small-scale technologies, targeting smallholder farmers (tillage, storage and processing). G5: Access to Extension Services. Expand the coverage and effectiveness of extension services</p>	<p>F1: Introduce high-yielding and short-duration (crop) rice varieties. F2: Establish contingency plans and strategic stocks (of rice) to support national emergency preparedness</p>
<p>CP-II: Extend the area under sustainable land management and reliable water control systems which includes soil fertility management and conservation agricultural water management, agricultural water use and irrigation land policy and administration</p>	<p>N3: Irrigation and Water Control Investment Strategy-Expand rice production under irrigation, (existing schemes rehabilitated and new gravity controlled schemes build). Low cost water control structure developed for rain fed lowland systems. N4: Fertilizer Use Enhance fertilizer use through efficient distribution, access and affordability by smallholders. Ecology-specific organic fertilizer use system will be encouraged</p>	<p>G-6: Accelerating the Provision of Irrigation Infrastructure. Small-scale interventions such as dug-outs, hand pump systems; valley bottom schemes etc. Rehabilitation, expansion and promotion of the use of the existing irrigation facilities and infrastructure. G7: Restoration of Degraded Environment. Minimize the impact of environmental degradation (restoring degraded natural resources).</p>	<p>F3: Develop appropriate irrigation schemes for different ecologies of farmers to ensure production throughout the year. F4: Improve accessibility and facilitate distribution of crops.</p>
<p>CP-III: Market Increase market access through</p>	<p>N5: Post-Harvest/Marketing Strategy Paddy to be</p>	<p>.....</p>	<p>F13: Develop effective post-harvest management strategies,</p>

<p>improved rural infrastructure and other trade related interventions which includes supply chain development, quality control and management system development, export infrastructure and global trade policies and agreements.</p>	<p>processed into acceptable national minimum standards by providing appropriate harvesting, threshing and milling facilities. N5(b) Marketing Branding and promotion, packaging retailing/food bazaars. N6: Equipment Access and Maintenance Easy and timely access to improved agricultural equipment/machinery</p>		<p>particularly storage facilities at community level.</p>
<p>CP-IV: Research Improve agricultural research and systems to disseminate appropriate new technologies and increasing the support given to help farmers adopt them which includes building research capacity and training.</p>	<p>N7: Research and Technology Dissemination Need to enhance technology development and dissemination along the rice value chain</p>	<p>.....</p>	<p>.....</p>

- NRDS (Ghana) tried to respond to CAAPD Pillars, GPRS and FASDEP (II)
- NRDS (Ghana) responded to MOFA Strategic Plan through FASDEP (II) and GPRS
- NRDS (Ghana) will achieve its targets if all actors and resources are adequately provided