

**NATIONAL RICE DEVELOPMENT STRATEGY
(NRDS)**

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**Prepared for the Coalition for African Rice Development
(CARD)**

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ACRONYMS

ABC	Agricultural Business Community
CAADP	Comprehensive Africa Agricultural Development programme
CARD	Coalition for African Rice development
CBO	Community based organization
CGIAR	Consultative Group for International Agricultural Research
ECOWAS	Economic Community of West African States
FBO	Farmer Based Organization
FFS	Farmer Field School
GDP	Gross Domestic Product
GOSL	Government of Sierra Leone
IADP	Integrated Agricultural Development Project
IDAS	Integrated Development of the Agricultural Sector
IVS	Inland Valley Swamp
MAFFS	Ministry of Agriculture Forestry and Food Security
MFMR	Ministry of Fisheries and Marine Resources
MLWRC	Magbosi Land and Water Research Centre
NGO	Non Governmental Organizations
NRDS	National Rice Development Strategy
NSB	National Seed Board
PEMSD	Project Evaluation Monitoring and Statistics Division
PRSP	Poverty Reduction Strategy Paper
RARC	Rokupr Agricultural Research Centre
SLARI	Sierra Leone Agricultural Research Centre

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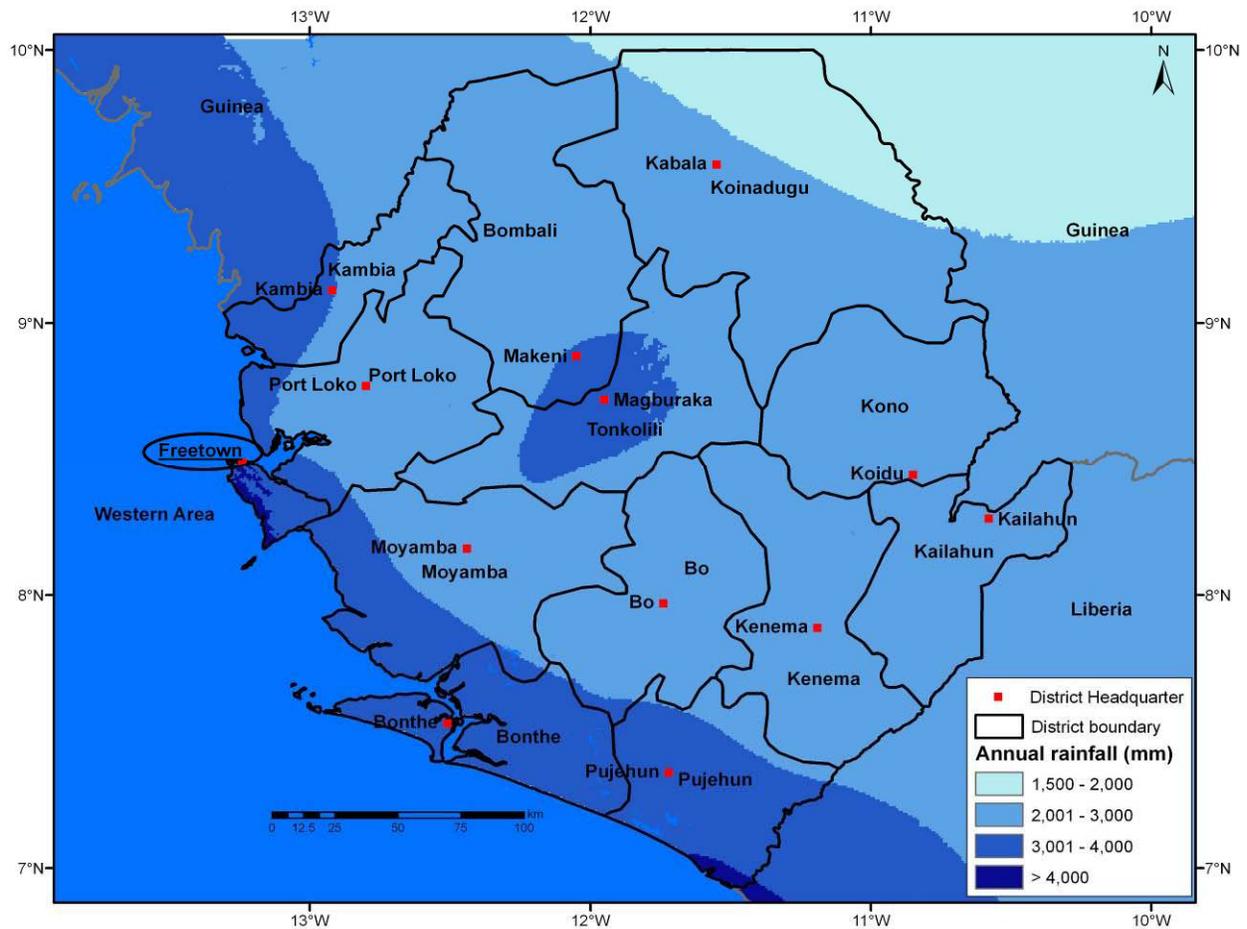


Figure 1 Map of Sierra Leone showing administrative districts and elevation

SUMMARY

The West African state of Sierra Leone occupies 72,300 km² of which 5.4 million ha are potentially cultivable. The crop sub sector with the staple food rice dominating contributes about 75 percent of agricultural GDP. Annual per capita consumption of rice (104 kg) in Sierra Leone is amongst the highest in sub Saharan Africa. About 70 percent of Sierra Leone's 4.9 million people in 2004 were below the national poverty line, with 52% living on less than US\$1 per day, while 26% could not afford minimum daily calorific requirements.

While climatic conditions are generally favourable for crop production including rice, biotic and abiotic factors such as diseases, pests, low soil fertility, in addition to the use of low yielding local varieties, poor extension services, and several socio-economic factors are considered to be limiting farmers' productivity. Also, most small holder farmer's yield is greatly reduced by post harvest losses due to poor crop management, inappropriate storage and marketing facilities. The form of agriculture practiced by the vast majority of Sierra Leonean farmers is very rudimentary. Fewer than five percent of the households have access to fertilizers, insecticides, herbicides and basic machinery which are resources that could help enhance rice production. Rice is cultivated in both the upland and diverse lowland ecologies (Inland Valley Swamps, Bolilands, Mangrove Swamps and Riverain Grasslands). Rice yield in the upland is however generally lower than in the lowlands.

Since Sierra Leone's independence, agricultural development policy has been focussed on the achievement of rice self-sufficiency among other objectives. Major interventions in the sector have included both direct government participation and indirectly, through the donor-funded integrated agricultural/rural development projects. All of these interventions targeted small-holder farmers, who constitute approximately 90% of the farmer population. The performances of the various interventions were generally disappointing and during the last two decades, the overall performance of the agricultural sector has been poor.

The clear lesson from all the past failures is that government interventions in agricultural production and marketing is very problematic, Government must therefore restrict its interventions to broad policy formulation and stimulation and support to private sector engagement in production and marketing. All government programmes require sound planning, allocation of appropriate roles to various stakeholders, good management of appropriate institutions and resources and exit strategies from time bound projects are crucial for development of the agricultural sector including the rice sub sector.

Sierra Leone requires about 530,000 mt of milled rice to meet the consumption needs of the population annually. National Paddy Rice Production was projected at 638,000mt in 2007. The level of rice self-sufficiency rose from 57.45 percent in 2002, to 69 percent in 2005 and then to 71 percent in 2007. The remainder must be imported at increasingly expensive prices in the current situation of high prices for food including rice. International nominal prices of all major food commodities reached, in the first three months of 2008. The price of rice, the main staple food in Sierra Leone has seen a steady increase by more than 50% on average in the entire country. Most affected by this recent food price inflation, are the low-income urban and peri-urban households and smallholder food deficit. Female and elderly headed households are the

most destitute. The promotion of domestic rice production is therefore a key element in the strategies for improving food security, stimulate economic growth and increase rural income. Efforts to support rice production programmes is the only solution to pull the country out of the worsening rice situation and reverse the present declining trend in food self-sufficiency.

The goal of the National Rice Development Strategy (NRDS) is to lay out a framework for significant increases in rice production in order to contribute to the improvement of food security and economic development in Sierra Leone. The specific objectives are to:

1. Ensure an increase in the sustainable productivity and production of rice in Sierra Leone
2. Promote appropriate post harvest handling, processing and marketing of rice
3. Develop appropriate infrastructure for rice production and marketing
4. Improve the capacity of stakeholders and institutions involved in rice sector

The strategy for increasing rice production is two pronged: (a) **increase in area cultivated, mainly in the lowlands where there is much underutilised capacity**, and (b) **increases in productivity per unit area in all ecosystems**. Area expansion will mainly be in the IVS due to its existence in all parts of the country coupled with its potential for sustainable production. The Government's goal is to achieve rice self sufficiency by 2013. This strategy targets a land area of 830,000 ha and an increase in the average rice yield/ha to 2 mt/ha to realise the government's goal of rice self sufficiency . Furthermore, an extension of the area to 1,100,000 ha over the following years, coupled with an increase in the average yield of rice to 4 mt/ha (ranging from 1.5 mt/ha in the uplands to 4.0 mt/ha in the IVS) is expected to result in the production of over 3 million tons of rice in 2018.

Increasing productivity of rice and expanding the area under the crop in Sierra Leone with the aim of significantly increasing rice production in the country will require considerable improvement in the existing infrastructure, agricultural services in addition to appropriate coordination and management. The following key interventions will be required to impact positively on rice production in Sierra Leone:

1. Rehabilitation and construction of feeder roads in key locations that will facilitate access to rice growing areas for easy supply of inputs and evacuation of produce; as well as inland valley development and community water shed management.
2. Provision of community service infrastructure including construction of farm markets centres, daily retain markets, irrigation schemes; post harvest processing of produce at on farm and village level including drying floors and crop store, rice hulling and milling machines.
3. Efficient provision of agricultural services particularly the development and dissemination of appropriate rice technologies along the entire value chain as well as collection of reliable data.
4. Provision of credit to small farmers, input suppliers and marketers

Sierra Leone is still recovering form the massive destruction of its economic base during the civil war. Implementing these programmes to ensure the delivery of the expected results will definitely need adequate support from donors to complement the efforts of the Government.

1.0 Introduction

The West African state of Sierra Leone occupies 72, 300 km² of which 5.4 million ha are potentially cultivable. The crop sub sector with the staple food rice dominating contributes about 75 percent of agricultural GDP. Annual per capita consumption of rice (104 kg) in Sierra Leone is amongst the highest in sub Saharan Africa. About 70 percent of Sierra Leone's 4.9 million people in 2004 were below the national poverty line, with 52% living on less than US\$1 per day, while 26% could not afford minimum daily calorific requirements.

The form of agriculture practiced by the vast majority of Sierra Leonean farmers is very rudimentary. Fewer than five percent of the households have access to fertilizers, insecticides, herbicides and basic machinery which are resources that could help enhance rice production. Rice is cultivated in both the upland and diverse lowland ecologies in Sierra Leone (Inland Valley Swamps, Bolilands, Riverain grasslands, and Mangrove swamps). The uplands account for approximately two-thirds of the acreage under rice. While climatic conditions are generally favourable for rice production, biotic and abiotic factors such as diseases, pests, use of low yielding local varieties, low soil fertility, poor extension services, and several socio-economic factors are considered to be limiting farmers' productivity. In addition, most small holder farmer's yield is greatly reduced by post harvest losses due to poor crop management, inappropriate storage and marketing facilities.

Sierra Leone requires about 530,000 mt of milled rice to meet the consumption needs of the population annually. National Paddy Rice Production was projected at 524,000 mt in 2006 and 638,000mt in 2007. The level of rice self-sufficiency rose from 57.45 percent in 2002, to 69 percent in 2005 and then to 71 percent in 2007. The remainder must be imported at increasingly expensive prices in the current situation of high prices for food including rice. International nominal prices of all major food commodities reached, in the first three months of 2008, their highest level in nearly 50 years, while prices in real terms in nearly 30 years. The prices of rice, the main staple food in Sierra Leone has seen a steady increase by more than 50% on average in the entire country.

The rising of food prices in Sierra Leone since January 2008 to date is a very serious threat to the livelihoods of majority of Sierra Leoneans. Most affected by this recent food price inflation, are the low-income urban and peri-urban households, who are largely dependent on the market to access their food requirements. Smallholder food deficit farmers are also among the worst affected by the continued increases in prices of the staple food, causing among them, high or extreme levels of food insecurity. Female and elderly headed households are the most destitute. The promotion of domestic rice production is therefore a key element in the strategies for improving food security, stimulate economic growth and increase rural income. Effort to support rice production programmes is the only solution to pull the country out of the worsening rice situation and reverse the present declining trend in food self-sufficiency.

2.0 Review of the National Rice Sector

Rice is the staple of Sierra Leoneans. Annual per capita consumption of rice (104 kg) is amongst the highest in sub Saharan Africa. It is grown mainly by small scale farmers on both the upland and diverse lowland ecologies. Sierra Leone has not been able to produce enough rice to meet its local consumption demand for a very long time now. From 1960 to 1975 production of rice has increased through expansion of land area and to some extent an increase in yield. In 1975 Sierra Leone is said to have experienced self sufficiency in rice. Records of over 600,000 tons of paddy are reported at the end of the seventies. In the late eighties, production fell to an average of just above 500,000 tons; further declining to about 460,000 tons in the mid 1990s when the civil war was engulfing the entire nation. The lowest production (198,000 tons) was recorded at the peak of the civil war to in 1999. Since then, rice production has been increasing from 310,000 tons in 2000 to 637,983 tons in 2007. National rice self sufficiency is currently about 70 percent.

Rice production in Sierra Leone is in the hands of small-scale farmers who produce barely enough for home consumption with little or none for the market. During the 2004/05 cropping season 56 percent of the households cultivated less than 1 ha of farm land while only 44 percent cultivated 1 ha and more. Rice field area per household ranged from 0.25 ha to 5.5 ha with an average of 1.06 ha. (GOSL, 2006). The small scale farmers in Sierra Leone are generally resource poor with only the hoe, axe and cutlass as the main implements while labour is mainly supplied by family members thereby severely limiting their scale of production. On the other hand, the widespread use of unimproved varieties, limited use of fertilizer, coupled with unimproved cultural practices adversely affects rice production.

After harvest most of the farmers leave rice bundles in the field to dry. Threshing and winnowing are invariably done by hand and further drying is on mud floors and tarmac roads. Access to concrete drying floors is limited to a small proportion of farmers in the country. The quality of local rice marketed is generally low due mainly to the lack of use of modern rice mills. Most of the rice mills were destroyed or rendered non functional during the war. In 2004, a total of 53 small scale rice mills existed in the country. Sixty percent of these mills were in the Northern Province. Traditional methods and the use of steel roller mills constitute the major means of rice processing in the country. Parboiling is widely practiced and parboiled rice constitutes a substantial proportion of local rice in the market particularly in the North.

The quality of imported rice in the market ranges from low quality 100% broken rice to higher quality Super A1 long grain rice (including perfumed rice in some supermarkets), providing all classes of consumers with a range of choices that adequately meet their needs. Unlike local rice, virtually all imported rice is not parboiled. The price of local rice is generally about 15 – 20 percent higher than the price of comparable grades of imported rice due to the acknowledged fact that local rice is more nutritious than imported rice. However, there is a growing appreciation of non parboiled imported rice by the younger generation of the population and urban dwellers mainly because of its lower cost.

There is a clear gender dimension in rice production, processing and marketing. Men are mostly involved in brushing, felling and land preparation, while women are heavily involved in planting

and weeding. Harvesting is almost equally shared between the sexes while processing and marketing of rice is predominantly done by women. The rice market is now dominated by four importers, three of whom operate as a cartel. Entry is restricted mainly by the capital requirements of the trade (MAFFS/MFMR, 2004). The system of marketing domestic rice which is dominated by women is quite traditional involving Assemblers, Wholesalers and/or Itinerant Merchants and Retailers.

Since Sierra Leone's independence, agricultural development policy has been focussed on the achievement of rice self-sufficiency among other objectives. Major interventions in the sector have included both direct government participation (mechanical rice cultivation in the riverain grasslands around Gbundapi and Torma Bum, and the bolilands in the Bombali and Tonkolili Districts) and indirectly, through the donor-funded integrated agricultural/rural development projects, which covered over 80% of the country in the 1970s and 1980s. All of these interventions targeted small-holder farmers, who constitute approximately 90% of the farmer population. The performances of the various interventions were generally disappointing and during the last two decades, the overall performance of the agricultural sector has been poor.

Sierra Leone returned to peace in the first half of 2002 after an eleven year brutal civil war that severely devastated the country's economy including the agricultural sector. Peaceful national elections in May resulted in the re-election of President Kabbah for a second five year term. In his inaugural address, he announced his goal of food for all within five years. With this, he placed the achievement of food security for all Sierra Leoneans as the overriding national priority for the following five years. The government supported farmers with seed rice and provided tractors that were mainly used for the cultivation of the bolilands. At the end of the five years, food security was not achieved and it is estimated that over 60 percent of the population are still living under US \$ 1 a day.

The current government which was elected in 2007 and led by H.E. Earnest Bai Koroma aims at accelerating the advancement of Sierra Leone through a vision articulated in his "*Agenda for Change*" which together with the outcomes of other consultative processes form the basis for the second medium term *Poverty Reduction Strategy*. The Agenda for Change focuses on four key priorities, the second, involves raising quantity and value added productivity in Agriculture and Fisheries, following the first priority which is the provision of reliable power supply for the country. Based on its importance in Sierra Leone, rice is central in priority two.

3.0 Challenges and opportunities facing national rice sector development

3.1 Socio economic importance of rice: Agriculture is the mainstay of the rural populations and the most dominant of the country's economic sectors followed by mining. It contributes 50 per cent to the GDP. The crop sector dominates the agricultural sector while rice is predominant in the crop sector. Virtually all farmers in Sierra Leone grow rice which is the staple food considered as a political crop in the country. Rice development therefore does not only provide food for the populace, it provides employment for a considerable number of farmers, saves valuable foreign exchange and impacts on the overall economy of the country.

In general, when compared with financial returns, economic returns at import parity price are considerably higher for all rice farming systems in Sierra Leone. Thus economic profitability analysis demonstrates that Sierra Leone has a comparative advantage in domestic production of rice for import substitution i.e. to supply its domestic market. Therefore policy emphasis on attainment of self sufficiency in rice production appears to be economically justified. However, moving to an export price regime implies a substantial decline in economic profitability for all rice cropping systems. But Sierra Leone would still maintain a comparative advantage in one of its major rice production systems - the improved Inland Valley System (MAFFS/MFMR, 2004).

3.2 Land tenure: The Sierra Leone Agricultural Sector Review document concludes that for the small scale subsistence agriculture prevalent in the country now, the existing land tenure system is adequate. The study, however, identified the following points that need to be highlighted:

a) The first is the inability of the banks and other financial institutions to provide farm credit based on the current system of land holding. The issue has been that the financial institutions do not consider the existing system as providing the needed security on which farm credit could be advanced. The individual's usufructuary estate does not provide the needed security. This is because the individual cannot mortgage the land on which he works without the consent of the family head and even where he can obtain the consent, the financial institution cannot sell the land to a purchaser who is not a member of the family should the farmer default in payment. To expect someone within the family to purchase the land in such circumstances is to show a lack of understanding of the social system operating in the traditional societies of Sierra Leone. To solve this problem, it has been suggested that community interests be registered to enable the communities' access farm credit.

b) For large scale commercial farming, there already exist some arrangements under which farmers and companies could acquire leases on land and there is evidence that many farmers particularly expatriates have taken advantage of this. What needs to be done is to use the arrangements to fashion out new legislation, which take modern demands into consideration, and generally streamlines the system to ensure that all parties know the full extent of their commitments under a leasehold arrangement.

c) It does not appear that the tenure system has sufficient safeguards for accommodating the interests of cattle owners in the community. The result is a constant conflict among crop farmers and those who rear cattle. It is important that a continuing dialogue among the people is instituted until a solution could be found.

3.3 Social issues: Almost 70 percent of the population of Sierra Leone is composed of youths below 30 years. The existing labour intensive farming is no longer attractive to the youths who are drawn to urban areas for easier jobs. This trend is fuelled by the growing disparity in the development of infrastructure between the rural and urban areas with the former not receiving due attention. The attraction of youths to urban areas has had serious consequences on agriculture by the continuing reduction in the supply of labour. On the other hand the urban areas are over crowded and there is increasing pressure on limited amenities, coupled with increase in crime.

This is pointing to the need for appropriate interventions to modernise agriculture and improve social amenities in the rural areas.

3.4 Trans-boundary/regional issues: Rice is traded among the Mano River Union countries (Sierra Leone, Guinea, Liberia and Cote d'Ivoire). There is an apparent net flow of rice from Sierra Leone to the neighbouring countries. Periodically, when rice prices are high particularly due to outside forces, there is the tendency for restrictions to be put on the exportation of rice by State authorities. It is clear that this measure has had very little, and if any, only temporary effects on rice prices. By contrast such measures have tended to undermine the long term effects of prices in stimulating production and development of regional trade. Furthermore, they are contrary to the ECOWAS treaty which provides for the free movement of people and goods across the borders of member countries.

3.5 Lessons learned from previous rice development efforts: The Sierra Leone Agricultural Sector Review (MAFFS/MFMR, 2005) outlined the history of major agricultural development programmes including rice in the country so that mistakes of the past can be avoided and new approaches and best practices adopted. Colonial governments especially in the early stages pursued a relatively non interventionist policy to agricultural development and apart from support to agricultural research and limited training; farmers relied on their own ingenuity. Later on there were government sponsored projects some of which failed because of poor staffing, poor management, inadequate funding and lack of knowledge of local socio economic conditions. Notable examples for rice were the irrigation and drainage schemes in the Scarcies, rice seed multiplication and distribution, mechanisation and rice milling and marketing schemes.

There was a shift in agricultural policy in the immediate post independence period to direct intervention in agricultural production by the State. The Rice Cooperation which was established in 1961 imported Russian tractors and equipment. It established its own rice farms and provided cultivation services to farmers. These schemes were poorly planned (often with no feasibility studies), located in unsuitable areas and poorly staffed. By 1967, the Rice Cooperation could not raise operating capital to pay farmers cash for produce and resorted to IOUs. Government was forced to close down the Rice Corporation in 1978 and the mechanical Cultivation Service reverted to the Ministry of Agriculture.

Concerning pricing, the policy during Rice Corporation period was unfavourable to farmers. The Corporation offered prices that were below world market prices. Its rice mills were idle for significant periods and the Rice Corporation concentrated its efforts on the more profitable importation of rice, which was a disincentive to local production. When the Rice Cooperation was closed in 1978 the mandate for operation of rice policy fell to the Sierra Leone Produce Marketing Board (SLPMB). Over the next 10 years the SLPMB also operated a policy that was very unfavourable to domestic rice producers (Spencer, et al, 1996). Its monopoly was removed in 1986 and the private sector assumed responsibility for the marketing of both locally produced and imported rice.

The government's Cooperative Department Credit Schemes which had been designed in the 1950s to give low cost institutional credit to cooperative societies to finance their marketing and other activities collapsed in the immediate post independence period. The policy was that loans guaranteed by government were provided by commercial banks to the Registrar of Cooperatives

who then lent to their members or invested in projects such as purchase of tractors, rice mills and construction of stores. The schemes achieved some success in the 1950s and early 1960s, but reflecting other aspects of life in Sierra Leone, politics intruded into the scheme. Unqualified staff were recruited, bad loans were given out, produce misappropriated in the field and what was delivered to the Rice Corporation was not paid for. Because of the defaults in payments, banks refused to give out more loans, and requested government to repay outstanding loans.

During the late 1960s and 1970s government's policy gave emphasis to the support for small scale agriculture. Integrated Development of the Agricultural Sector (IDAS) projects commenced in 1967 to be followed by the Integrated Agricultural Development Projects (IADPs) in 1972. The main components of these projects were: (1) provision of intensive extension services (2) supply of improved planting materials (3) supply of low interest development and seasonal credit to farmers (4) provision of infrastructure such as feeder roads and wells and (5) utilization of qualified staff, usually expatriate management staff on contract. Although some of the inputs were said not to have reached the intended beneficiaries, the IADPs had a positive effect on agricultural output and rural income during the life of the projects but the effects were not sustainable and quickly faded when subsidies were removed at the end of the projects.

During the 1980s the Ministry of Agriculture and natural Resources launched a *Green Revolution Programme* to boost agricultural production. It was characterized by wide publicity and the acquisition of vehicles. It failed because of inadequate extension services, planning, monitoring and evaluation.

The clear lesson from all the past failures is that government interventions in agricultural production and marketing is very problematic, Government must therefore restrict its interventions to broad policy formulation and stimulation and support to private sector engagement in production and marketing. All government programmes require sound planning, allocation of appropriate roles to various stakeholders, good management of appropriate institutions and resources and exit strategies from time bound projects are crucial for development of the agricultural sector including the rice sub sector.

3.6 Lessons learned from previous rice research efforts: Agricultural productivity needs to increase significantly if incomes and poverty are to be reduced in Sierra Leone. Given the limited scope for expansion of the area under annual crop production using the traditional bush fallow system, most of the productivity increases must come from increases in yields, resulting from adoption of new technologies by the small-scale farmers who produce the bulk of agricultural output. In the medium to long term, the agricultural research system would need to generate the appropriate mix of technological improvement. However, for short-term increases in productivity the greatest reliance must be on modification and adoption of technology that is already available, and can be quickly experimented with and modified to suit their own needs by local farming communities.

Many rice varieties grown on the uplands belong to the African rice (*O. glaberrima*) type or to morphologically intermediate types between *glaberrima* and *O. sativa*. Traditionally, farmer utilisation of improved rice varieties developed by the national and international research systems has been low mainly, due to the high input requirements of these varieties. In general, farmer's

preferential choice for both upland and lowland seed rice include farmer's own *sativa* or *glaberrima* selections, Rokupr Rice Research Station (now Rokupr Agricultural Research Center)'s improved *sativa* varieties, improved *sativa* varieties from International Research Centres, and WARDA's inter-specific hybrid (NERICAs). Farmers' choice of international germplasm is not uncommon demonstrating that innovation is of relevance to farmers. However, farmers are very (correctly) selective. They are ready to try innovations but adopt only what is more relevant and responds better to their specific needs.

In the 1980s and 1990s the Rokupr Rice Research Station developed high yielding (ROK) rice varieties of various durations with tolerance or resistance to iron toxicity, salinity, insect pests and diseases, for a range of farming systems. Some of the best ROK varieties were selections from local varieties, exploiting the potential of indigenous knowledge, using minimum levels of fertiliser. Widespread use of these varieties will minimize the risk of crop failures, which is a very important consideration for subsistence farmers.

Newer rice varieties tolerant to salinity, iron toxicity, resistant to important pests and diseases are in the pipeline for release (NARCC, 2003). High expectations are placed in the recently developed New Rice for Africa, NERICA rice¹ varieties due to their higher yield potential (2-2.5 t/ha) and taller size which makes harvesting easier, and their better weed suppression ability due to droopy leaves habit inherited from the African parent. NERICA rice varieties also have shorter duration (about 90-100 days compared to 120-150 days of typical upland varieties) allowing for a second crop during the rainy season. In addition NERICA rice varieties display resistance to local stress (drought and pests and diseases). NERICA has brought closer the possibility of offering farmers improved rice varieties that are adapted to local conditions and will allow significantly increased productivity. Field trials in Sierra Leone which started in 1997, have identified NERICA 1, NERICA 5, WAB 450-IB-P32, and WAB 450-I-B-P 33-11 as suitable. These varieties are currently being multiplied and distributed throughout the country.

In addition to developing improved planting materials, research institutions have developed crop and soil management practices such as optimum time of planting, weeding and appropriate pest management. Experiences on upland soils indicate that the cropping cycle can be made more productive by good weed control and judicious use of inorganic and organic inputs. The latter includes use of composts on small vegetable plots, green manuring, crop residue restitution and use of cattle manure available in the northern parts of the country. Thus although technologies for continuous cropping of uplands have not yet been worked out for Sierra Leone, some information on intensification of cropping exists that can be useful to farmers.

Development of inland valley swamps for irrigated rice production has encountered many problems including serious technical ones in Sierra Leone. The technological requirements for appropriate development of swamps differ because of variations of hydrological conditions even within the same agro-ecological zone. These have not always been understood and have on many occasions been ignored. The result has sometimes been that attempts to develop water control systems in some swamps have resulted in environmental damage and loss of productivity in the swamps. Lessons have been learned from such failures

¹ Obtained at the West Africa Rice Development Association (WARDA) by crossing two strains –*Oryza sativa* of asian origin and *Oryza glaberrima* of african origin using embryo rescue techniques.

3.7 Human and Institutional capacities: A good number of the current employees of the Ministry of Agriculture Forestry and Food Security (MAFFS) are not adequately qualified for the tasks they are expected to perform. The bulk of the employees are unskilled staff. MAFFS now has six divisions: Crops, Livestock, Forestry, Engineering, Extension and Planning, Monitoring and Evaluation (PEMSD). Until recently, extension was part of the Crops Division and operated through its field offices, while livestock and other sub sectors also provided their own extension services. The designation of Extension as a division confers the responsibility for extension in all the other technical divisions.

The current decentralization moves by GOSL are to improve accountability and allow stakeholders at district and local levels to have a greater say in the allocation of public services (as well as greater responsibility for the support to those services). But the quality and quantity of local government staff are inadequate and must improve dramatically if much must be accomplished

Employment opportunities associated with the provision of a range of agriculture related services will expand in Community Based Organizations (CBOs) and the private commercial sector. Most of these opportunities however, require business, technical and communication/literacy skills that are in relatively short supply at the present time. They need to be acquired through short and medium term formal and informal training. Training capacity is limited, but expanding rapidly in the privates sector in particular in response to strong demand (GOSL, 2004).

4.0 Priority areas and approaches

Sierra Leone has a total of 5.4 million hectares of arable land. The vast majority of this land is on the upland ecology while the remaining 20 percent is in diverse lowland systems comprising of the Inland Valley Swamps (IVS), Mangrove Swamps, Bolilands, and Riverain grasslands. Upland rice area also dominates the total land area under rice (Table 1). In 2007, 55 percent of total land area under rice was on the upland while the remaining 45 percent was in the various lowland ecosystems. Inland valley Swamp rice occupies the greatest portion of lowland rice area (Table 1). Farmers perceive lowlands as being less important because lowland cropping does not allow for diversified crop stands at the same time, it imposes higher labour requirements and the rice produced is of relatively lower palatable quality compared to the upland.

Table 1 Major categories of land and land use in Sierra Leone

Ecology	Ecosystem	Arable land area (ha)	Percent of arable land	Cultivated Area under rice (ha)*	Percent of total area under rice
Upland	Upland	4,300,000	80	363,894	55
Lowland	Inland valley Swamp	630,000	12	170,000	26
	Mangrove Swamp	200,000	04	70,000	11
	Riverain Grassland	110,000	02	5,593	01
	Boliland	120,000	02	50,000	08
Total		5,360,000	100	659,487	100

* Rice area in 2007

4.1 Upland ecology: Upland rice production is practiced in all parts of Sierra Leone. The dominant soils are Ultisols and Oxisols and they are characterized by low inherent fertility, high acidity and associated aluminium toxicity. They are also shallow, have a low structural stability and, in many cases a compacted subsoil. There are extensive tracts of uplands that are available for expanding rice production in Sierra Leone. Coupled with the flexibility to practice mixed cropping which farmers use as an insurance against crop failure, the upland still remains an attractive ecology for rice based crop production.

However, the steady increase in the population of Sierra Leone is making it increasingly impossible for farmers to have access to enough land to allow adequate fallow periods (minimum 10 years) in order to restore soil fertility. In recent times, the fallow periods along the major highways has dropped to 3 – 4 years and more farmers now have to travel long distances in search of land that has fallowed for more than 5 years. The reduced fallow period and attendant increase in weed infestation has increased the burden of weeding on women while the declining yields have adversely affected productivity and farmers' welfare. The bush fallow system needs serious consideration and possible modification to address its adverse consequences of weed infestation and deforestation. There is a general tendency for the preservation of uplands through reforestation and tree crop production.

In view of the shortcomings of the bush fallow system, it may be advisable to concentrate rice production in the lowlands and use the uplands for tree crop production and other annual crops that cannot tolerate waterlogging conditions in the lowlands. There is presently enough lowland area to produce sufficient rice for local consumption and even export. This alternative will significantly reduce the upland area needed to grow rice and thereby increase the area that can grow into forest. Also, productivity will increase due to the relatively higher fertility of the lowlands compared to the present uplands.

4.2 Lowland ecology: Soils of the lowlands benefit to some extent from the nutrient losses of the upland areas through leaching in the movement of the water downstream. Lowlands have deeper subsoil with low contents of weatherable minerals but with high content of organic matter in the topsoil. There are instances where iron and aluminium cations are in excess tending to combine in insoluble mineral forms while other mineral bases are leached in excess. These circumstances create plant toxicity conditions (MAFS/MFMR, 2004).

5.0 Vision and Scope of NRDS

5.1 Goal and Objectives:

The goal of the NRDS is to lay out a framework for significant increases in rice production in order to contribute to the improvement of food security and economic development in Sierra Leone. The specific objectives are to:

1. Ensure an increase in the sustainable productivity and production of rice in Sierra Leone
2. Promote appropriate post harvest handling, processing and marketing of rice
3. Develop appropriate infrastructure for rice production and marketing
4. Improve the capacity of stakeholders and institutions involved in rice sector

5.2 Target for increased rice area and yields

In 2007, a total of 637,983 mt of rice were produced from a total of 659,487 ha of land (Table 2). The bulk of the land area under rice was in the uplands (363,894 ha). In the lowlands, the bulk of the rice was produced in the IVS (170,000 ha) followed by the bolilands (50,000 ha). Mean rice yield per hectare over all the ecologies was 0.97 mt/ha. For the major ecologies, mean rice yield was 0.96 mt/ha and 1.23 mt/ha in the upland and lowland, respectively.

The strategy for increasing rice production is two pronged: (1) increase in area cultivated, mainly in the lowlands where there is much underutilised capacity, and (2) increases in productivity per unit area in all ecosystems. Area expansion will mainly be in the IVS due to its existence in all parts of the country coupled with its potential for sustainable production. The Government's goal is to achieve rice self sufficiency by 2013. This objective will be met with a total land area extended to 830,000 ha and an increase in the average rice yield/ha to 2 mt/ha.

A further extension of the area to 1,100,000 ha over the next five years, and an increase in the average yield of rice to 4 mt/ha (ranging from 1.5 mt/ha in the uplands to 4.0 mt/ha in the IVS) will result in the production of over 3 million tons of rice in 2018 (Table 2), providing a surplus for export to neighbouring Mano River Union countries.

Table 2 Area and production of rice in 2007 and projected targets fro 2013 and 2018.

Ecology	2007			2013			2018		
	Area (Ha)	Yield mt/ha	Prod. (Mt)	Area (Ha)	Yield mt/ha	Prod. (Mt)	Area (Ha)	Yield mt/ha	Prod. (Mt)
Upland	363,894	0.72	349,561	400,000	1.25	500,000	425,000	1.50	637,500
IVS	170,000	1.23	324,442	225,000	2.50	562,500	400,000	4.00	1,600,000
Mangrove	70,000			100,000	2.25	250,000	125,000	3.50	437,500
Riverain	5,593			25,000	2.50	62,500	50,000	3.50	175,000
Boliland	50,000			80,000	1.50	120,000	100,000	2.50	250,000
Total	659,487	0.97	637,983	830,000	2.00	1,495,000	1,100,000	4.00	3,100,000

Increasing productivity of rice and expanding the area under the crop in Sierra Leone with the aim of significantly increasing rice production in the country will require considerable improvement in the existing infrastructure, agricultural services in addition to appropriate coordination and management. The following key interventions will be required to impact positively on rice production in Sierra Leone:

1. Rehabilitation and construction of new feeder roads in selected locations as identified by the MAFFS and in keeping with the overall object of agricultural development
2. Provision of community service infrastructure appropriately designed to eliminate bottlenecks from the initiation of the cultivation process to marketing the produce. This should include construction of farm markets centres, daily retain markets, access roads; irrigation schemes, (inland valley development, community water shed management)
3. Provision of appropriate production infrastructure, within easy access of communities for post harvest processing of produce at on farm and village level. This should include village drying floors and crop store, rice hulling and milling machines.

4. Efficient provision of agricultural services particularly the development and dissemination of appropriate rice technologies along the entire value chain
5. Collection of reliable data
6. Provision of credit to small farmers to intensify input use and
7. Provision of lines of credit to input suppliers and marketers

Sierra Leone is still recovering from the massive destruction of its economic base during the civil war. Implementing these programmes to ensure the delivery of the expected results will definitely need adequate support from donors to complement the efforts of the Government.

5.3. Financial and Human Resource Commitment of the Government

Sierra Leone has a research centre specifically for rice research, the Rokupr Agricultural Research Centre (RARC). There are a total of 18 scientists with at least a masters degree and 15 technicians (Table 3). In order to produce the improved technologies and varieties needed to support the drive for increased rice productivity, the Sierra Leone Agricultural Research Institute (SLARI) estimates that the number of researchers should be increased to 30 by 2018.

Table 3 Number of Researchers, Technicians, and Extension workers in 2008 and projected targets for 2013, 2018

Year	Researchers with MA or Ph.D.			Research Technicians			Extension Workers		
	Total	Rice specialists (full time)	Rice specialists (part time)	Total	Rice specialists (full time)	Rice specialists (part time)	Total	Rice specialists (full time)	Rice specialists (part time)
2008	18	18	0	15	10	0	350	300	50
2013	27	25	2	20	15	5	550	400	150
2018	30	25	5	25	20	5	600	450	150

The number of qualified rice researchers in Sierra Leone has been dwindling even before the war. The deteriorating economic situation forced many professional including rice researchers to seek greener pastures elsewhere. Non Governmental Organizations in the country attracted many researchers because of their better conditions of service. Lack of the required resources and training opportunities prevented the implementation of a staff development and recruitment system that would have ensured adequate replacement of such staff. The situation was further aggravated by the war which resulted in the destruction of the Rice Research Station. There is therefore need for training of staff in appropriate disciplines so that the required will be available to carry out much needed activities that will ensure the provision of technologies needed to ensure the expected productivity of rice in Sierra Leone.

The former linear model of transferring technology from the researcher – extension – farmer is being gradually replaced within the Integrated Agriculture Research for Development (IAR4D) using Innovation Platforms. Farmer Field Schools are also adopting the Innovation System. It is envisaged that the innovation system will not require the large number of extension worker to farmer ratio. However, in view of the current low number of extension staff in the country, there

will be need to almost double the current number of extension personnel to provide much needed linkage with the Farmer Field Schools (FFS) as well as in the Innovation Platforms.

The Government of Sierra Leone allocated a total of Le 21,337,200,000 (4.6% of the total national recurrent budget) to the MAFFS. By virtue of the national importance of rice in the country, most of this allocation will be used in rice development activities. The government has made plans to purchase tractors and other agriculture machinery for the production of rice. Similarly a significant amount of funds have been allocated to the Agricultural Engineering division of MAFFS mainly for Inland valley Swamp development. A substantial proportion of the annual budget allocated to the newly established Sierra Leone Agricultural Research Institute (SLARI) will be used in funding research activities devoted to rice. However, the total allocation to SLARI by the Government of Sierra Leone is less than 50 percent of the required budget submitted by the Institute for the 2009 financial year.

Also, the proportion of government budget allocated to agriculture is way below that required by the New Partnership for Africa's Development (NEPAD) Comprehensive African Agriculture Development Programme (CAADP) agreement to which the Government subscribes. Heads of State and Government in Africa have pledged themselves to "...allocating at least 10 percent of national budgetary resources for the implementation of CAADP ... and sound policies for agricultural and rural development within five years." In the process of providing additional public resources for the sector, so as to meet the national objective of increased agricultural production, the GOSL is aware of the key role of the private sector in accelerating agricultural development through production, processing, marketing, storage, transport and export services. Increasing public investment is basically geared to providing leverage for the acceleration of private investment and efficient utilization of all investments, both public and private. GOSL also recognises that increasing public allocation should go to priority areas, with the rice sector recognised as primary.

5.4 Government Agricultural Development Policy

Rice being the staple food and main agricultural commodity, Government's policy for its development is embedded in the general agricultural development policy, the main elements of which are summarised below.

5.4.1 Seed system

The goals of the seed policy are:

- By delivering high quality seeds of improved rice varieties to the major ecosystems where the varieties have been proven to be suited, the seed programme can play a key role in agricultural development and the attainment of national food security goals
- Formulation and implementation of a national seed policy will provide a defined and stable framework for the development of an effective and sustainable seed system.
- Guide the conduct of all future seed related operations.

The implementation strategy is as follows:

- The Government of Sierra Leone through its various agencies and institutions under the coordination of the National Seed Board shall play the lead support role and develop pilot operations, maintain public service infrastructural and service agencies which are required to maintain an efficient seed supply. Government will also endeavour to enhance farmer demand for improved seeds, and create an operating and economic environment favourable for investment in seed supply.
- Government will encourage and support the private sector to produce, to the maximum extent possible, the seeds that are required for farmers' use. The public sector shall withdraw from the commercial production of seeds as the private sector develops the capability to produce and supply such seeds. As the private sector progresses in its supply of seeds, Government agencies shall gradually reduce their supply of seeds in order to prevent Government subsidized competition stifling the private sector initiatives and to conserve government funds.
- Government recognizes that a complete infrastructure for research seed multiplication and marketing is required to maintain a continuing flow of improved seeds of high yielding rice varieties. Government will therefore make every effort to ensure that all current public sector seed infrastructural components are established and operated in the manner most beneficial to national agricultural and economic development. Cooperative and supportive participation of both Government and the private sector are required to ensure efficient use of funds and other national resources, while providing the most effective eservice to agriculture.
- The overall strategy should lead to as situation where in general, activities/components of a public service nature which normally require some form of subsidization shall be conducted by Government and its subsidiary organizations. All activities/components of a commercial, market responsive nature, and in which the private sector is willing to invest in such a manner as to efficiently serve all or part of the national needs, shall be the responsibility of the private sector as appropriate.
- Under the authority of the minister of Agriculture Forestry and Food Security, a national Seed Board (NSB) shall be established and charged with the overall responsibility for advising the Government on all matters relating to the Seed Policy and ensuring legislations and protocols as well as seed industry planning and implementation.
- For variety evaluation, release and withdrawal, a variety Release Committee (VRC) shall be constituted under the authority of the NSB.
- In the national seed programme a four generation system of seed multiplication will be followed. This means that recognition will be given to four seed classes: breeder, foundation, registered and certified seed.
- Good quality seeds should have high varietal and physical purity, high germination ability and vigour, meet the minimum requirement of seed moisture and have a sound phyto sanitary rating. Standards reflecting the above attributes shall be drawn up in consideration of the local needs as well as regional and international requirements in order to facilitate seed trade and use. Particularly, Sierra Leone will contribute to support efforts to harmonize seed standards in ECOWAS sub region.
- Government will upgrade existing seed quality control facilities into a) a central Seed Testing Laboratory in Freetown and b) at least four regional satellite seed testing

laboratories, for effective coverage in the country. The required level of skilled manpower resources necessary for the running of the seed testing laboratories as well as the programmes of field inspection and seed trade monitoring will be ensured through recruitment of additional staff and appropriate training in both local and overseas training institutions.

- International assistance will specifically be sought for capacity development through
 - i. Manpower development and use of subject matter specialist
 - ii. Infrastructure and institution development
 - iii. Entrepreneurial development and privatisation

5.4.2 Post Harvest and Marketing

The policy objectives are:

- (i) Storage
 - To enhance inter-seasonal and inter-year crop price stability; and
 - Promote national food security through efficient crop storage.
- (ii) Processing
 - To reduce crop loss which is currently incurred through inefficient processing;
 - To preserve perishable agricultural commodities thereby reducing their level of wastage and the degree of their seasonal price fluctuations;
 - To widen the demand base for agricultural commodities, thereby accelerating the rate of growth of the agricultural sector; and
 - To diversify employment opportunities in rural communities through the establishment of small scale agricultural commodities processing industries.
- (ii) Marketing
 - The efficient distribution of agricultural produce such that seasonal variations are minimized and supplies made even and reliable throughout the country at affordable prices year round; and
 - Facilitation of the exportation of all exportable agricultural products.
 - Ensure that all marketed produce is suitable for consumption.

The main implementation strategies are:

- (i) Storage
 - Government will encourage research institutions to explore appropriate and affordable means and technologies to facilitate on-farm storage of produce;
 - Government will encourage and motivate the private sector to efficiently assemble and store surplus agricultural products off farm.
 - Government will encourage and assist the immediate processing of perishable agricultural products, while appropriate technologies are explored/developed for their storage in fresh forms.
- (ii) Processing

- Government will promote investment in agro-processing (especially in rural areas) through credit guarantee facilities, infrastructural facilities and other incentives for farmers' associations and private entrepreneurs ;
 - Government will undertake an assessment of current crop specific post-harvest losses; and
 - Government will encourage research institutions to explore and develop simple improved practices of post-harvest handling and processing to reduce crop loss.
- (iii) Marketing
- Government will promote a free, fair and competitive marketing environment for agricultural commodities.
 - Government will restrict all procurement of rice for public institutions to domestic rice only
 - Offer a range of attractive incentives to commodity producers and exporters;
 - Individual entrepreneurs, associations and limited liability companies will be free to export agricultural commodities;
 - Subject all exportable commodities to grading and certification to maintain acceptable quality standards;
 - Subject all commodities (for both import and export) to normal customs examination;
 - Maintain a general surveillance over the free commodity market operations;
 - Encourage the evolution of marketing cooperatives which will principally be private sector initiatives;
 - Provide an appropriate framework for marketing research and the dissemination of market information (relating to all agricultural products);
 - Continue to provide adequate infrastructure for the rapid development of agricultural marketing. Efforts will be intensified to open up more rural areas through the construction and maintenance of rural roads as well as facilitating the construction of more rural markets and improve storage facilities for such markets; and
 - The Ministry will continuously liaise with appropriate institutions to ensure the safety of food for consumption.

5.4.3 Water Resources Management

Objectives:

- To undertake a comprehensive development of both underground and surface water resources for multi-purpose use;
- To undertake measures for the control of erosion or floods and for watershed management, including afforestation and prevention of pollution of water bodies; and

- To construct and maintain boreholes, irrigation and drainage systems and other works necessary for food production and human water needs.

Implementation Strategies

- Passing of a national water resources legislation to regulate the development and exploitation of water resources;
- Continuing to implement flood and erosion control measures in affected areas;
- Encouraging the development of both small and large scale irrigation schemes in suitable areas;
- Encouraging the efficient use of water resources through participatory methods; and
- Encouraging both Governmental organizations and non-Governmental organizations involved in water resources development to upgrade their capabilities for constructing water infrastructure.

5.4.4 Mechanization

The main policy objectives are:

- To provide mechanical power to replace some of the labour required in agricultural pursuits, thereby increasing the productivity of labour, reducing the drudgery of agriculture, and encouraging youth to stay on the land; and
- To facilitate expansion of cultivated area in ecologies where labour bottlenecks limit production potential.

The following specific strategies will be pursued:

- Government will promote and facilitate the involvement of the private sector in the mechanization of the agricultural sector;
- The Ministry shall work closely with entrepreneurs and farmers' associations:
 - To ensure that equipment imported into the country are suitable for the intended agro-ecologies.
 - To encourage the standardization of machines imported, thereby making the stocking of spares easy; and
 - To ensure that machinery operators and mechanics are adequately trained.
- The work-oxen training and extension programme will be reactivated and strengthened and, a pilot mechanization programme involving adaptive research and the development of various types of farm power will be initiated;
- Encouragement and support will be given to research institutions in accelerating the development and local fabrication of suitable equipment for use by small scale and intermediate farmers. The participation of the private sector in the development and eventual commercialization of prototypes will be actively pursued.

5.4.5 Research

The objectives of research shall include:

- The development and selection of improved and high yielding production materials such as seeds , seedlings, livestock animals (including small ruminants and poultry);
- The development of appropriate technologies in the areas of land preparation, planting, harvesting, processing and storage of farm produce (which are efficient and improve returns to labour), and the development of appropriate animal husbandry techniques; and
- The development of appropriate sustainable technologies for integrated natural resource and pest management that increase production potentials of crop and livestock systems without adverse effects on the environment.

In designing an agricultural research strategy, government will ensure that:

- Research is geared towards the relevant and practical needs of Sierra Leonean producers (i.e research will be producer-driven and will be designed to solve male and female producers' problems);
- Appropriate mechanisms will be designed to co-ordinate and monitor research activities;
- Research bodies will be adequately funded, for as long as necessary to ensure the attainment of results. Research funding will, as much as possible, be tied to specific activities with measurable goals.
- Government will promote close liaison between research institutions and extension agencies and ensure that the research agenda responds to farmers' knowledge needs and that relevant research findings are accessible to users; and
- Government will encourage all relevant stakeholders (including farmers) to be actively involved in the development and funding of research.

5.4.6 Extension

The objective of extension is to enhance the capacity of the rural population to raise their standard of living, using locally available resources, with minimum assistance from, or reliance on government.

The Ministry will adopt the following strategies:

- The establishment of an appropriate community-based extension programme, in conformity with the current decentralization policy of Government. The strategy will involve the establishment of a community based participatory extension system, making use of farmers' associations and other groups;
- The training and continuous education of frontline extension workers who are generalists (i.e with knowledge in crops, livestock, forestry management, water management and data collection);
- Promotion of training programmes on integrated – crop/livestock- farming systems;
- Enhancing the capacity of farmers to acquire relevant knowledge to make well-informed choices on how to best manage their resources;
- Redressing gender based constraints in extension services delivery; and

- Facilitating effective communication channels and networks among researchers, extension agents and farmers.

5.4.7 Human Resources Development

The policy objective is to increase the number of adequately trained and sufficiently motivated agricultural personnel in the country.

Implementation Strategies

- Assessment of manpower and training needs of MAFFS, research- and other relevant institutions;
- Preparation and implementation of appropriate manpower development programmes for various cadres of agricultural workers, from vocational to professional levels;
- As women feature prominently in agricultural pursuits - especially food crop production, processing and marketing – a special focus of the human resources development drive will be the increase in the number, and training of, female agricultural workers. Furthermore, all MAFFS staff will be trained in analyzing gender based constraints in agricultural support programmes;
- Provision of appropriate incentives, in terms of remuneration and other conditions of service, for agricultural workers;

5.4.8 Agricultural Finance/Credit

The objective of agricultural finance/credit policy is to facilitate access to adequate and timely investment funds for agricultural development.

Strategies

A two-pronged approach will be pursued: the first relates to fiscal and monetary policies as they affect the sector, while the second, outlines desirable changes in the operations of lending institutions which provide loans to the agricultural sector.

- Fiscal and Monetary Policies will focus on:
 - The elaboration of a finance/credit policy for agricultural development;
 - Encouraging private lending institutions to adopt policies that are suited to the needs of agricultural investment;
 - Enhancing the capacities of farmers/farmers' groups and associations to access credit; and
 - Establishment of a government monitoring system to ensure that credit guidelines are observed.
- Changes in Operations of Lending Institutions will involve:

- Encouraging an increase in the number of branches and share capital of Commercial banks, Development banks and Rural banks thereby facilitating the penetration of remote rural communities and the mobilization of rural savings; and
- Encouraging the granting of bulk loans to farmers and farmers' groups/associations, relying on customary rights and securities.

5.5 Governance of NRDS

The Sierra Leone Rice Development Strategy is aligned to the country's agricultural development policy and reflects the importance of rice in the socio economic as well as political characteristics of the country. A task force comprising of key stakeholders in agricultural development in Sierra Leone was appointed at the end of a national consultation on rice development in the country. The task force is charged with the responsibility of drafting the NRDS. The task force will also serve as an advisory body for the coordination of the NRDS.

A NRDS secretariat will be established within the Ministry of Agriculture Forestry and Food Security (MAFFS). This secretariat will serve as a coordinating unit to link with the various stakeholders in the NRDS. The Minister of Agriculture Forestry and Food Security will designate one of the senior directors of the ministry to be a liaison officer for the NRDS. The Ministry's Project Evaluation and Monitoring division will be responsible for monitoring and evaluating the implementation and achievements of the strategy.

ANNEX

Investment Programme Outline for the rice sector

6.1 Improving rural/village infrastructure

The main purpose of the improvements of basic rural infrastructure is ultimately to increase output of rice from the farms to the marketing and processing outlets. It is expected that interventions will be made on a nationwide basis. The overall objective should be to set in place essential support infrastructure to facilitate increasing rice production to reduce poverty and improve the welfare of rural communities.

The main activities should contribute to the provision of a critical mass of essential infrastructure to fulfil the overall objective as follows:

- Rehabilitation and construction of new feeder roads in selected locations as identified by the MAFFS and in keeping with the overall object of agricultural development
- Provision of community service infrastructure appropriately designed to eliminate bottlenecks from the initiation of the cultivation process to marketing the produce. This should include construction of farm markets centres, daily retail markets, access roads; irrigation schemes, (inland valley development, community water shed management)
- Provision of appropriate production infrastructure, within easy access of communities for post harvest processing of produce at on farm and village level. This should include village drying floors and crop store, rice hulling and milling machines.

Each intervention should be cost effective and economically justified. Due consideration will be given to agricultural production potential and potential for increases, socio economic surveys and appropriate engineering design to allow adequate cost/benefit analysis. The bottle necks will be clearly identified through basic surveys.

6.1.1 Reclamation and Development of Inland valley Swamps

An estimated 40,000 ha of land under swamp rice was lost due to the war. In the short term, this land area needs to be brought back into production by rehabilitation of these swamps to bring them back to the pre war figures. This project will also support the expansion of community involvement in the restoration of priority swamps at a rate of about 20,000 ha/annum; the initiation of farmer field schools in land and water management in swamp rice production, and equipping farmers to sustain production. The Magbosi Land and water Research Centre of the Sierra Leone Agricultural Research Institute is expected to play facilitation roles in the water projects while the training and physical works are carried out by the private sector.

Table 4 Development of IVS and small scale irrigation

Activity/Intervention	Duration/Period	Description	Cost (US \$)
Irrigation sector study for dry season small scale swamp irrigation	2009/2010	Assessing the potential of IVS irrigation especially for dry season rice production	300,000.00
Land and water management training	2009 - 2014	Magbosi land and Water research center outreach staff and farmer training in land and water management techniques in IVS irrigation.	500,000.00
Boosting swamp rice production to pre war	2009 - 2015	Expanding community involvement in restoration of priority swamps at	

levels, self sufficiency and export		about 10,000 ha/annum, initiate small farmer field schools in land and water management in swamp rice production, equipping farmers to sustain production	25,000,000.00
Regional irrigation pilot project	2009/10 – 2011/2012	Implementing a 5 ha IVS irrigation pilot project in each of the regions as a test case for possible future expansion of small scale irrigation	100,000.00
IVS irrigation expansion programme	2013 - 2018	Implementing an expansion programme based on results of the pilot and at a rate of 50 ha/annum for 5 years	2,000,000.00
		Total	US \$ 27,100,000.00

6.1.2 Rehabilitation and Expansion of Feeder Road Network

Because of the poor road network of about 80 km per 1000 km², there cannot be much improvement in the movement of agricultural goods and services without adequate funding for the rural road sector. In the short term, strategic links must be made motorable all year round. Whereas the percent road sector is centralized, there will be the need to decentralize it to give the districts more power to participate in the road maintenance.

The objectives of the roads infrastructure policy are to encourage effective and efficient methods of infrastructure rehabilitation using appropriate labour intensive technologies, local resources and inputs. Employment generation is an important consideration and is important as long as the unemployment or under employment rates of unskilled and semi skilled remain high. The location and length of feeder roads to be constructed should be agreed with the MAFFS and in consonance with the anticipated decentralization programme.

Table 5 Rural road rehabilitation

Activity/Intervention	Duration/Period	Description	Cost (US \$)
Rural road maintenance plan development	2009	Assist Sierra Leone Authority (SLAR) to prepare a rural roads maintenance plan so that there can be free movement of agricultural produce and services	300,000.00
Labour based rural roads network expansion	2009 - 2014	Expand rural roads network at a rate of 100 km/annum for 5 years	14,000,000.00
Labour based road maintenance	2009 - 2018	Expansion of community involvement in labour based restoration of key rural roads	SLRA sources
		Total	US \$ 14,300,000.00

6.1.3 Rehabilitation and Expansion of rural Markets

Markets are vital to the distribution of all goods and services including rice. In Sierra Leone market accessibility is generally poor in the rural communities. Access to and movement from the typical market place is cumbersome and disorganized. In addition a great amount of portage is required to carry rice from trucks to stalls this increasing market costs and contributing to wastage due to multiple handling.

Daily retail markets are important for development of agricultural trade, particularly in the bigger villages and chiefdom headquarter towns. They need permanent structures including facilities for easy loading and unloading

vehicles. Many existing markets need upgrading and some new ones need to be built. These should be covered markets with market stalls, lockable stores, a warehouse, food processing and sales bars, drains, toilets, water supply, waste disposal facilities, adequate lorry loading and unloading facilities, a car park and link fencing.

Table 6. Improvement of market infrastructure

Activity/Intervention	Duration/Period	Description	Cost (US \$)
Study of rental market stores	2009	Detailed study on development of rental stores in key market centres for revenue mobilization	300,000.00
Rehabilitation and expansion of key market infrastructure	2009 - 2014	Market infrastructure improvement and implementation of rental market stores in a key market per district	5,200,000.00
Total			US \$ 5,500,000.00

6.2 Efficient provision of agricultural services

Government has primary responsibility for efficient provision of services to the agricultural sector. In some areas eg research, market information systems, Government is expected to shoulder the main responsibility, while in other areas such as provision of extension and rural financial services, the private sector is expected to plan an important role.

6.2.1 *Research:* The purpose of research programme is to generate appropriate and profitable technologies for use by the farming communities. The principal stakeholders (researchers, extension agents and farmers) should be involved in the process of technology generation, diffusion and adoption. Appropriate linkage and communication mechanisms between these actors are of paramount importance in the development of any sustainable agricultural system.

A system of participatory selection and multiplication of seeds with individual farmers and groups would be supported to undertake multiplication of improve rice varieties by accessing micro credit to purchase inputs. Improved and high quality seeds would be gradually made available on sale to an increasing number of farmers that would in turn become enabled in attaining higher yields.

Activities during the first two years would include rehabilitation and equipping outstations of the Sierra Leone Agricultural Research Institute (SLARI), and promotion of community/farmer-led varietal selection and improvement for upland and lowland rice. Activities during the 3 – 7 years of the project should include support to SLARI and MAFFS stations for the production of foundation and registered seeds, facilitation and support for participatory varietal selection and improvement and promotion of private multipliers for rice seeds.

Table 7 Enhancing the capacity for technology development

Activity/Intervention	Duration/Period	Description	Cost (US \$)
Enhancing the capacity of the Rokupr Agricultural Research Centre (RARC)	2009 - 2014	Research	2,500,000.00
		Infrastructural development	500,000.00
		Governance and management	1,200,000.00
		Sub total	4,200,000.00
Enhancing the capacity of the Magbosi Land and Water Research Centre	2009- 2014	Research	1,300,000.00
		Infrastructural development	250,000.00
		Governance and management	800,000.00

(MLWRC)		Sub total	2,350,000.00
		Total	6,550,000.00

6.2.2 *Extension:* The programme seeks to create a semiautonomous National Agricultural Advisory Service which will gradually take over the agricultural extension delivery and management from MAFFS. Primary responsibility will be vested in the farmer groups that will be the prime clients of the advisory services. The extension programme should be enhanced by constantly receiving practical farm information from research. Extension also needs to be closely tied with research to feed back information from farmers. These factors make it necessary to strengthen the linkages between farmers, extension workers and researchers.

Table 8 Requirements for effective extension delivery and management

Activity/Intervention	Duration/Period	Description	Cost (US \$)
Enhancing the capacity for the dissemination of technologies	2009 - 2018	Vehicles	800,000.00
		Equipment	160,000.00
		Infrastructure	450,000.00
		Total	US \$ 1,500,000.00

6.2.3 *Data collection and market information system:* Policy makers and planners including private sector participants and donor agencies need reliable and timely agricultural statistical information for the formulation in monitoring and evaluation of developmental strategies and programmes especially those in support of increased food security and agricultural production. The development of effective and efficient marketing information systems is a critical component for the commercialization of the rice sector. This will enable farmers make informed decisions about their cropping portfolio and increasing their bargaining power during the marketing season. Short and long term programmes are proposed for implementation by the Project Evaluation monitoring and Statistics Division (PEMSD) of MAFFS. The short term programme focuses on the immediate improvement of the scope and coverage of current data collection activities by:

- a) *training of more staff to collect data at field level and ultimately increasing the number of households from which information is collected*
 1. *improved data collection at the field level by the introduction of better designed questionnaires;*
 2. *adequate preparation for undertaking an agricultural census*
 3. *establishing an embryo data Processing Unit with the necessary equipment*
- b) *The longer term programme focuses on building the capacity of an agricultural statistics unit by:*
 1. *improving the capacity and capability of PEMSD to properly collect, process, analyse and disseminate agricultural statistical data*
 2. *developing a scientific statistical survey design for collecting agricultural data*
 3. *establishing an improved Data Processing Unit capable of processing agriculture survey results using state of the art computer software packages*
 4. *conducting an agricultural census*

Table 9 Collection of reliable data

Activity/Intervention	Duration/Period	Description	Cost (US \$)
Improving data collection	2009 - 2014	Assistance to Agricultural statistics	1,500,000.00
		Support to PEMSD for data collection	500,000.00
		Total	US \$ 2,000,000.00

6.3 Credit for Agricultural Market Development

Over 80 percent of the rural population in Sierra Leone is poorly capitalised and cannot therefore access modern input that will improve productivity and hence their welfare. Furthermore, Sierra Leone lost most of its productive capacity due to shifts in the macro economic environment and the war. Despite an impressive potential for growth the agricultural sector still faces an array of constraints. Key among the issues facing Sierra Leone are a) poor social services b) inadequate budgetary allocation to agriculture for production services c) lack of rural finance and marketing systems and d) weakened and demoralised private sector.

The strategy proposed is to intensify agricultural production and monetise the rural economy by increasing access to modern agricultural inputs. The project will encourage increased use of modern inputs and through farmer access to seasonal credit for inputs, advisory service for adoption of improved technology and increased access to development credit by private sector input and output suppliers. Success of this project will depend on complementary actions that will provide support to the agricultural system by strengthening rural marketing infrastructure, private trader investment in marketing services and the availability of appropriate crop conservation and marketing technologies. A two pronged approach will be used.

1. *Provision of credit to small farmers and communities to intensify input use:* The aim is to raise fertiliser and seed supply to sustainable levels and stimulate demand through easy access to input credit.
2. *Provision of lines of credit to input suppliers and marketers:* Strengthening private trader investment in marketing services by provision of support for NGOs, traders and farmers associations to facilitate their access to and management of credit from banks for investment in infrastructure and equipment for processing, packaging, storage, transportation and marketing of rice and implementation of grades and standards.