



## High-Level Conference on:

### Water for Agriculture and Energy in Africa: the Challenges of Climate Change

Sirte, Libyan Arab Jamahiriya, 15-17 December 2008

## National Investment Brief

### SIERRA LEONE

#### EXECUTIVE SUMMARY:

About 70 percent of the population of Sierra Leone is poor, and about 68 percent of the population cannot even afford enough food. Twenty six (26) percent is extreme poverty, and can meet only 71 percent of their basic needs. More than 40% of children under age five are too short for their age. The food import bill in the country has rapidly increased at a growth rate higher than that of the population. Only about 47 percent of the natural cereal requirement is domestically produced.

Agriculture is a vitally important component of the Sierra Leonean national economy, contributing 46.4% to the GDP in 2006. The most important crops are rice, cassava and sweet potato. Other food crops grown in the country include maize, sorghum, fundi (cereal), and groundnuts. The predominant type of farming is the bush fallow system, with holdings ranging from 0.5 to 2 ha. Irrigated agriculture is poorly developed in Sierra Leone with an area equipped for irrigation of 29,360 ha though irrigation potential is estimated at 807,000 ha. Sierra Leone climate is tropical hot to humid. Climate variability and change affect the water available in the environment for domestic and industrial water supply, hydroelectric power generation, irrigation, etc. Extended periods of drought, and loss of soil fertility and degradation as increase precipitation, adversely affect subsistence agriculture.

Sierra Leone can be divided into twelve river basins, of which five are shared with Guinea and two with Liberia. The hydropower potential of Sierra Leone is estimated at 1513 MW scattered in 27 sites across the country. At present, two sites have been developed at Guma and Kemema. A plant is being built at Bumbuna with an installed capacity of 47 MW.

Strategies for agriculture, water and energy is enshrined in various policy document. The Water and Sanitation Policy seeks to mitigate the challenges facing the use of water to achieve food security. The energy Policy seeks to *meet the energy needs of the Sierra Leone population by establishing efficient energy production, procurement, and transportation, distribution and end user systems in order to contribute to social and economic development in an environmentally sustainable manner. The policy calls for a reform of existing National Power Authority into a corporate, self funding utility, making it more efficient.* The Agricultural Development Strategy (ADS) and the Medium-Term Agricultural Strategic Plan seeks to boost food production and promote sustainable agricultural development. The strategies comprise development programmes for rice, other food crops, export crops, forestry, livestock and fisheries; and research & extension. There is also a National Food and Energy Policy which aims to increase the use of modern energy in agriculture to result in increased agricultural production, leading to the achievement of the country's food security objectives.

There are seven projects in the portfolio. Two were recently completed, for US\$21.15 million and US\$51.41 million respectively. Three projects are currently ongoing, they include a power and water project, and the completion of the Bumbuna Dam for US\$47 million and US\$91.6 million respectively. In the pipeline are three projects; one is geared towards reducing the effect of climatic change on agricultural production at the cost of \$3.4 million, and the second is a sustainable land and water development project for US\$32.29 million and the third aims to diversify food production. There are over six donors, complementing the efforts of the Sierra Leone Government.

## 1. CONTEXT

### 1.1 AGRICULTURE AND FOOD SECURITY

#### Agriculture

Agriculture is a vitally important component of the Sierra Leonean national economy. In 2006, it represented 46.4 percent of GDP and employed nearly 60 percent of the total economically active population, mostly in small-scale, peasant production. In 2007, the GDP was US\$1,672 million. The most important crops are rice, cassava and sweet potato. Other food crops grown in the country include maize, sorghum, fundi (cereal), and groundnuts. Cocoa and coffee, oil palm and kola nuts are grown largely for exports.

The predominant type of farming in Sierra Leone is the bush fallow system, with holdings ranging from 0.5 to 2 ha. Up to 10 different crops are traditionally grown in mixed stands in one season, with rain fed upland rice dominating, being grown by 96 percent of farmers. Traditionally, farmers use the Inland Valley Swamps (IVS) for rice in the rainy season, followed in the dry season by groundnut, vegetables, potatoes and cassava. Typically, crop production is characterized by low yields and productivity and occurs in a setting severely deprived of institutional facilities. Farm inputs, including tools, seeds and technology are inadequate and rudimentary. Access to markets is restricted due to the bad state of the overall road network.

#### Irrigation and water control

Irrigated agriculture is poorly developed in Sierra Leone, and no recent data on its extent is available. Generally, areas with good water control and having the possibility of more than one crop a year are very limited. In 1992, 1 000 ha were reported to be irrigated for sugar cane production and 28 360 ha of wetland had been equipped for rice cultivation, although most of it was not operational. Thus the area equipped for irrigation was 29 360 ha in 1992. In 1992, 126 000 ha of non-equipped wetlands and inland valley bottoms were cultivated, bringing the total water managed area in 1992 to 155 360 ha.

Sierra Leone's irrigation potential was estimated at 807 000 ha in 2007. About 71 percent of uplands and 90 percent of the lowlands are cultivable, but only a 12.2 percent of this land is actually cultivated each year. Lowlands are relatively important with a total cultivable area of 1.165 million ha. These are differentiated in four ecosystems: inland valley swamps (IVS), bolilands which are drainage depressions, mangroves in the coastal tidal zone, and annually flooded riverine grasslands. Lowland suitable for development corresponds to the above irrigation potential, leaving aside environmental aspects.

#### Food security

About 70 percent of the population of Sierra Leone is poor, and about 68 percent can not even afford enough food. Twenty six percent is in extreme poverty, and can meet only 71 percent of their basic needs. Food insecurity remains worrying with limited access to food, poor quality food intake, and low production. Although food production has been increasing, major constraints remain. Production technology is at subsistence-level, and poor rural infrastructure hinders access to markets. With regard to nutrition, energy intake is growing slowly, but many do not get the minimum requirement.

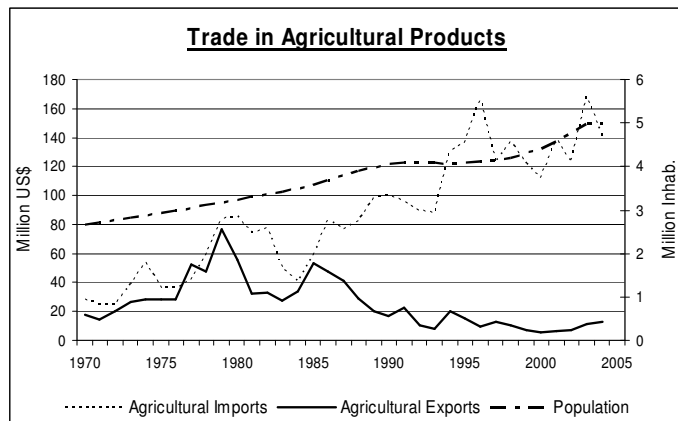
Sierra Leone portrays a very high level of undernourishment, being one out of two persons undernourished. The proportion of malnutrition has increased from 46 percent in 1990-92 to 50 percent in 1999-2001. Malnutrition in young children is high, with more than 40 percent of children under age five too short for their age. The World Bank, in its Country Assistance Strategy for Sierra Leone observed that given the country's annual population growth rate of 2.1 per cent, rural per capita incomes have to grow by at least 5.6 percent annually and urban by 4.0 percent annually to achieve the MGD 1 and World Food Summit Targets.

#### Food and agriculture trade and import balance

The food import bill in the country has rapidly increased (see figure below), at a growth rate higher than that of the population. As a consequence of the civil conflict, only about 47 percent of the natural

cereal requirement of 626 704 tonnes were domestically produced in 2003 and the value of the agricultural imports reached a peak of approximately US\$ 168.6 million.

Agriculture export corresponded to import around 1978/79, with a value close to US\$ 77 million. At this point, export and import took a dive, and export reached as low as US\$30 million around 1993, while import reached its lowest point of around US\$45 million around 1995. The civil war raging in the country at the time could be the primary reason for such trend. However, in 2003, it is noted that imports started to take a downturn, while export is taking an upward turn. It seems that Sierra Leone is reverting to the tendency of the last years, but there is still a long way to run.



The Sierra Leonean President is promoting several interventions to reverse the trend that has security and food security implications. As stated in his 2006 address celebrating World Food Day the President informed that the government is promoting off season production of rice in inland valley swamps, mangroves, riverine grasslands. Hydromorphic sites are also being encouraged to ensure double or even triple rice cropping per year. The object is to reverse this trend by exporting surplus, thereby saving hard currency through import substitution. The government is also encouraging change in attitude, value and food preference which makes it difficult for the population to accept alternative to rice.

## 1.2 WATER RESOURCES AND HYDROPOWER

Sierra Leone can be divided into twelve river basins, of which five are shared with Guinea and two with Liberia. The groundwater resources of the country have not been extensively studied. They correspond almost totally to the base flow of the rivers and the permeability of the substratum is high. Internal renewable water resources are estimated at 160 km<sup>3</sup>/year, with surface water accounting for 150 km<sup>3</sup>/year.

The hydropower potential of Sierra Leone is estimated at 1513 MW scattered in 27 sites across the country. At present, two sites have been developed. A 2.4 MW plant is at Guma and a 4 MW plant which supplies part of the electricity needs of Bo and Kemema. A plant is being built at Bumbuna with an installed capacity of 47 MW with a 203 km long transmission line intended for the Western Region.

The development of additional hydropower sites is very important since in Sierra Leone, roughly five percent of people have access to electricity. The energy situation is a serious impediment to Sierra Leone's economic growth, particularly in the industrial and service sectors. Furthermore, the country is also one of a small number in West Africa with some of the highest costs of electricity generation and delivery in the world.

## 1.3 CLIMATE CHANGE

Sierra Leone climate is tropical hot to humid. Climate variability and change affect the water available in the environment for domestic and industrial water supply, hydroelectric power generation, irrigation, etc. Moreover, increased intensity of tropical cyclones, extended periods of drought, and loss of soil fertility and degradation, as a result of increased precipitation, adversely affect subsistence agriculture. Erratic and high intensity rainfall also erodes vulnerable soils, lowering production. Overall, climate change, including global warming and increased climate variability, could result in a variety of impacts on agriculture. Some of these effects are biophysical, some are ecological, and some are economic. Climate change over the next century may have significant effects on how much food is produced, as well as food security, or how much food is available to people.

## 2. NATIONAL STRATEGIES FOR WATER, AGRICULTURE AND ENERGY

### 2.1 POLICY CONTEXT

A major objective of the Government of Sierra Leone is *to improve agricultural production and productivity in order to achieve food security*. The commitment to agricultural development was given a big political boost by former President Ahmad Tejan Kabbah when he pledged in his Inaugural address to ensure that *no Sierra Leonean should go to bed hungry*. The current government is also committed to enhancing agricultural production. The present President Ernest Bai Koromah has pledged to improve agricultural productivity by providing necessary farms inputs, machinery rentals and agricultural extension services to farmers. Water and energy being essential ingredients for food production and food security, the below policy measures have been put in place.

#### *Water and Sanitation Policy*

With support from the United Nations Economic Commission of Africa, a water and sanitation policy for Sierra Leone has been developed. The policy seeks to mitigate the challenges facing the use of water to achieve food security. They include managing the river catchments to reduce deforestation and its impact, building capacity to use water for irrigation of crops to increase food production, and providing support for research in water resources management for food production. Supporting institutions proving credit for irrigation schemes to increase food production was also highlighted.

#### *Energy Policy*

An energy policy has been developed for Sierra Leone. The main policy goal of the energy sector is to *meet the energy needs of the Sierra Leone population by establishing efficient energy production, procurement, and transportation, distribution and end user systems in order to contribute to social and economic development in an environmentally sustainable manner*. The policy calls for a reform of existing National Power Authority into a corporate, self funding utility, making it more efficient. Fuel consumption in agriculture is negligible because of the largely non-mechanical nature of the sector. Energy consumption in agriculture is not usually accounted for in the national energy balance of Sierra Leone, and there are very few agro based industries. The Government implementation of the food security programme will involve modernization of the Agriculture sector in which energy will play a significant part. Implementing the policy is estimated at US\$103 million.

The Agricultural Development Strategy (ADS) and the Medium-Term Agricultural Strategic Plan (MTASP): In pursuance of the overall food security objectives, both the ADS and MTASP concentrate on steps to boost food production and promote sustainable agricultural development. The strategies comprise development programmes for rice, other food crops, export crops, forestry, livestock and fisheries; and research & extension.

#### *National Food and Energy Policy*

The drafted national food and energy policy aims to increase the use of modern energy in agriculture to result in increased agricultural production, leading to the achievement of the country's food security objectives.

#### *Climate Change*

Under the Least Developed Country Fund (LDCF), the IFAD through the Global Environment Fund is supporting the Sierra Leone Government with a project titled: Integrating adaptation to climate change into agricultural production and food security. The objective of the project is to lessen the impact of climate change on vulnerable rural communities, as well as on natural resources for sustainable agricultural production and increase food security. The project has three components: Sustainable development of Inland Valley Swamps for rice production; integrated natural management and water resource management for agriculture, and capacity building and awareness raising on climate change at the institutional and local level.

### 2.2 INVESTMENT ENVELOPE

The investment envelope for the short, medium and long term is presented in the Table below and expressed in million US \$ (based on CAADP investment projections). In total, it is estimated that small

scale water investment would cover 61,000 ha, rehabilitation of irrigation schemes would cover 1, 000 ha, while large scale projects would cover 4, 000 ha, totalling 66,000 ha. The total investment envelope is 194 million for the entire period. Seventy-eight (78) percent (\$151M) will go towards small scale water control, while the balance 22 percent will be used for rehabilitation of irrigation (\$3M) and large scale hydraulic projects (\$40M). From the table, more emphasis is being placed on small scale water control, as there is limited number of irrigation or large scale hydraulic projects in Sierra Leone. Water for agriculture does not seem to be a major problem at the moment. As such, investment in small scale water control projects is essential to boost food production. Nevertheless, investment in large scale hydraulic projects is increasing progressively from \$2 million in the short term, to \$26 million in the long term.

Time scale	Type of investment (million US\$)			
	Small scale water control	Rehabilitation of irrigation	Large scale hydraulic projects	Total
Short-term	77	1	2	80
Medium-term	49	2	12	63
Long-term	24	0	26	50
Total	151	3	40	194
<b>Area ( ha)</b>	<b>61,000</b>	<b>1,000</b>	<b>4,000</b>	<b>66,000</b>

### 2.3 PROJECT PORTFOLIO

Section 3 presents recently achieved, active and pipeline projects related to the above investment envelope. Currently there are eight projects in the portfolio, five with water components. Two have been recently completed, to include the agricultural sector rehabilitation project for US\$21.15 million and the power, water and waste management project for US\$51.41 million. Three projects are currently ongoing, to include a power and water project, and the completion of the Bumbuna Dam for US\$47 million and US\$91.6 million respectively. There is also a rural and private sector development project for US\$32 million. In the pipeline there are three projects. One is geared towards reducing the effect of climatic change on agricultural production at the cost of \$3.4 million and sponsored by IFAD. The second is AFA/NEPAD sponsored bankable project for US\$32.29 million and the third aims to diversify food production. There are over six donors, complementing the efforts of the Sierra Leone Government.

### 3. PROJECT PROFILES (ON-GOING AND PROJECTED)

Project title	Funding Partners	Lifeline	Total Budget	Description
<b>I. PROJECTS RECENTLY IMPLEMENTED</b>				
Agriculture Sector Rehabilitation Project	ADF, Govt. of Sierra Leone	2004	UA14.4million (US\$21.15 M)	The project goal is to reduce poverty and enhance food security. Its objective is to enhance agriculture production and improve farmers' income. It has three components: (1) agricultural production; (2) capacity building and (3) Project management and coordination.
Power, Water Supply and Waste Management	World Bank	2004	UA\$35.0 million (US\$51.41 M)	The project will improve sustainable access to essential power, rural water supply and sanitation, and urban waste management services.
<b>II. ON-GOING PROJECTS</b>				
Sierra Leone Power and Water Project	World Bank	01-07-2004 to 31-03-2010	US\$ 47.16 million	The project aims to improve sustainable access to essential power, rural water supply and sanitation, and urban solid waste management services.
SL Bumbuna Hydroelectric Completion (CN)	World Bank AfDB Government of Italy Netherlands Clean Development Facility Government of Sierra Leone	30-06-2006 to 30-06-2014	US\$91.8 million	This project will complete a near-finished dam, install generators and rehabilitate transmission lines, 50 MW will be added to today's functioning levels of 10-20 MW in the Western Region. Average cost of bulk power will be radically cut and the rotating power black-outs will end.
Rural and Private Sector Development	World Bank	22-05-2007 to 14-11-2012	US\$ 32 million	The objectives of the Project are to improve efficiencies along the value chain of agricultural commodities with higher benefits flowing to the producers. The project will have four components, one of them aims to increase farmers' access to improved agricultural technology and practices to support quality improvement of commodities
<b>III. PIPELINE PROJECTS</b>				
Integrating adaptation to climate change into agricultural production and food security in Sierra Leone	IFAD	2008 - 2015	US\$ 5.4 million	The objective of the project is to lessen the impact of climate change on vulnerable rural communities, as well as on natural resources for sustainable agricultural production and increase food security. The project has three components: Sustainable development of Inland Valley Swamps for rice production; Integrated natural management and water resource management for agriculture, and capacity building and awareness raising on climate change.
Diversified food production	ADB/GOSL	2008-2011	US\$ 12 million	Encouraging and helping farmers to grow other food crops besides rice for food security
Bankable Investment Project Profile (BIPP): Sustainable Land and Water Resources Development.	FAO-NEPAD		US\$32.29 million	The specific project objectives are to: (i) rehabilitate and put into food production previously developed/partially developed Inland Valley Swamps (IVS); (ii) promote small-scale community irrigation, especially by women market gardeners, for the production of non-rice food crops, as a contribution to food security and poverty reduction, and (iii) strengthen institutional capacity in water resources management, with a focus on agriculture.

ANNEX 1: MAP OF WATER CONTROL IN SIERRA LEONE



## ANNEX 2: COUNTRY STATISTICS

Country and population								
Area of the country	2005	7174	1000 ha					
Cultivated area as % of the total area of the country	2005	9.5	%					
Total population	2005	5525	1000 inhab					
• of which rural	2005	60	%					
Population economically active in agriculture	2005	1249	1000 inhab					
• as % of total economically active population	2005	59	%					
• female	2005	47	%					
• male	2005	53	%					
Economy and Development								
Gross Domestic Product (GDP) (current US\$)	2007	1672	million US\$/yr					
• value added in agriculture (% of GDP)	2006	46.4	%					
• GDP per capita	2007	286	US\$/yr					
Access to improved drinking water sources								
Total population	2006	53	%					
Urban population	2006	83	%					
Rural population	2006	32	%					
Water Resources and management								
Average precipitation	2007	181.2	10 <sup>9</sup> m <sup>3</sup> /yr					
Total actual renewable water resources	2007	160	10 <sup>9</sup> m <sup>3</sup> /yr					
Dependency ratio (transboundary rivers)	2007	0.0	%					
Total actual renewable water resources per inhabitant	2007	28959	m <sup>3</sup> /yr					
Total dam capacity	1995	0.22	10 <sup>9</sup> m <sup>3</sup>					
Total water withdrawal	2000	0.38	10 <sup>9</sup> m <sup>3</sup> /yr					
• as % of total actual renewable water resources	2000	0.24	%					
IRRIGATION AND DRAINAGE								
Irrigation potential	2007	807	1000 ha					
Water Management								
Area equipped for irrigation: full control - total	1992	29.36	1000 ha					
Equipped lowlands	1992	28.36	1000 ha					
Total area equipped for irrigation	1992	29.36	1000 ha					
• Area equipped for irrigation as % of cultivated area	1992	5.4	%					
• Annual increase rate		-	%					
• Power irrigated area as % of area equipped for irrigation		-	%					
• Area actually irrigated as % of area equipped for irrigation		-	%					
Non-equipped cultivated lowlands and flood recession	1992	126.00	1000 ha					
Total agricultural water managed area	1992	155.36	1000 ha					
• Agricultural water managed area: as % of cultivated area	1992	28.8	%					
• Drained cultivated area as % of total cultivated area		-	%					
Typology of irrigation schemes								
Small-scale schemes (<ha)			1000 ha					
Medium-scale schemes (- ha)			1000 ha					
Large-scale schemes (>ha)			1000 ha					
Irrigated crops								
Sugar cane	1991	1	1000 ha					
ENERGY INDICATORS								
Energy Production			Mtoe					
Net Imports			Mtoe					
TPES			Mtoe					
- TPES/Pop			toe/capita					
- TPES/GDP			toe/thousand 2000 US\$					
- TPES/GDO (PPP)			toe/thousand 2000 US\$ PPP					
Electricity Consumption			TWh					
- EC/Pop			kWh/capita					
ENERGY SUPPLY AND CONSUMPTION								
	Coal	Gas	Crude oil	Petroleum products	Hydro	Other Renewable & Waste	Others	TOTAL
Production								
Imports								
Exports								
International Marine								
Bunkers								
Stock Changes								
Total Primary Energy Supply (TPES)								

\* in thousand tonnes of oil equivalent (ktoe) on a net calorific value basis.

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