Agricultural and Rural Development Statistics in Sierra Leone - Key Aspects of Institutional Arrangements & Performance.

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ABSTRACT

The Comprehensive Africa Agricultural Development Program (CAADP) is an African owned initiative to improve economic growth through agriculture-led development. Sierra Leone is to the forefront of this initiative being one of the first sub-Saharan countries to receive funding for its National Sustainable Agricultural Development Plan (NSADP), through the Global Agriculture & Food Security Program (GAFSP). The Government and its partners have a number of rural development programmes underway to improve agricultural productivity and understanding which of these interventions are proving to be most effective needs reliable and credible data. At present, Sierra Leone's agricultural and rural development statistics are somewhat limited e.g. over the last three years both rice production and imports seem to have increased. While this does not necessarily indicate that the figures themselves are flawed, it exposes the lack of detailed information at the Government's disposal to explain these trends.

This paper will focus on Sierra Leone to review arrangements for the collection of agricultural and rural statistics to meet policy development, monitoring and evaluation, internal and external requirements. The paper will identify the providers, the key sources of information, the strengths and weaknesses of the methodologies used and the information provided. It will look at practises to reconcile results from different data collection initiatives and to improve collaboration. The paper will conclude with proposals, reflecting the new Global Strategy for Agriculture and Rural Statistics, for how the system could be better organised and to identify ways to improve collaboration to make the overall process more efficient and effective; while this will reflect the Sierra Leone context it is also likely to have

more general appeal as data reconciliation, collaboration and institutional co-operation are issues across many sub-Saharan Africa countries.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ACRONYMS

ARS   Agricultural Sector Review
ATS   Agricultural Tracking Survey
CAADP   Comprehensive African Agricultural Development Programme
CPI   Consumer Price Index
CWIQ   Core Welfare Indicator Questionnaire
DHS   Demographic and Health Survey
EA's   Enumeration Areas
ECOWAS Economic Community of West African States
EPRU   Economic Policy Research Unit

EWS NET   Early Warning System Network
EWS   Early Warning Network
FAO   Food and Agricultural Organization
GDP   Gross Domestic Product
GAFSP   Global Agriculture and Food Security Programme
GoSL   Government of Sierra Leone
HIV/AIDS   Human Immunodeficiency Virus/ Acquire Immune Deficiency
             Syndrome
ICT   Information and Communication Technology
IMF   International Monetary Fund
IRCBP   Institutional Reform and Capacity Building Project
JPAL/IPA   Jameel Poverty Alleviation Lab/Innovations for Poverty Action
LSMS   Living Standard Measurement Survey
MAFFS   Ministry of Agriculture Forestry and Food Security
MDG   Millennium Development Programme
MIS   Management Information System
MOFED   Ministry of Finance and Economic Development
MSU   Michigan State University
NEPAD   New Partnership for Africa's Development
NERICA   New Rice for Africa
NRA   National Revenue Authority
NSADP   National Sustainable Agricultural Development Plan
NSDS   National Strategy for the Development of Statistics
NSS   National Statistics System
NU   Njala University
PEMSD   Planning Evaluation Monitoring Statistics Division
PETS   Public Expenditure Tracking Survey
PRSP   Poverty Reduction Strategy Paper
RGDP   Real Gross Domestic Product
SDS   Service Delivery Survey
SLARI   Sierra Leone Agricultural Research Institute
SLIHS   Sierra Leone Integrated Household Survey
SNA93   System of National Account 93
SSA   Sub-Saharan Africa
SSL   Statistics Sierra Leone
WB   World Bank
WFP   World Food Programme
LIFDC   Low-Income Food Deficit Country
LDC's   Least Developed Countries
UNHDI   United Nations Human Development Index
PPS   Probability Proportional to Size
COICOP   Classification of Individual Consumption by Purpose
Eurotrace DBMS   Eurotrace Data Base Management System

1.0   BACKGROUND AND OBJECTIVES

Over the years, many initiatives to build statistical capacity in Africa have emerged. Many problems have hindered these efforts, including inadequate funding. Recently the World Bank and development partners began a major new commitment to support Sierra Leone's statistical system aimed at improving the statistical data collection in key line ministries. It is

hoped that the adoption and implementation of the Sierra Leone National Strategy for the Development of Statistics (NSDS) will be more successful than previous programs by placing data collection in these ministries at the center of the program to build statistical capacity.

For the Sierra Leone Government to successfully design and implement its results-based Poverty Reduction Strategy Programs (PRSP) and the Comprehensive Africa Agricultural Development Program (CAADP) being promoted by the New Partnership for African Development (NEPAD), an improved data collection and analysis system for agricultural and rural statistics is required. The NSDS together with new Global Strategy to Improve Agricultural and Rural Statistics will provide the impetus for these much needed improvements.

The objectives of this paper are to:
- identify the main agricultural issues and data needs;
- describe the current sources and institutional arrangements for collecting agricultural and rural statistics, including strengths and weaknesses;
- identify ways to make the process more efficient and effective; and
- make proposals for the harmonization of agricultural and rural data collection in Sierra Leone.

2.0 WHAT ARE THE MAIN AGRICULTURAL ISSUES AND DATA NEEDS

Sierra Leone belongs to the group of Least Developed Countries (LDC's) and is classed by FAO as a Low-Income Food Deficit Country (LIFDC). On the UN's Human Development Index (UNHDI), Sierra Leone was ranked 158 out of 169 countries in 2008(UNDP Report 2008). Its population is estimated at 5.8 million (2010) with an annual growth rate of 2.1% (2004 population and Housing Census). About two-thirds of the population lives in rural areas, of which about 70% are below the poverty line. Presently, in spite of the vast resource endowment, the country is considered as one of the poorest with a GDP per capita income estimated at about US$ 320 in 2010, which is less than it was in 1980 (in 2002 Sierra Leone emerged from an eleven year civil war which had devastating social and economic impacts).

Sierra Leone covers 72,300 km^2 of which 5.4 million hectares (74%) is potentially cultivatable land. The uplands agro-ecology represents approximately 80 percent of all arable land; this has low fertility and is suitable for a wide variety of food and cash crops. The rest are lowlands with better fertility status and the potential for high crop yields under sound management practices. This comprises 690,000 ha of inland valley swamps, 145,000 ha of naturally grassy drainage depressions (bolilands), 130,000 ha of riverain grassland and 20,000 ha of mangrove swamps.

Sierra Leone's economy is largely based on two sectors: agriculture and mining, though both sectors have been declining over the last two decades. Agriculture accounts for almost half of GDP (46% in 2008) and provides employment for about 75% of the economically active labour force (15-64 years) in the country (with women predominant). The crop sub-sector, with rice dominating, contributes about 75 percent of agricultural GDP. The annual per capita consumption of rice is amongst the highest in sub-Saharan Africa. It is estimated that domestic production of rice currently accounts for up to 60 percent of the total annual national requirement.

Table 1 Contribution of major Agricultural sub-sectors to GDP (%)

Sub-sector	2001	2002	2003	2004	2005	2006	2007	2008
Crops	25	29	28	30	32	32	31	32
Livestock	2	3	3	3	3	3	3	3
Forestry	6	5	5	4	4	4	4	3
Fishery	7	7	8	9	9	8	8	8
Agric's contrib. to GDP	40	44	44	46	48	47	46	46

Source: Statistics Sierra Leone

The fisheries sub-sector contributes 21 percent and livestock represents 4 percent of GDP. Fisheries are dominated by artisanal marine capture systems, and by small-scale fishing in inland waters. Foreign fleets mainly do industrial fishing. Total catch is currently estimated at 65,000 metric tons with artisanal production accounting for up to 70 percent.

The contribution of forestry to the agricultural sector's GDP has varied between 9 and 13 percent since 1984/85. Over 90 percent of the domestic energy needs for heating and cooking are provided by fuel wood. Fuel wood and charcoal production provides a supplementary source of income for most farmers. Uncontrolled logging practice has a negative impact on the remaining forest reserves.

Tree crops plantations, which are found mostly in the Eastern part of the country, constitute the bulk of agricultural exports and of the domestic palm oil supply. The main export crops are coffee, cocoa, kola nut and oil palm. Present yields are low because of lack of maintenance.

Mainly semi-nomadic herders in the Northern part of the country keep cattle. Birth rates of livestock are low, mortality high and off take is only 7 percent, due mainly to feed deficiencies and uncontrolled parasites and diseases. Poultry are the mostly widely owned form of livestock and also the most numerous. Pigs are the least widely owned but nevertheless they are widely distributed and many are found in urban areas. The country's livestock population has been very severely depleted during the conflict period and many years will be required to rebuild stock numbers to pre-war levels.

Ensuring food security has been the most important economic and political issue facing the country due to rapid population growth coupled with declines in average yields as in other SSA countries, limited use of modern inputs, expansion of production to marginal lands, and enormous soil degradation effects. Fluctuations in production are arise from migration effects - most young men move from agricultural areas in search of manual labour in gold and diamond mining - floods and pests attacks, and, in many cases, policy volatility has also contributed to food security problems.

Among the constraints faced by farmers, access to inputs is considered as a major hurdle preventing production increases. Improvement in terms of yields is also hampered by limited access to knowledge and technologies resulting from scarce extension services and training. Production is further constrained by the lack of storage facilities which generates high rates of post-harvest losses. Only 5 percent of farmers have access to proper storage. Value-addition is low in the absence of modern processing equipments and rural infrastructure constrains farmers' access to market. More broadly, farmers suffer from limited rural services, including financial services which prevent investments in modern inputs, as well as rural enterprises development. It is estimated that only 5 percent of the farmers have access

to rural financial services. Rural enterprises involved in agro-processing and input trading are predominantly informal and often do not respond to farmers' needs. Their products are of low quality and lack the necessary diversification to meet the limited needs of the low purchasing power of the rural community. Finally, most value chains are short and underdeveloped.

Despite these constraints, the potential for agriculture sector growth is substantial in Sierra Leone, given the favourable population/land ratio, abundant and diversified resources, and present low yields for almost all the crops (hence the potential for yield increase is great). In the light of the above, GoSL's draft policy statement sets out a framework for support to agriculture with the objectives of:
a)   Increased and diversified domestic production of food, with a view of achieving food security in the medium to long- term;
b)   Increased agricultural productivity, output, rural incomes and employment, while ensuring adequate protection of the environment
c)   Balanced regional agricultural growth and equitable distribution of income; and
d)   Maximized foreign exchange earnings from agriculture.

Since the start of the millennium, the government has set itself the challenge of implementing poverty reduction strategy programs (PRSP) and meeting the Millennium Development Goals (MDGs). This has increased the need for data to understand livelihood strategies and rural incomes (levels and sources) to identify the drivers which will move households out of poverty.

Similarly participation in the CAADP/NEPAD programme has increased both the level and the effectiveness of budget allocations to the agricultural sector with the need to evaluate the benefits and costs of different types of investments (not only direct investments in agriculture but also investments in roads, education, and health) and their impact on growth. Decentralization has also increased the demand for disaggregated agricultural statistics (i.e., those reflecting the crop and livestock production situation for Local Government) and for analytical capacity at the local council level.

To identify potential threats and respond to potential food shortfalls, the government of Sierra Leone needs access to reliable crop forecast estimates based on weather data and crop planting information, data on national and regional food stocks, and good estimates of prevailing consumption needs (including information on changing dietary patterns though this is not often considered).

3.0   WHAT ARE THE MAIN SOURCES OF INFORMATION FOR AGRICULTURAL POLICY MAKING?

The Ministry of Agriculture Forestry and Food Security (MAFFS) and Statistics Sierra Leone (SSL) are the main sources of official agricultural statistical information used by international organizations and the Government. However the Sierra Leone Agricultural Research Institute (SLARI) with the support of international research institutions, the University of Sierra Leone (specifically Njala University) and some international NGO's now provides vital agricultural information that are vetted by SSL to meet international standards. In particular MAFFS and SSL have been assisted by the universities and agricultural research institutes particularly with respect to analyses.

Arguments in favor of using central statistical offices, such as SSL, to collect agricultural statistics are that they use statistically rigorous procedures and professional enumeration staff and therefore get more accurate estimates by reducing sampling and non-sampling errors. On the other hand, the argument in favor of MAFFS is that they are closer to the users of the data they produced so they can better design the surveys to respond to their needs and more easily communicate the results.

MAFFS has the advantage regarding enumerators over SSL as the ministry has Extension, Monitoring and Evaluation officers in all the 14 administrative districts that are used as data collectors. SSL hires enumerators on contract for each survey activity. Despite the difference in personnel, experience has shown that it is the training and robust supervision that makes the difference to having an accurate and reliable data.

The allocation of analytical responsibility to MAFFS and participation of other analysts either from UN Agencies, who also serve as donors, and university research centers to support MAFFS had been the best approach to getting both quality of analysis and contributions to policy decisions.

However, it has been realized that housing agricultural statistics in SSL and MAFFS does not appear to be the key performance aspect, so much as how well functioning and well funded the chosen institution is. In general, the weaknesses observed in the agricultural statistics systems appear to be more of a function of inadequate budgets than institutional organization.

Since the inception of the National Statistical System in 2007, key line ministries have had Statistician based in these ministries. MAFFS is a key ministry that has SSL Staff being posted and this staffs' role is to give technical advice and also compile all agricultural data collected by MAFFS and send to SSL head office. Hence a symbol of having an harmonized data system for public consumption.

By design in Sierra Leone, agricultural statistics systems put more premium and resources into the production of data needed for food security analysis and estimates of agricultural GDP for the national accounts. This is usually associated with the fact that these are the areas the two key institutions (SSL and MAFFS) have personnel with at least some expertise while weak in the analysis of other agricultural data using sophistical software.

With collaboration becoming stronger, the MAFFS and those assigned SSL staff under the NSDS are expected to work closely with the WB, WFP and the Food and Agriculture Organization of the United Nations (FAO) and other national agencies to have a reliable and timely data collection plan for agriculture and rural statistics (e.g., the conduct of agricultural censuses and major food security assessment surveys). However, most of these strategic plans have been difficult to implement due to inadequate funding.

Efforts to collect household-level survey data permitting analyses of policies and investments conducive to agricultural productivity growth and poverty reduction in rural areas are very limited. In most cases the surveys are one-shot affairs covering limited geographic areas and they do not provide the type of panel data needed for longitudinal assessments of household incomes and livelihood strategies. The Sierra Leone Integrated Household Survey (SLIHS) was conducted by SSL in 2003/2004. This survey data has been used for all poverty analysis and was also used to provide information for the PRSP. However, panel data collection have not been incorporated into regular household surveys because of methodological challenges for analysis which requires advanced training and the ability to use advanced software to

analyze such dataset. This is lacking in both SSL and MAFFS institutions due to lack of trained personnel and funding problems.

However, with all the above shortcomings, the SLIHS 2010/2011 data collection is currently going on with SSL conducting the exercise which is now at its ninth cycle. This is a Living Standard Measurement Survey (LSMS) which includes a significant agricultural component.

The table below shows some major surveys that have links to agricultural data bases and the roles and relationships among the institutions involved in generating the data.. This shows a diversity of organizational approaches, methodological approaches and responsibilities for the collection of basic production and crop forecasting data.

Table 2: Collection of Agricultural data in Sierra Leone				
Type of Data	**Data collection process**	**Institutions Involved**	**Frequency**	**Survey description (information collected, sample selection)**
Agricultural Production (crops and livestock)	Sierra Leone Farm Production and Food Security (FPFS)	SSL/ WFP/ FAO/ MAFFS	2005, 2007, 2010	Household and plot-level production data, with additional information on land area and use, assets, inputs use, demographics, selected food security indicators, use of extension/services, income. Agricultural cropping methods, individual characteristics of smallholders, assets (including livestock holdings and agricultural production assets). Sample from 7000 to 9000 households; results representative at national, provincial and district levels and for five agro-ecological zones; also representative for each of the four regions (north, south east and west),
Population Census incl. questions on agriculture	Sierra Leone Population and Housing Census	SSL	1985, 2004	Official national census which serves as sampling frame for other surveys. 2004 Census included agricultural questions on acreage of various food and cash crops; number of livestock; access to agricultural production resources.
Living Standards Measurement Survey with consumption and agriculture module	Sierra Leone Integrated Household Survey	SSL	2003/04; 2011	The main objective of the SLIHS is to collect high quality, credible and objective data on population and socioeconomic characteristics of households, including income, consumption and expenditure for monitoring development performance. For the 2003/04 survey a total of 3,720 households were enumerated, stratified into urban and rural localities - as the sampling frame was based on the 1985 Census its reliability has been questioned - 66 Urban EAs (30%) and 160 Rural EAs (70%) were selected systematically with 20 urban households and 15 rural households randomly selected from a listing of households in each of the selected EAs.
Performance in sectoral service delivery including agriculture	Public Expenditure Tracking Survey (PETS)	MOFED	Half yearly	The PETS tracks all government expenditures in its line ministries and departments. It collects information from key social and economic sectors ranging from education to expenditure of agriculture and the environment. The PETS targets almost all districts, local councils etc. This information is been processed and analyzed by the EPRU of the MOFED and thus inform the government on the way forward.
Food Security	WFP Vulnerability Survey	WFP	2005, 2007, 2010	The overall objective of this survey is to provide broad and up-to-date baseline information on food production and household food security for the implementation of the Sierra Leone PRSP. The principal aspects covered by the study are local farm

				production, trading of food in rural areas, access of rural households to food, utilisation of food at the household level including nutrition and health aspects, and vulnerability of the rural population to the various facets of food insecurity. The survey used a two-stage cluster sampling design with probability proportional to size (PPS) sampling at the first stage.
Economic Surveys including agribusiness	Census of Businesses	SSL (ESD)	2005	These Censuses and surveys are directed mainly towards the collection of data required for assessing the contribution of the business sector to the GDP of the country, as well as for meeting planning and policy formulation needs. The Census of Business Establishments, 2005 focused on all urban settlements in the 14 Administrative Districts of the country, in all, 138 localities. Establishment covered were only those business entities operating out of business premises visible to the interviewers during the enumeration process, that is, permanent structures (defined as a structure with walls and roof such a shop, supermarket, store, pharmacy, garage, workshop, or a factory) were included. This excludes all mobile roadside/street traders with no fixed location and business activities carried out in street markets or from dwelling without visible identification.
	Annual Economic Survey	SSL(Economic Statistics Division)	2009	The Survey provides annual estimates for the compilation of national accounts aggregates such as the GDP, as well as for analyzing the structure and performance of the business sector in Sierra Leone. Data was collected on a variety of issues such as employment, operating expenses including payroll and fringe benefits; non-operating expenses, sales revenue; capital expenditure and business environment.The survey covers employment, turnover, wage bill, and operating surpluses. The survey covered business establishments operating in the Four Regional Cities of Freetown, Bo, Kenema and Makeni. (over 65% of businesses operating in this country
	Business Confidence Survey			The Sierra Leone Business Confidence survey obtains qualitative information to monitoring the current and future business situation and forecast short-term developments in the economy. The survey samples 40 establishments in each of 4 sectors - Construction, Industry (represented by Manufacturing and Mining), Wholesale and Retail Trade, Other Services

				(Tourism, Banking, Insurance, Transport and Communication).
Light monitoring survey with agriculture module	CWIQ Survey	SSL	2007	The overall objective of the Sierra Leone CWIQ survey, 2007 was to provide timely information for monitoring the implementation of the Sierra Leone Poverty Reduction Strategy. The survey instrument included the modified generic scannable CWIQ questionnaire; with an agricultural module collecting information on production, cultivation and marketing activities for a small number of major food and cash crops The sample consisted of 520 Enumeration Areas (E.A.s) covering rural and urban areas across all Local Councils. Fifteen households were sampled in each EA and resulting in an overall sample of 7,800 households.
Nutritional Status of Women & Children	Demographic and Health Survey(DHS)	SSL	2008	The 2008 Sierra Leone Demographic and Health Survey (SLDHS) was a nationally representative sample survey designed to provide information on population and health issues in Sierra Leone. The SLDHS includes information collected on nutritional status of women and young children,. The 2008 SLDHS was carried out from late April 2008 to late June 2008, using a nationally representative sample of 7,758 households (353 clusters selected by pps from a list of all enumeration areas and 22 households were then systematically selected from a complete listing of all households carried out in each selected cluster).
Production and Market Information	Agricultural Tracking Survey(including market survey)	SSL, MAFFS & JPAL/IPA	2010	The ATS focused on a subset of eight "core crops" comprised of five food crops (rice, cassava, maize, groundnut and sweet potato) and three tree cash crops (cacao, coffee and palm oil). In addition, some basic data on cultivation was collected across all crops, including revenue, access to seeds from the formal sector and other aspects of agriculture to track whether subsistence farmers are becoming more commercial over time. The marketing module also dealt with markets and products (both domestic and imported); producer, consumer, and wholesale prices and available; transport costs for key commodity transport routes The ATS follows a standard two-level sampling methodology for a total sample of 9,030 households.
Production, adoption and	Adoption and dissemination of	SSL, MAFFS &	2009	A monitoring survey in targeted project communities to estimate the proportion of household that have access to NERICA seed varieties and planting materials; proportion

dissemination of NERICA (New Rice for Africa)	NERICA survey in Sierra Leone, 2009	JPAL/IPA		of unexposed farmers that would adopt NERICA if exposed to it; proportion of NERICA farmers that used inorganic fertilizers; total NERICA production per unit land area; total number and type of NERICA varieties grown; and the main problems encountered. Sampling followed the standard 2 stage design restricted to targeted project areas.
Market prices	CPI Survey	SSL	Monthly	Prices are collected for 251 items from six (6) markets in the Greater Freetown area, three (3) Markets in Bo Town, three (3) markets in Kenema Town and two (2) markets in Makeni Town for weekly prices and other outlets for monthly items whose prices are less likely to fluctuate rapidly. The National Index is computed by aggregating the CPI for the four index towns (using Classification of Individual Consumption by Purpose (COICOP) and traditional Laspeyres methodology).
Production	Report on 2009 Real Gross Domestic Product (RGDP) Estimates of Sierra Leone	National Accounts Section (ESD)	Annually	GDP figures are estimated from the following sources: administrative data received from institutions, surveys conducted by other institutions and the annual National Accounts Survey conducted by Statistics Sierra Leone to complement the sources mentioned. GDP figures are computed by Statistics Sierra Leone using the standard 1993 system of National Accounts (SNA93) methodology. The base year was recently revised from 1990 to 2001 to ensure that the estimates do not only comply with current international standards but also satisfy the ECOWAS statistical harmonization system of reporting by member states. In order to enhance comparability over the years the prices of a single year, known as the base year (2001), are used to compute the GDP for all other years, which produces the Real/Constant Gross Domestic Product (RGDP).
Imports & Exports of agricultural products	Foreign trade statistics data collection (incl. export).	NRA, SSL & Bank of Sierra Leone.	Agriculture and Non-agric. Collected on monthly bases.	Initially data collected from Bills of Entry form/batches from NRA(Customs). These data were coded and data capture by data entry operators. The data is then edited by Statisticians using excel. This will be sent to the Eurotrace DBMS Database management system and extraction done using the COMEXTbrouser standalone. Data is now collected electronically using ASCYCUDA ++ at customs (NRA). This data in turn is sent to the Eurotrace for managing and processing the data. A EUROTRACE is an automated system with three partitions namely (1) EUROTRACE DBMS (2) COMEXT and (3) Editor.

3.1 What are the strengths and weaknesses of what is provided?

A major weakness given the recent push toward crop and animal production and income diversification in Sierra Leone is the lack of accurate data on the production, consumption, and trade of processed and fresh crop products, fish and livestock. Weakness in these data also has serious implications for estimates of food security. Despite ample evidence that the food dietary needs are diversifying away from the almost exclusive reliance on staple cereals and tubers of the past, analysts continued to ignore the role played by horticultural/vegetable production, fish, and livestock products in food security estimates.

Information on fishing for the National Accounts tends to come from technical reports compiled by the Ministry of Fisheries and Marine Resource and information on livestock services from the Livestock Commission rather than using the results in sample surveys conducted by MAFFS and SSL. However, efforts to include some information on these sectors in the crop production or other national surveys have now been put in place. According to SLIHS 2007 Report, a total fish catch as obtained from the 2003/2004 survey was estimated at 1,332,759 which were far above the total fish production and export for 2003 and 2004 reported by the Ministry of Fisheries and Marine Resources. The same SLIHS 2007 report also reported that a total estimated number of 4,372,794 livestock were obtained from the 2003/2004 survey. Hence there are variances amongst surveys.

Table 3: Ministry of Fisheries and Marine Resource and Livestock Commission data together with the survey results.

Table 3a: Fishery (Production and Export) – 2000 to 2007								
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Shrimp	1505	1277	1119	1541	1445	1378	1354	1373
Industrial Fishery	12694	21321	12602	15624	12786	14419	12288	17240
Artisanal Fishery	45910	39950	55659	65458	106216	116614	120490	111937
Total	**60255**	**62548**	**69254**	**82623**	**120453**	**132411**	**134135**	**130550**

Source: Fisheries and Marine Resources

Year	Table 3b: Livestock Type and Number of Heads- 2001-2010							
	CATTLE	**SHEEP**	**GOATS**	**CHICKEN**	**DUCKS**	**RABBITS**	**PIGS**	**Total**
2001	109,020	131,280	153,540	1,363,750	127,500	1,938	7,525	1,894,553
2002	130,824	157,536	184,248	1,704,688	159,375	2,422	9,406	2,348,499
2003	156,989	189,043	221,098	2,130,859	199,219	3,027	11,758	2,911,993
2004	188,387	226,852	265,317	2,663,574	249,023	3,784	14,697	**3,611,634**
2005	226,064	272,222	318,381	3,329,468	311,279	4,730	18,372	4,480,516
2006	271,277	326,667	382,057	4,161,835	389,099	5,913	22,964	5,559,812
2007	325,532	392,000	458,468	5,202,293	486,374	7,391	28,706	6,900,764
2008	390,638	470,400	550,162	6,502,867	607,967	9,239	35,882	8,567,155
2009	470,000	620,000	730,000	8,600,000	729,560	11,087	43,058	11,203,705
2010	517,000	682,000	803,000	9,460,000	802,516	12,196	47,364	12,324,076

Source: PEMSD Note: 2009 figures are projections

Production statistics has been dominant for rice than any other food crop reason being that it is the staple food for Sierra Leoneans whilst other crops like cassava, maize groundnut etc has been used as supplement to rice nevertheless their cash earning capabilities.

However, production statistics for some of the basic horticultural/vegetable crops (pepper, onions, tomatoes, mangos, bananas etc) are also being reported though measurement errors are high. The 2010 ATS survey attempted to remedy these shortfalls by incorporating almost all of these important aspects of food and vegetable crops (ATS Final report 2011). Whilst the table below compiled by PESMD showed an estimated 1.87 metric tons per hectare, the ATS 2011 report obtained 0.5 Metric Tons per Hectare of rice produced annually. Hence, the two results showed a huge variance in yield for rice.

Table 4: Rice production estimates from surveys and MAFFS data (2001 – 2010)

Year	Area (Ha)	Yield (Mt/Ha)	Production (Mt)	Milled Equivalent (Mt)	Population	National Requirement (Mt Milled)	Self-Sufficiency (%)
2001	258,850	1.20	310,620	186,372	4,725,033	491,403	37.93
2002	343,142	1.23	422,065	253,239	4,814,808	500,740	50.57
2003	356,506	1.25	445,633	267,380	4,906,290	510,254	52.40
2004	426,772	1.27	542,000	325,200	4,999,509	519,949	62.54
2005	427,907	1.29	552,000	331,200	5,094,500	529,828	62.51
2006	422,556	1.33	562,000	337,200	5,216,890	542,557	62.15
2007	432,356	1.36	588,004	352,802	5,343,200	555,693	63.49
2008	475,592	1.43	680,097	408,058	5,473,530	569,247	71.68
2009	499,111	1.78	888,417	533,050	5,607,930	583,225	91.40
2010	549,022	1.87	1,026,671	616,003	5,746,800	597,667	103.07

Source: PEMSD, MAFFS
- Note: Milled recovery = 60%
- Population growth rate at 1.9% using 2004 population as baseline
- Per caput consumption = 104 kg per person per annual

There are often incompatible differences between production estimated from harvest data and production estimated from household and consumption. Since the industry sector is not well develop in Sierra Leone, household consumption data collected during living standards measurement surveys (LSMS) are used as an estimate of domestic production of key crops to help establish a baseline for national accounts estimates but this method is limited as the infrequent conduct of the LSMS does not permit annual monitoring of trends. Also, research has proved that it will also over-estimate production if there are unrecorded imports of the food crops.

There are both methodological and funding issues involved in collecting better data on these sectors. There is now a matter of urgency to conduct an Agricultural Census as it has taken decades without undertaking such an activity. Agricultural Censuses data are the most

paramount amongst all data needed to help analyst in analyzing key economic and policy issues.

4.   DISCUSSION

SSL was established as an autonomous agency in 2002 and since then there has been good collaboration between the SSL and MAFFS in collecting agricultural data. Though the roles of each institution remain constant, SSL has had a lead role over MAFFS in terms of data management and capacity building. This was implemented over time and included a substantial investment (funded by the IMF and the WB) in capacity building at SSL and assistance from FAO and WFP in training MAFFS staff to ensure a smooth transition.

Through the years, MAFFS, SSL and other institutions have depended heavily on donor projects to develop and implement surveys, as well as to analyze agricultural statistics, such that internal capacity for survey analysis still needs to be developed. MAFFS has the capacity in terms of manpower as they have agricultural staff and field data collectors but lack the requisite training to accurately collect these needed data. SSL on the other hand has technical staffs that are capable of handling such surveys but their effort is derailed with lack of funds to carryout these activities. There is a strong sense that the agricultural survey work should be based in MAFFS as the NSDS has adopted the move to place SSL staff in key ministries. This is to strengthen the system of survey management and analysis of complex agricultural data within MAFFS Linkages between these two institutions have been strengthened through the NSDS process, which has established collaboration amongst the key statistics providers to ensure user and stakeholder input into the survey planning and result reporting processes. Hence with the implementation of the NSDS, there is no duplication of effort in the basic activities as currently designed and implemented.

One of the key questions is the relationship between the MAFFS-based agricultural surveys and the Integrated Living Condition Survey (LSMS), conducted by SSL, for production estimates. The collection of production and living standard measurement survey data are based on clustered, stratified sampling designs. Statistics Sierra Leone uses its national sampling frame based on scientific sampling methodologies without biases to select a nationally representative sample. On the other hand crop forecasting (projections) figures are based on non-scientific methodologies (mostly purposive sampling methodologies are used) and are seen as problematic in the eyes of international agencies like IMF and World Bank (regarded as not transparent) and yet they have formed the basis for crop production estimates in the National Accounts and are used in key policy decisions.

MAFFS manages the Early Warning System Network (EWS NET) with support from FAO and other international agencies to produce seasonal crop assessments, though Sierra Leone has not had the adverse effect of drought conditions as in other African countries. On the average, the country is a rain fed country with high amount of rainfall to many types of crops within the cropping season. During the crop assessment missions, there are documented systems for using crop cuts to estimate yields, but not all crops lend themselves to crop cutting, and it is not clear that crop cutting is always executed during these missions. Generally, missions talk to local officials and extension agents to assess the state of crop development.

SSL on the other hand have not been involved in annual agricultural data collection. Since the 2004 Population and Housing Census, a number of agricultural modules have been integrated

into some major surveys like the CWIQ and other living standard surveys. However, a more robust Agricultural Tracking Survey (ATS) was conducted in 2010 which took into account the production and sales aspect of major crops including key staple food, cash and vegetable crops. The ATS followed a two-level sampling methodology, which is the standard for household level surveys. First, 920 Enumeration Areas (EAs) were sampled for the ATS out of the 9,671 EAs from the 2004 census. The sampling was stratified by district so to ensure survey representativeness at this level. Second, within each sampled EA, a sample of up to 10 agricultural households was drawn using information collected during the ATS Listing Exercise, conducted in October and November 2009. The total target sample size for the ATS Survey was 9,030 agricultural households. For each EA, 5 additional replacement households were also drawn. Hence depending on the nature of surveys conducted by SSL, scientific procedures are always followed to meet international standards.

As examined in detail by the IMF, WB and other international organizations the differing methods result in differing production estimates and living standard measurement figures. Clearly for production data collected by MAFFS, there are issues with the methods used and a shortfall in research methodology to reach international standards.

As in other countries, the crop forecasting (projection) data are available before any other data as is usually done in the office, and thus is more timely. The problems come in when they are used as the final crop production statistics and thus mostly not comparatively reliable for some key crops involved. The variability in data quality makes it difficult for all users to know which information that is reliable.

The system is undergoing changes now. The key data users for instance, WFP and FAO are keen on the main research institutions having a harmonized data set for public consumption. Key in this is the discussion about the relative value of using living standard condition surveys and rural sector survey data for final production estimates. There has been a proposal to develop a Management Information System (MIS) within key ministries. These institutions are expected to work directly with the NSDS office whose desk is at SSL. NSDS works well in a coordinating role for some aspects and more directly as an agent in surveys implementation and a lobbyist secretariat with latest survey activities. The arrangement is such that international agencies and other data users could now have access to demographic, economic and social statistics data through the NSDS office.

There are also enormous funding issues. As initially proposed, the World Bank through DFID was to initially fund the start of the NSDS following its acceptance by both government and donor partners and Agencies. However there has been no funding from the above mentioned institutions. As proposed in the NSDS, the agricultural sector needs a census of agriculture which has not been conducted for the past decades. This highly informed data needs a huge fund for its operations. The price collection system especially farm gate prices, while not costly, has not been operating recently by MAFFS due to a funding gap. SSL collects CPI data in the main towns which is used as a proxy to represent the national CPI. Where funds are available, CPI data are expected to be collected in all districts and large headquarter towns but due to funding gap, the collection of these data is only done in main towns. The dependence on donor funding is high, as with funding from the government for agricultural surveys and from several donors for the living measurement survey are oddly low. A crop cutting exercise for production estimates which tends to be more reliable and scientific is very expensive and thus relies on external funding.

5.0   HOW COULD THINGS BE IMPROVED?

The FAO's assessment over the years noted a need for developing linkages between the suppliers and users of agricultural data. This needs a variety of efforts to establish coordinating committees of which many are in connection with particular projects recommended by FAO, WFP or the WB. As evidenced by most government functionaries, most of these committees do not perform as expected. They meet infrequently and they tend to act as rubber-stamps, and their responsibilities are not clearly defined and their activities may overlap with those of other institutions. A problem with some of these committees is that in an effort to be all-inclusive (e.g., including representatives of civil society from women's and youth groups) many committee members lack the competence to discuss surveys and statistical issues being presented for approval. The second outmost problem is that many of those who are at the helm of things in these committees are not knowledgeable in survey implementation processes. Although these committees do not always function well, it is clear that there is a need for strong inter-institutional coordination. Improvements in these areas contribute to making the collection and analysis of agricultural statistics more demand-driven. As the systems become more responsive to user needs, they will eventually build the stakeholder support needed to obtain reliable support from the government budget. More thought needs to go into the design of the various committees and the assignment of responsibilities. Perhaps more and smaller committees with narrowly defined roles rather than large committees that meet once or twice a year and are expected to fulfill all the coordinating needs of the various actors and stakeholders which they cannot meet.

As stated earlier, MAFFS, SLARI, the Ministry of Fisheries and Marine Resources and NGO'S dealing with agricultural issues have been key stakeholders in the collection and dissemination of agricultural data. However, SSL by its statutory mandate vets all statistical data obtained from these actors. There has not been a formidable coordinating body recognized as a stand out coordinating body for agricultural statistics. However, the NSDS expressed the need for such body as is expected that this body will be set up soon although indirectly there has been enormous collaborative efforts between these institutions. For instance, SSL has in the past years working with MAFFS, WFP, FAO and other NGO's interested in agricultural information and has been very successful. MAFFS has been working collaboratively with the Ministry of Fisheries and Marine Resources on fish and other marine resources data. This data in turn will now reach SSL through the SSL Staff assigned to MAFFS. Thus a semblance of indirect collaboration is ongoing.

Both SSL and MAFFS (or both working collaboratively) have demonstrated the ability to produce the necessary statistics when there is an adequate budget to conduct an agricultural survey and staff for the assignment. Close studies on the improvement of statistical institutions in the past years have pointed out that the two greatest challenges facing these two institutions are getting the right mix of expertise among the staff of whatever institution is charged with a particular task and obtaining an adequate budget for the implementation and conduct of agricultural research. To collect and report reliable agricultural statistics, one needs a combination of statistical and subject matter expertise. This can be obtained by having SSL organized by subject matter areas (which is in existence) and either hiring a mix of statistical and subject matter expertise and/or offering further subject matter training to statisticians operating at all levels of the system. Achieving such goal can also be obtained by giving the task to MAFFS and improving the statistical capacity of their staff e.g. by posting statisticians from the statistics office to the ministry – this is the way we have chosen to go in Sierra Leone (a key component in the NSDS document). A third option is concentrating

statistical expertise at SSL and subject matter expertise in the MAFFS while developing collaborative protocols to make sure that the appropriate mix of skills is available for the various tasks (e.g., more agricultural skills for training interviewers to measure variables correctly and to identify data points that do not make agronomic sense; more statistical skills for designing the sampling frame and weights and conducting statistical analyses). In the latter case, better collaboration will probably occur if the staff of each institution has some training in both subject matter and statistical topics.

There is a need for capacity building among those producing the data and analyses as well as among the intended users (e.g., donors, policy makers), as indicated earlier. As a key constrain, both SSL and MAFFS are understaffed, under-funded for operational activities, and underpaid, causing good personnel leave for better paying jobs, hence a recipe for high staff turnover in these two institutions. The result can be unmotivated staff without the skills to deal with complicated sampling issues. SSL with the development of the NSDS have often developed staffing plans that include the upgrading of skills for existing personnel and hiring new personnel but these have not been fruitful due to lack of funds to carryout robust training for staff. Reality is yet to come by as only few of these plans have received the funding necessary for implementation (see proposed SLNSDS 2008-2012 final report). Sierra Leone operates through a decentralized system so that development can be felt at the local level. As decentralization efforts have spread, the need for statistically skilled personnel at the decentralized level has increased tremendously.

In addition to the problems of capacity building among staff responsible for the collection and analysis of agricultural data in SL, a major constraint to increasing use of and confidence in statistical data on agriculture is a weak understanding among agricultural policy makers of how sampling works (how the results differ from non-sampling approaches) and how to interpret survey results. This problem is exacerbated in some cases when sampling and or weighting problems produce questionable results and the source of the problem is not understood by users especially agencies like FAO, WB, WFP etc. This portrays a need for developing an appreciated statistical method among the potential users of the data as well as the need to resolve sampling and weighting problems rapidly so that these data users do not lose confidence in what is available for them.

Funding has been far from adequate to cover the improvements being sought in both SSL and MAFFS. Funding for most statistical efforts is a combination of donor and national resources. SSL is a semi − autonomous institution as the government pays salaries of staff but the institution operates independently. The activities of the institution are mostly donor funded. Donors tend to support capacity building and efforts to improve data collection methods and also fund vital surveys while the government also supports the costs of implementing surveys that lacks support from donor but are very important to the government. In recent years, this has meant numerous studies, strategies and trials to improve statistics on the agriculture sector but funds have not been coming on regular basis. There can also be a problem with the late funding of projects, e.g. when this leads to delays in the collection of production data immediately after the harvest season and the consequence is that unreliable data in terms of food security data will be captured.

6.0   CONCLUSIONS

The study has identified many areas that need continued improvement. In general, the weaknesses observed in the agricultural statistics systems appear to be more a function of inadequate budgets than institutional organization (arrangements).

Progress has been made in terms of the timeliness and the reliability of the annual crop and livestock production statistics by MAFFS although there are still major problems regarding sampling and measurement in some cases which reflect a lack of knowledge and appreciation of statistical techniques such as sampling amongst data users. Crop forecasting and food security assessments are also improved, but continue to exhibit some problems with conflicting methods and results due to inadequate coordination between SSL and MAFFS.

Market information systems are growing but still weak. In terms of monitoring economic growth and poverty indicators for the PRSP, the agricultural sector appears to be performing better than other sectors in terms of basic reporting though the appropriateness of the agriculture and environment indicators being monitored has been questioned, however, due to the limited number of indicators and a poor understanding of the relationship between poverty and the indicators being used.

A key weakness in the statistical system is the ability to respond to the demand for more disaggregated data (e.g., smaller administrative districts and for target groups of interest such as women and youth). Another weakness is the inability to produce reliable statistics on the increasingly wide range of agricultural production activities that generate income for rural households (e.g., livestock and other agricultural products).

The conduct of supplementary surveys dealing with particular issues of relevance to the agricultural sector (e.g., HIV/AIDS, links between agricultural productivity growth and poverty reduction) is still at its infantry stage that cannot inform key policy issues. This lack of analysis spreads across the entire agricultural statistical system, calling to question the relevance of these statistics to the policy process. Poor understanding of statistical methods and the benefits of sampling versus informal surveys on the part of decision makers is still a weakness in Sierra Leone.

In moving forward, the most critical institutional problem is the inability to mobilize funds to build and maintain capacity and to conduct a larger and more complex data collection and analysis requested by stakeholders in the agricultural statistics system. Instead of focusing on questions about which institutions (e.g., SSL, MAFFS and other agriculture related institutions) deliver better in terms of statistical services, there is need to develop a joint strategy among all the actors in the agricultural statistics system to fund (i) the collection of basic data, document it, and issue annual reports of descriptive statistics and (ii) the policy analysis that adds value to the foundation data through supplementary analyses and/or surveys.

To the extent that stakeholders are asking for the expansion of foundation data to include new products and new levels of disaggregation, it will be expected that they also contribute to the increased funding needed to accomplish these goals. From experience, the institutions that does policy analysis and supplemental survey work are numerous as well as those institutions building foundation data bases but to date, there are only few examples of successful collaboration among these institutions in the regular production of policy relevant analyses

and reports. Most efforts in this area have been through donor-funded projects that have failed to develop independent funding mechanisms. It is our view that the SSL and MAFFS should not be expected to be the only actors conducting policy analysis. The primary role of these two institutions should be making sure that there is a reliable set of basic agricultural data available and well enough documented for others to use.

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