



European
Commission

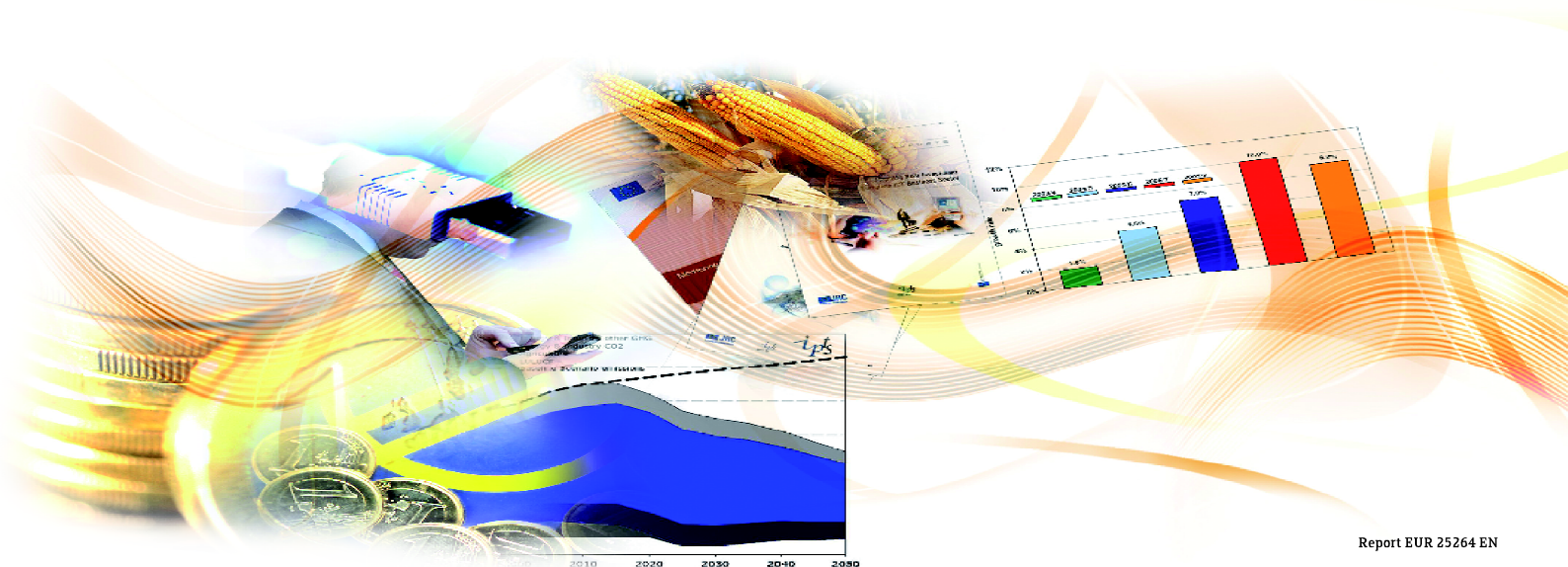
JRC SCIENTIFIC AND POLICY REPORTS

Rural poverty reduction and food security: The case of smallholders in Sierra Leone

Authors

Sergio Gomez y Paloma, Szvetlana Acs,
Silvia Saravia Matus, Alpha Lakoh,
Baudouin Michel, Gisele Hites,
Frank Sammeth

2012



Report EUR 25264 EN

Joint
Research
Centre

European Commission
Joint Research Centre
Institute for Prospective Technological Studies

Contact information

Address: Edificio Expo. c/ Inca Garcilaso, 3. E-41092 Seville (Spain)
E-mail: jrc-ipts-secretariat@ec.europa.eu
Tel.: +34 954488318
Fax: +34 954488300

<http://ipts.jrc.ec.europa.eu/>
<http://www.jrc.ec.europa.eu/>

This publication is a Reference Report by the Joint Research Centre of the European Commission.

Legal Notice

Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this publication.

Europe Direct is a service to help you find answers to your questions about the European Union
Freephone number (*): 00 800 6 7 8 9 10 11

(*) Certain mobile telephone operators do not allow access to 00 800 numbers or these calls may be billed.

A great deal of additional information on the European Union is available on the Internet.
It can be accessed through the Europa server <http://europa.eu/>.

JRC 68518
EUR 25264 EN

ISBN 978-92-79-23548-1 (pdf)
ISBN 978-92-79-23547-4 (print)
ISSN 1831-9424 (pdf)
ISSN 1018-5593 (print)
doi:10.2791/76571

Luxembourg: Publications Office of the European Union, 2012
Rome: Food and Agriculture Organization of the United Nations

© European Union, 2012
Reproduction is authorised provided the source is acknowledged.

Printed in Spain

Rural poverty reduction and food security: The case of smallholders in Sierra Leone

Authors:

Sergio Gomez y Paloma, Szvetlana Acs, Silvia Saravia Matus, Alpha Lakoh, Baudouin Michel, Gisele Hites, Frank Sammeth

2012

■ Acknowledgments

This study is based on ideas developed at the Sustainable Agriculture (SUSTAG) action of DG JRC IPTS'AGRILIFE Unit. It has been carried out by a network of researchers coordinated by Sergio Gomez y Paloma (JRC – IPTS), Baudouin Michel (Gembloux University and EARTH – GEDIF Belgium) and Alpha Lakoh (Njala University, Freetown Sierra Leone) who coordinated the collection of primary data.

The authors are grateful for the help, support and useful comments received from many people during the different stages of the project and the validation of the field data. First, thanks go to the six hundred and fifty nine rural small-holders living in various villages of the following districts: Kono, Kenema Kailahun, Tonkolili and Bombali for the crucial information provided. A special mention goes to the following European Commission officers (their affiliation refer to the year 2010): Willem Olthof, David Radcliffe, Philippe Steinmetz and Paolo Sarfatti (DG Development); Leonard Mizzi and Claudia Wulz (DG Agriculture); Beth Masterson and Didier Nils (DG AIDCO); and Paolo Roggeri (DG JRC), who have contributed to the general setting of the project - including the selection of Sierra Leone as study area - and provided valuable comments to previous versions of this report and supported the implementation of the project during all stages. Likewise, The Delegation of the European Commission in Sierra Leone: Marc De Bruycker (Head of the Delegation), Mr Matthias Reusing (Head of the Rural Development Section), Georges Dehoux (Food Security Officer), who provided key insights about ongoing EU aid programmes and Mr Paolo Girlando, coordinator for the use of STABEX funds (USTP: Use of STABEX Transfers Project), who offered relevant information about the funds' utilisation.

We would further like to thank Mr Mohamed Ajuba Sheriff, Sierra Leone's Assistant Director of Agricultural Statistics of the Ministry of Agriculture, Forestry and Food Security who provided us with guidance about data availability and quality. Mrs Diana Tempelman (Senior Gender & Development Officer) and Mr Kevin Gallagher (Senior Food Security Development Officer) FAO representatives, as well as Mr Housainou Taal, WFP Deputy Country Director and Ms Miyuki Yamashita and Marit Fikke from the World Food Programme for sharing useful information about the current food security situation in Sierra Leone.

During the field validation, Mr Tennyson Williams and Mr. Patrick Sawyer (ActionAid), and Mr. Franz Moestl and Joachim Ballweg (Welthungerhilfe), kindly introduced us to aid implementation sites and informed us about the situation at ground level. Additionally, we would like to thank Mr Doriane Desclee and Mrs Emilie Vautravers (EARTH consultants), who have kindly assisted during the project implementation and validation of the results on the field. We would also like to express our gratitude to those responsible for organising the households' interview process and data collection in the different locations of Sierra Leone.

Also researchers from various institutions contributed to the analytical review of the contents of this report, including Guillermo Filchman and Hatem Belhouchette (Institut Agronomique Méditerranéen de Montpellier IAMM) and Kamel Louhichi (INRA- UMR Economie Publique).

Finally we would like to thank the following staff members of the Institute of Prospective Technological Studies (DG Joint Research Centre - European Commission): Jacques Delincé, Geertrui Louwagie and Stephen Langrell for valuable comments, Monika Schmidt for formatting support and Adriana Cristoiu for contributing to the scientific and conceptual preparation of the project.

■ Table of Contents

Acknowledgments	2
Executive Summary	13
1 Introduction	17
2 Description of the Context in Sierra Leone	21
2.1 General Context	21
2.2 Population	22
2.3 Health	24
2.4 Education	25
2.5 Macroeconomics	25
2.6 Labour	27
2.7 Major Sectors	27
3 The Agricultural Sector	31
3.1 Agriculture in the Economy	31
3.1.1 Crop Production	33
3.1.2 Livestock, Fishery and Forestry	38
3.2 Agro-Ecologies, Agricultural Production and Agrarian System	40
3.3 Chiefdoms & Farm Households: Institutional and Technical aspects	48
3.3.1 Land Tenure	48
3.3.2 Social Structure. Traditional Chieftaincy Structure and Role of the Paramount Chief	49
3.3.3 Household and Division of Labour	51
3.3.4 Production at the Farm Household Level	51
3.4 Agriculture - Related Governmental Policies in Post War Sierra Leone	54
3.4.1 Development policies	54
3.4.2 Agricultural taxation and tariff policies	56
3.4.3 Rice: Government support and intervention	57
3.5 Sector Constraints and Challenges	57
3.5.1 Poverty & Food Insecurity	58
3.5.2 Crop production constraints	59
3.5.3 Concluding remarks	66

4	EU Support Programmes for Rice and Tree Crop Production (STABEX)	67
4.1	<i>Objectives of the STABEX funded programmes and priority issues</i>	68
4.1.1	<i>Support to food crop production: rice</i>	68
4.1.2	<i>Support to cash crop production: cocoa and coffee</i>	68
4.2	<i>Initial Achievements of STABEX programmes</i>	69
4.2.1	<i>Rice</i>	69
4.2.2	<i>Cocoa and coffee</i>	70
5	Survey Methodology	73
5.1	<i>Study Area</i>	73
5.1.1	<i>Sample Size and Selection</i>	74
5.1.2	<i>Data Collection</i>	75
5.2	<i>Data Analysis and Presentation of Results</i>	76
5.2.1	<i>Calculation of economic performance</i>	77
5.2.2	<i>Input factor productivity of smallholders</i>	85
6	Survey Results	87
6.1	<i>Characterisation of smallholders</i>	87
6.1.1	<i>Household demography</i>	87
6.1.2	<i>Main activities and income sources</i>	89
6.1.3	<i>Crop Allocation and Farm Production of smallholders</i>	90
6.1.4	<i>Resources of smallholders</i>	92
6.1.5	<i>Infrastructure and communication</i>	97
6.1.6	<i>Community leadership and social participation</i>	98
6.2	<i>Evaluation of the economic performance and viability of smallholders</i>	101
6.2.1	<i>Farm typology</i>	101
6.2.2	<i>Economic viability of smallholders</i>	118
6.3	<i>Input factor productivity of smallholders</i>	125
6.3.1	<i>Land productivity</i>	125
6.3.2	<i>Labour productivity</i>	128
6.4	<i>Evaluation of the influence of the support provided</i>	135
6.4.1	<i>Relevance</i>	137
6.4.2	<i>Effectiveness</i>	142
6.4.3	<i>Impact</i>	144
6.4.4	<i>Sustainability</i>	146
6.4.5	<i>General Improvement in the Community Area</i>	147
6.4.6	<i>Non-Supported Farmers</i>	148

7	Conclusions	157
7.1	<i>Surveyed Smallholders, Agrarian System and Institutional Background</i>	157
7.2	<i>Income Calculation, Poverty Level and Productivity Analysis</i>	159
7.3	<i>Main Achievements of STABEX – funded projects</i>	161
7.4	<i>Insights for Technical Assistance</i>	163
7.5	<i>Methodological Lessons and Insights for further Analysis</i>	165
8	References	167
9	Appendices	175
	<i>Appendix I. Questionnaire A</i>	175
	<i>Appendix II. Questionnaire B</i>	187
	<i>Appendix III. Farm types</i>	193
	<i>Appendix IV. Combined productivity per working unit for rice, cocoa and coffee per district</i>	197
	<i>Appendix V. Price of main crops and wage per district in Sierra Leone</i>	203

List of Tables

Table 1.	<i>Distribution of farming population by region and vulnerability level</i>	23
Table 2.	<i>Sierra Leone Health Indicators</i>	24
Table 3.	<i>Employed labour force by sector and sex (%)</i>	28
Table 4.	<i>Sectorial contributions to GDP (in % GDP)</i>	28
Table 5.	<i>National Rice Production and Self-sufficiency (1997 – 2008) - Sierra Leone</i>	35
Table 6.	<i>Livestock (heads) per major category in selected countries of Western Africa (2008)</i>	38
Table 7.	<i>Agro-Ecological Regions in Sierra Leone</i>	41
Table 8.	<i>Total arable land per agricultural area in Sierra Leone (2001) & Annual average of area under production per agricultural area</i>	45
Table 9.	<i>Yield of Major Crops in Sierra Leone (2008)</i>	52
Table 10.	<i>Crop yield level in West Africa, rainfed (2000 – 2004 average, ton/ha)</i>	53
Table 11.	<i>Average annual consumption per household by district (in Leones)</i>	58
Table 12.	<i>Food production targets and achievements (2005 – 2007)</i>	59
Table 13.	<i>Use of seeds by households in 2003/2004 (% of households per different supply channel used)</i>	61
Table 14.	<i>National Requirement for Machinery and Agrochemicals 2009 – 2012</i>	62
Table 15.	<i>Price of Local vs. Imported Rice in Sierra Leone per 50kg Bag</i>	64
Table 16.	<i>Freetown to District headquarters: Price in Leones for one 50kg bag</i>	65
Table 17.	<i>Sierra Leone and Sub-Saharan Africa investment spending on infrastructure, 2005-2007</i>	65
Table 18.	<i>Distribution of sample observation</i>	74
Table 19.	<i>Basic Income Calculation</i>	80
Table 20.	<i>Comparative Summary of the assumptions on the income calculation approaches: Neoclassical Approach (NA) & Peasant Farming (PF) Approach</i>	82
Table 21.	<i>Average age composition of farming households in the Northern and Eastern regions of Sierra Leone</i>	88
Table 22.	<i>Educational composition of farming households in the Eastern and Northern regions of Sierra Leone</i>	88
Table 23.	<i>Professional status of smallholders</i>	89
Table 24.	<i>Resources of smallholders in the Eastern and Northern regions of Sierra Leone</i>	93
Table 25.	<i>Market accessibility in the Eastern and Northern regions of Sierra Leone</i>	98
Table 26.	<i>Communication in the Eastern and Northern regions of Sierra Leone</i>	98
Table 27.	<i>Economic results of the smallholders per average farm by districts based on Neoclassical Approach and Peasant Farming Approach (Leones/year)</i>	107
Table 28.	<i>Economic results of the smallholders per average acre by district based on Neoclassical Approach and Peasant Farming Approach (Leones/acre)</i>	108
Table 29.	<i>Economic results of the smallholders per working unit by district based on Neoclassical Approach and Peasant Farming Approach (Leones/hhWU)</i>	109
Table 30.	<i>Economic results of the smallholders per household unit by district based on Neoclassical Approach and Peasant Farming Approach (Leones/hhUnit)</i>	110

Table 31.	<i>Different output values and input costs as proportion of the total for an average smallholder per district based on Neoclassical Approach and Peasant Farming Approach (%)</i>	112
Table 32.	<i>Percentage of farms per region above and below the poverty lines with Peasant Farming Approach (PF) – based on Farm Net Income (FNI) of smallholders</i>	123
Table 33.	<i>Evaluation Matrix for Support Provided</i>	137
Table 34.	<i>Basic Comparison of smallholders in the surveyed Northern and Eastern regions of Sierra Leone</i>	158

List of Figures

Figure 1.	Map of Sierra Leone	21
Figure 2.	Structure of the population of Sierra Leone in 2008	23
Figure 3.	Economic Growth in Sierra Leone (percentage change of GDP)	26
Figure 4.	Composition of exports from Sierra Leone in 2005	29
Figure 5.	Agricultural Production Index per capita. Sierra Leone 1985 - 2009	31
Figure 6.	Production of major annual crops (thousand of metric tons) in Sierra Leone 1980 - 2006	34
Figure 7.	Food production Index (1999-2001 = 100)	34
Figure 8.	Sierra Leone rice production and requirement in metric tons	35
Figure 9.	Sierra Leone export volume of tree crops in metric tons	36
Figure 10.	Top imports – Sierra Leone – 2007	37
Figure 11.	Top exports – Sierra Leone – 2007	37
Figure 12.	Livestock (Ship-equivalent %) in selected countries of Western Africa	39
Figure 13.	Agro-Ecological Regions in Sierra Leone (%)	41
Figure 14.	Forest area and Agricultural land in percentage of total land	44
Figure 15.	Top agricultural goods production – Sierra Leone – 2007	44
Figure 16.	The upland-lowland continuum	45
Figure 17.	Average consumption of fertilizers (kg per hectare)	60
Figure 18.	Number of agricultural workers per tractor in use. Selected countries of Western Africa (2007)	61
Figure 19.	The five districts identified for the survey	73
Figure 20.	Combined productivity ratio	86
Figure 21.	Average gender composition of farming households in the Northern and Eastern regions of Sierra Leone	87
Figure 22.	Sources of income for smallholders in the Eastern and the Northern regions of Sierra Leone (% of farms)	89
Figure 23.	Sources of income for smallholders in the Eastern and the Northern regions of Sierra Leone ranked from the most important to the least important	90
Figure 24.	Average acreage under cultivation per crop for the sample of smallholders in the Eastern and Northern regions of Sierra Leone	91
Figure 25.	Proportions of smallholders in the Northern and Eastern samples cultivating the different crops	91
Figure 26.	Allocation of acreage to different crops for the median farm in the Eastern region of Sierra Leone	92
Figure 27.	Allocation of acreage to different crops for the median farm in the Northern region of Sierra Leone	92
Figure 28.	Total cultivated acreage per farm for food and tree crops per district	94
Figure 29.	Average number of years of land under forest and bush fallow per district	94
Figure 30.	Total acre per household member per district	95
Figure 31.	Food production area for one household member per district	95
Figure 32.	Total household and hired labour use for production in days per year per district (men, women and children hours worked included)	96
Figure 33.	Total household labour availability and use and hired labour use in days per year per district	96

Figure 34.	Local participation in the community by the respondent in the Eastern and Northern regions of Sierra Leone	99
Figure 35.	Membership of farmer associations or groups in the Eastern and Northern regions of Sierra Leone	99
Figure 36.	Position held in any farmer organisation by the interviewee in the Eastern and Northern regions of Sierra Leone	100
Figure 37.	Evaluation of benefits from membership in farmer organisations, Eastern region	100
Figure 38.	Evaluation of benefits from membership in farmer organisations, Northern region	100
Figure 39.	Crop mix categories present in Sierra Leone Survey (% of total cultivated acreage and all surveyed farms)	102
Figure 40.	Crop mix categories present in Sierra Leone Survey (% of total cultivated acreage and all surveyed farms)	102
Figure 41.	Crop mix categories in the Sierra Leone Survey, at district level (% of total cultivated acreage)	103
Figure 42.	Percentage of farms cropping rice at district level	103
Figure 43.	Percentage of farms cropping trees at district level	104
Figure 44.	Farm Types (Number, Percentage and Percentage of total surveyed area)	104
Figure 45.	Farm Net Income of Neoclassical and Peasant Farming Approach for an average smallholder per district (Leones/year)	105
Figure 46.	Annual Cash flow of output value and input production costs (Leones/year)	106
Figure 47.	Farm Net Income for an average smallholder per district based on Neoclassical Approach (Leones/year)	111
Figure 48.	Farm Net Income for an average smallholder per district based on Peasant Farming Approach (Leones/year)	111
Figure 49.	Output value of crop production per production orientation for an average smallholder by district (Leones/year)	113
Figure 50.	Output value of food and tree crop production for an average smallholder by district (Leones/year)	114
Figure 51.	Output value of food crop production per crop of an average smallholder by district (Leones/year)	114
Figure 52.	Output value of rice per rice type for an average smallholder by district (Leones/year)	115
Figure 53.	Distribution of food crop production of an average smallholder by district (Leones/year)	115
Figure 54.	Distribution of food crop production of an average smallholder by district (%)	115
Figure 55.	Output value of tree crop production per crop of and average smallholders by district (Leones/year)	116
Figure 56.	Distribution of tree crop production of an average smallholder by district (Leones/year)	116
Figure 57.	Distribution of tree crop production of an average smallholder by district (%)	117
Figure 58.	Variable costs of an average smallholder per district of the Neoclassical and Peasant Farming Approach (Leones/year)	117
Figure 59.	Farm viability of smallholders in Northern region based on Peasant Farming Approach	118
Figure 60.	Farm viability of smallholders in Eastern region based on Peasant Farming Approach	119
Figure 61.	Farm viability of smallholders in Northern region based on Neoclassical Approach	119
Figure 62.	Farm viability of smallholders in Eastern region based on Neoclassical Approach	120
Figure 63.	Farm viability per farm type in Northern and Eastern regions based on Neoclassical Approach	121

Figure 64.	<i>Farm viability per farm type in Northern and Eastern regions based on Peasant Farming Approach</i>	121
Figure 65.	<i>Farm viability per farm type for Northern region based on Peasant Farming Approach</i>	122
Figure 66.	<i>Farm viability per farm type for Eastern region based on Peasant Farming Approach</i>	122
Figure 67.	<i>The proportion of the farms above and below the poverty lines with Peasant Farming Approach – based on Farm Net Income (FNI) of smallholders</i>	123
Figure 68.	<i>Poverty level per household based on Peasant Farming Approach (only agricultural income is accounted for)</i>	124
Figure 69.	<i>Poverty level per farm type based on Peasant Farming Approach (only agricultural income is accounted for)</i>	125
Figure 70.	<i>Land productivity per total cultivated land area–output value per acre by district (Leones)</i>	126
Figure 71.	<i>Output value of tree and food production per acre used by district (Leones)</i>	126
Figure 72.	<i>Cocoa and coffee output value per acre by district in the Eastern region (Leones)</i>	127
Figure 73.	<i>Food output value per acre by district (Leones)</i>	127
Figure 74.	<i>Upland/IVS/Boli rice output value per acre by district (Leones)</i>	128
Figure 75.	<i>Average yield of rice per rice type by district (bushels/acre)</i>	128
Figure 76.	<i>Total labour productivity per days worked (output value per working day, in Leones/day)</i>	129
Figure 77.	<i>Total Labour productivity in food and tree crop production in the Northern and Eastern districts</i>	129
Figure 78.	<i>Total labour use per acre (days/year)</i>	130
Figure 79.	<i>Labour use per acre for food and tree crops (days/year)</i>	130
Figure 80.	<i>Labour productivity per working unit for Upland rice in the Northern and Eastern regions</i>	131
Figure 81.	<i>Labour productivity per working unit for IVS rice in the Northern and Eastern regions</i>	132
Figure 82.	<i>Labour productivity per working unit for Boli rice in the Northern region</i>	132
Figure 83.	<i>Labour productivity per working unit for cocoa in the Eastern region</i>	133
Figure 84.	<i>Labour productivity per working unit for coffee in the Eastern region</i>	133
Figure 85.	<i>OECD-DAC Evaluation criteria and the Logical Framework Approach</i>	135
Figure 86.	<i>Adequacy of support provided by Welthungerhilfe STABEX in the Eastern districts of Sierra Leone</i>	138
Figure 87.	<i>Adequacy of support provided by Action Aid STABEX in the Northern districts of Sierra Leone</i>	139
Figure 88.	<i>Adequacy of support provided by MAFFS projects and extension services in Northern region of Sierra Leone</i>	139
Figure 89.	<i>Adequacy of support provided by Other NGOs in the Northern region of Sierra Leone</i>	140
Figure 90.	<i>Adequacy of support provided by Other NGOs in the Eastern region of Sierra Leone</i>	140
Figure 91.	<i>Adequacy of support provided by all aid programmes in the Eastern region of Sierra Leone</i>	141
Figure 92.	<i>Adequacy of support provided by all aid programmes in the Northern region of Sierra Leone</i>	141
Figure 93.	<i>Change in production as a result of engaging in technical assistance projects in the Eastern region of Sierra Leone</i>	142
Figure 94.	<i>Change in production as a result of engaging in technical assistance projects in the Northern region of Sierra Leone</i>	142
Figure 95.	<i>Change in income as a result of engaging in technical assistance projects the Eastern region of Sierra Leone</i>	143

Figure 96.	<i>Change in income as a result of engaging in technical assistance in the Northern region of Sierra Leone</i>	143
Figure 97.	<i>Impact of support on different aspects of food security in the Eastern region of Sierra Leone</i>	145
Figure 98.	<i>Impact of support on different aspects of food security in the Northern region of Sierra Leone</i>	145
Figure 99.	<i>Expected sustainability of different components of the projects in the Eastern region of Sierra Leone</i>	146
Figure 100.	<i>Expected sustainability of different components of the projects in the Northern region of Sierra Leone</i>	147
Figure 101.	<i>Changes in different areas of development during the last two years in the Eastern region of Sierra Leone</i>	148
Figure 102.	<i>Change in different areas of development during the last two years in the Northern region of Sierra Leone</i>	148
Figure 103.	<i>Average farm net income (FNI) per farm household unit (hhUnit) for non-supported and supported farmers (Leones)</i>	149
Figure 104.	<i>Supported and non-supported farms below and above the Extreme (Food) Poverty Line (%)</i>	149
Figure 105.	<i>Supported and non-supported farms below and above the Extreme (Food) Poverty Line per region (%)</i>	150
Figure 106.	<i>Average net farm income (NFI) per farm household unit (hhUnit) for non-supported and supported farmers at regional level (Leones)</i>	150
Figure 107.	<i>Cultivated area of non-supported and supported farmers per region: Number of acres per farm household</i>	151
Figure 108.	<i>Sex of household head for supported and non-supported farmers</i>	151
Figure 109.	<i>Years of education of household head of supported and non-supported farmers</i>	152
Figure 110.	<i>Head of household engagement in farming for supported and non-supported</i>	152
Figure 111.	<i>Relevance of income sources for supported and non-supported farmers</i>	153
Figure 112.	<i>Position of Head of households in a farming group or association for supported and non-supported farmers</i>	153
Figure 113.	<i>Number of tool assets per household of supported and non-supported farmers</i>	154
Figure 114.	<i>Number of equipment and tractor assets per household of supported and non-supported farmers</i>	154
Figure 115.	<i>Number of tractors hired and in possession of the households of supported and non-supported farmers</i>	155

List of Acronyms

CAADP	Comprehensive African Agriculture Development Program
CSP	Country Strategy Paper
CWIQ	Core Welfare Indicator Questionnaire Survey
EC	European Community
EDF	European Development Fund
EU	European Union
FAO	Food and Agricultural Organization for the United Nations
FMO	Framework of Mutual Obligations
IMF	International Monetary Fund
MAFFS	Ministry of Agriculture, Forestry and Food Security
MFMR	Ministry of Fisheries and Marine Resources
NRDS	National Rice Development Strategy
NSADP	National Sustainable Agriculture Development Plan
PEMSD	Planning, Evaluation, Monitoring and Statistics Division in Sierra Leone
PRSP	Poverty Reduction Strategy Paper
SLIHS	Sierra Leone Integrated Household Survey
STABEX	EC's compensatory finance scheme to STABILise EXport earnings of the ACP countries
USTP	Use of STABEX Transfers Project
UNAIDS	United Nations Program on HIV/AIDS
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
WHO	World Health Organisation
WFP	World Food Programme

■ Executive Summary

Agriculture is essential to Sierra Leone's economic and social development since two-thirds of the population live in rural areas, the vast majority of them being employed in the farming sector, and the country disposes of ecosystems that could allow it to further exploit its production. Rice (representing the staple food of the population), cocoa and coffee (main export commodities) are, in this context, of strategic importance. While rice production is expected to comply with food security objectives, coffee and cocoa are high value export commodities which push economic growth. Consequently, both types of crops are considered relevant in contributing to the country's development.

Sierra Leone ranks amongst the poorest countries in the world in terms of per capita GDP. Concerning the agricultural sector and more specifically smallholders (which constitute the large majority of farmers), crucial unsolved issues relate to inadequate tools, land preparation and infrastructure, and limited access to markets and inputs, adding to very low labour productivity. This causes that smallholders operate far below their productive potential, with crop production remaining primarily driven by (semi)subsistence households generating very little income. Consequently, Sierra Leone's (semi)subsistence farming systems are characterised by highly inefficient input/output mixes as well as high pre-harvest and post-harvest losses. Farmers lack access to yield-increasing inputs (such as improved tools or seeds) and face limited ability to invest in economic activities not only due to credit shortage but also to village-level institutional arrangements which do not support using land as collateral for loans. Lastly, reduced cash-income keeps smallholders particularly vulnerable to remain in the poverty-trap.

As part of the efforts of both the international community and the Sierra Leone government to reconstruct and develop the country after the decade-long civil war, the government of Sierra Leone requested in 2005 the use of European Union STABEX (Stabilisation of Export Earnings) funds (an instrument of the 8th EDF – European Development Fund) for the improvement of national rice production and the rehabilitation of cocoa and coffee plantations to achieve its food security goals and improve the agricultural export sector of the country. Most of the support provided between 2007 and 2009 by these projects (which reached a value of 4,378,000 EUR) focused on increasing yields through a set of measures and technical assistance which mainly dealt with factors hampering or/and increasing (i) smallholder agricultural productivity, (ii) current and potential farm income and, more generally, rural poverty. The latter remains an important research topic that is relevant to policy since it allows assessing and comparing the impact of technical development assistance on different farming systems in view of a good allocation/ utilisation of funds and resources, and considering future designing of aid programmes.

The present report analyses the results of a survey of 604 smallholders in 5 districts in the Northern and Eastern regions of Sierra Leone carried out in 2009 when the STABEX-funded projects were concluding. The purpose is, on the one hand, to improve knowledge and understanding of the agro-economic and social conditions of rural areas in Sierra Leone, and, on the other hand, to provide a general assessment of aid programmes financed in this area by the 8th European Development Fund. For this reason, the regions selected for the survey were those representatives of the main agricultural areas of the country where support was provided: the **Northern region** largely dominated by rice farmers, and the *Eastern region* where farmers are mainly engaged in coffee and cocoa production (next to rice) under agro-forestry plots.

Quantitative and qualitative data was collected from smallholders through two questionnaires and face to face interviews that were realised during multiple visits. Interviewers were trained at Njala University and administered the questionnaire between June and November 2009. Interviews mostly focussed on ongoing socio-economic issues (farm-household economics and perception of the subsidies). More than 90 per cent of the interviewed smallholders were recipients of STABEX funds. There is no data reflecting interviewees' conditions prior to 2009. Therefore, the data analysis chiefly provides an in depth picture of smallholders' situation in terms of farm net income, productivity and poverty in the second half of 2009. Despite this constraint, the results provide valuable insights on the farmers' perceptions of shortcomings and opportunities of aid programmes under the context of rural, post-conflict Sierra Leone as well as the key agro-economic and social limitations faced by farmers in the two studied regions.

Data collection (and the review of the literature available) took place in a context of limited research networks and written sources for local information (particularly regarding the socio-economic organisations of farm-households within the village or chiefdom levels in Sierra Leone). Consequently, most of the data presented in this report is primary data (combining survey and interview material), gathered through the research project itself. While cross-referencing is, for the above reasons, not entirely feasible, a field validation and stakeholder consultation through the project team allowed for a process of data verification and to acquire additional relevant information (the verification took place during a field visit in November 2009).

Regarding farm households' characteristics and income, strong regional differences between the poorer North and relatively wealthier East were observed and reflected throughout all factors analysed: yields, household size, magnitude of losses and productivity. Households in the Eastern region who produce coffee and cocoa, also dispose on average of more family labour, more land and higher (total and per-capita) income compared to households in the Northern region. Also a larger percentage of surveyed smallholders in the Eastern region reported to rely on off-farm income sources. Rice was recognised as being an imperative component for food security, while the (relatively) high market value of coffee and cocoa confirmed both commodities as important sources of income and foreign currency.

The results of the economic analysis indicate that rice production, which partially covers own household consumption, is far below its potential due to high losses, low productivity and labour-intensity of farming, particularly in the Northern region. On the other hand, coffee and cocoa production in the Eastern region was found to be economically profitable, generating income for most of those smallholders who cultivate these crops. Rice remains below its economic potential also in this region, despite higher yields and lower costs. As mentioned, losses are very high (up to one-third) in both regions; predominantly in the pre-harvest phase, but also during post-harvest.

Results on the viability analysis of the surveyed farms show that the majority of smallholders in both districts come out as viable (86% in the Northern districts and 97% in the Eastern districts). The latter occurs when the farm economic variables are contextualised and reflect the local circumstances (mainly in the form of village institutional arrangements), meaning that they are not or just partially integrated to the markets. However, despite the relatively high percentage of farm viability in both regions, a much lower proportion of farm-households were above the extreme (food) poverty line (1% in the Northern region and 37% in the Eastern region), when accounting for agricultural income only. This means that even if the farming systems are themselves viable (it is possible to cover the operational costs without remunerating the farmers for their labour input), they cannot fully cover their basic needs (as householders') from farming activities along under the current agricultural technology and practices. This shows that more

attention needs to be paid to the increase of crop productivity (especially staple crop for self-sufficiency), diversification of production to higher value/cash crops and diversification of their income coming from other sources.

Qualitative data from the survey indicated that the STABEX aid programmes were to a great extent perceived as adequate and sustainable (concerning their long term benefits) in terms of their technical nature as well as regarding infrastructure and organisational improvements. However, the amount of aid was deemed altogether insufficient considering the households that were targeted and analysed in this study. In this sense, the responses to perceived adequacy do not evaluate the measure itself, but rather the amount provided in relation to local needs as understood by the recipients. Despite the lack of satisfaction in terms of the quantity of support received, most of the households (about 80%) stated some and even great improvement in production and income as a result of participating in STABEX-funded initiatives. The latter was a specific aim of the STABEX program.

The analysis (which combined farmers' perceptions, expertise of selected stakeholders, primary data on farm-household economics, and secondary information from statistics, economic and technical literature) allows drawing a set of insights for the technical assistance. Future aid programmes in the area may improve via further focusing on the following intervention priorities: reducing the very high pre-harvest and post-harvest losses for rice through training, provision of more adequate tools, machinery and processing facilities, and dissemination of more effective agronomic techniques. Likewise, physical infrastructure and re-establishment of local markets are also crucial in enhancing rural livelihoods in Sierra Leone. In this respect, micro-credit systems (adapted to the socio-economic circumstances and institutional arrangements at the village/chiefdom level) and provision of information on markets may help compensate cash shortages and consequently enable farmers to sell at higher market price. The improvement of infrastructure (i.e. production and market roads) would help access more profitable markets and reduce hardship of transport at all stages of production and commercialisation processes (cooperatives have proven successful in this sense); as well as to identify and engage in new business endeavour. In the case that the widespread shifting cultivation system is replaced by permanent agricultural practices, the constant supply of other inputs such as fertilizers or pesticides must be guaranteed. Lastly, agro-forestry systems could also be explored in order to support smallholders in the diversification of their agricultural portfolios. The latter could help reduce the impact of price volatility in specific commodities, reduce risks due to climate change and improve forest management.

■ 1 Introduction

Sierra Leone is a West African country that was recently devastated by a civil war which lasted more than 10 years (1991-2002). The war destroyed the country's governmental institutions and infrastructure, and forced the population to abandon their land, creating refugee streams converging towards the capital, Freetown. Sierra Leone has since regained its stability and has started a process of economic recovery. In this context, agriculture is one of the key elements to the country's future development given that two-thirds of the population lives in rural areas, the vast majority fully employed in farming activities (Poverty Reduction Strategy Papers (PRSP) I (2005a) and II (2009)). Rice, representing the staple food of the population and main component of the local diet on the one hand and cocoa and coffee, as main export commodities on the other hand, are therefore of particular relevance. Rain-fed rice can be grown in various agro-ecologies across the country. The imports in Sierra Leone currently represent almost a quarter of the population's requirements; but the gap between production and consumption is decreasing as the country moves closer to self-sufficiency. Cocoa and coffee are mainly grown in the Eastern part of the country, where the uplands are concentrated.

Access to resources (i.e. production inputs) adequate infrastructure and markets is severely limited, thus hampering the agricultural sector's capacity to obtain the maximum output. In addition, the majority of crop production still depends on a smallholder farming structure which faces specific obstacles to securing efficient management practices. Likewise, production incentives are also embedded within the village or chiefdom organisation which dominates most social and economic decisions, particularly concerning agricultural decisions. Small farmers in Sierra Leone report rather low

yields, are unable to fulfil essential land and forest preservation (i.e. reduced idle periods of the shifting cultivation agrarian system), including soil preparation tasks, and since the civil conflict market access has not been fully re-established. Consequently, most farming dependent households are below the poverty line.

The Government of Sierra Leone requested the use of the 8th EDF (European Development Fund) STABEX (Stabilisation of Export Earnings) transfers funds in the mid 2000's (see more details on STABEX in Section 4 and Box 2) for the improvement of national rice production and the rehabilitation of cocoa and coffee plantations to achieve its food security goals and accelerate economic recovery. Most of the support provided by the projects (which initiated in October 2007 and finalised in December 2009) is focused on increasing yields of smallholders, who represent the large majority of the agricultural sector. In this context, understanding the determinant factors of agricultural productivity, organisation of farming practices, farm income and rural poverty alleviation remains an important research topic that is particularly relevant to policy since it allows assessing and comparing the impact of development assistance strategies in view of a good utilisation of funds and resources with respect to the desired outcome.

The overall objective of this study is to improve knowledge of the characteristics of agricultural smallholders located in Sierra Leone in view of (i) identifying constraints they face for an efficient and sustainable use of production resources, (ii) highlight consequences for their food security (see Food Security Programme of the United Nations World Food Program in Sierra Leone in Box 1), and (iii) propose productivity-related strategies for alleviation of the rural poverty.

Box 1: Food Security

Food Security has gained much attention on the international development agenda in recent years, mainly due to the food price hikes in 2007/2008 which have pushed many people further into poverty. Estimates by the Food and Agriculture Organization (FAO) put the number of malnourished people worldwide at over 1 billion for 2009, compared to 915 million in 2008. This is the highest number since 1970, the earliest year for which comparable statistics are available and also represents a reversal of the trend towards reaching the first of the Millennium Development Goals (MDG). The number of malnourished in Sub-Saharan Africa is estimated at around 265 million people (half the proportion of malnourished in the world by 2015).

After the 2008 peaks, the relative decrease in food prices has done little to alleviate the problems in many developing countries. Prices remained high on many domestic markets, and the number of 'food-insecure' people remains on the rise. The global economic crisis has further exacerbated the problem and the effects of climate change, combined with global population growth, further threatens food security in many developing countries. Consequently, food security has remained a priority on the international agenda.

Source: Food Facility Interim Report,

Food Facility: Interim report on Measures Taken, SEC(2010)245

For more details: refer to

http://ec.europa.eu/development/policies/9interventionareas/ruraldev/food_intro_en.cfm

Food Security Programme of the World Food Programme (WFP) in Sierra Leone

Sierra Leone is at a critical stage of development after a war that exacerbated long-standing development challenges and caused unprecedented population displacement and devastation of infrastructure. Despite recovery since the end of civil war in 2002, Sierra Leone ranks 176th of 177 countries in the 2006 United Nations Development Programme Human Development Report. The spread of HIV/AIDS threatens to exacerbate poverty.

This second-generation country programme is therefore transitional: the Government is moving from an emergency footing and is unable to provide the human and budgetary resources or leadership required to carry out the country programme, which run from 2008 to 2010, synchronised with the United Nations Development Assistance Framework (2008–2010) on which it is based, supporting the national effort to improve health and education.

This programme builds the capacity of government institutions and district counterparts with a view to promote government and community ownership. The objective is to provide safety net programmes to assist hungry poor households, including those affected by HIV/AIDS, to meet their education, health and nutrition needs on a sustainable basis while addressing gender imbalances.

Source: World Food Programme – Country Programme – Sierra Leone (2008 – 2010) on

<http://www.wfp.org/content/country-programme-sierra-leone-2008-2010>

To achieve this objective, it has been essential to analyze the constraints present under the dominant agrarian systems in Sierra Leone, the existing inter-relationship between farming practices and decisions at the village and household level, the achieved agricultural productivity levels, the key sources of agricultural income and the degree of rural poverty. For this

purpose, both academic literature on the socio-economic organisation of rural households and primary data collected through face-to-face interviews with farmers were respectively reviewed and analysed. Ultimately, the study is expected to improve the effectiveness of selected development programmes for agriculture and poverty alleviation in Sierra Leone. For this

reason, the survey not only contained specific questions related to household traits, farming techniques, inputs, outputs, costs and sales, but also questions aiming to understand farm household perception on the type of aid received and its usefulness.

Consequently, the following specific objectives are considered:

- To conduct a comparative analysis of farming systems and poverty levels (using empirical evidence collected through face to face interviews of selected agricultural smallholders) in relevant agricultural areas of Sierra Leone. In this respect, special emphasis is given to the evaluation of households' capacity to engage in sustainable production practices.
- To assess the viability of the agricultural smallholders (in terms of farm net income) and the potential for poverty alleviation at the regional and farm (individual and farm type) levels.
- To assess the support provided by use of STABEX funds in securing sustainable and effective use of production resources and in promoting rural poverty alleviation in the corresponding farming systems and regions.

After a brief account of the general context in Sierra Leone introduced in Section 2, the report focuses on the particular traits of the country's agricultural sector in Section 3. The review includes a presentation of the role and value of agriculture in the national economy, a description of the sector in terms of agro-ecologies, dominant agrarian system, crop production patterns, as well the socio-economic organisation of agricultural activities at the village or chiefdom level. The main idea is to outline the constraints and challenges currently faced by agricultural agents in Sierra Leone both from a physical and institutional viewpoint. Section 4 describes the EU support to the agricultural sector of Sierra Leone, along with a description of STABEX interventions. The methodology to set up the survey, build the sample and select the appropriate analytical concepts and tools to understand the economics of smallholders are brought forward in Section 5. The discussion of results follows in Section 6 where the qualitative and quantitative data collected from the face-to-face interviews allow us to establish a characterisation of smallholder and carry out an assessment of their economic performance and viability. The survey results also convey valuable information to analyze the influence of technical development support to farm households. Conclusions are presented in Section 7.

■ 2 Description of the Context in Sierra Leone

2.1 General Context

Sierra Leone is a West African country, bordered by Guinea in the Northeast, Liberia in the Southeast, and the Atlantic Ocean to the Southwest (Figure 1). It is divided into 4 Provinces (also referred to as regions in the present report): Northern, Southern, Eastern and

Western regions; with a total surface of 71 740 km² and a population estimated at 6.7 million in 2008 (World Bank, 2009). In addition to a favourable environment for tropical agriculture with abundant rain (2000-4500mm per annum) and high biodiversity, the country has rich marine resources and minerals including diamonds, gold, rutile and iron ore (Jalloh 2006).

■ Figure 1. Map of Sierra Leone



Source: United Nations Cartographic Section map no. 3902, Rev 5, January 2004¹.

1 Authorization to reproduce the UN map was obtained by email on May 4th, 2010.

The capital Freetown is the largest city (estimated population of approximately one million) and the economic, financial and cultural centre of the nation. English is the official language, but Krio (a Creole language derived from English which incorporates words and syntax from other African and European languages such as Yoruba, French and Portuguese) is the lingua franca spoken by 97% of the population (WHO, 2009). Krio unites all the different ethnic groups (in total 16², each with its own language), especially in their commercial interactions.

Transition from civil war

Since the mid 1980's, Sierra Leone has suffered economic decline and political instability³. Between 1991 and 2002 the country has gone through several military coups and a brutal armed conflict. The civil war started in March 1991 when the Revolutionary United Front (RUF) initiated a military insurrection in the East (close to the Liberian border) with the intention of overthrowing the government. However, by 1992 a group of young military officers, led by Capt. Valentine Strasser, launched a military coup which sent President Momoh (who had been elected president in a one-party referendum in 1985) into exile in Guinea and established the National Provisional Ruling Council (NPRC) as the ruling authority in Sierra Leone. Despite the change of power, the RUF continued its attacks. As a result of popular demand and mounting international pressure, the NPRC agreed to hand over power to a civilian government via presidential and parliamentary elections, which were held in April 1996. Ahmad Tejan Kabbah, a diplomat who had worked at the UN for more than 20 years, won the presidential election. The RUF did not participate in this process and thus continued the conflict until the Abidjan Accord in November 1996. The agreement was

derailed by another military coup d'état in May 1997. This time the army joined forces with the RUF and formed a ruling junta: the Armed Forces Revolutionary Council (AFRC). President Kabbah and his government went into exile in neighbouring Guinea.

An oil and arms embargo followed, and in 1998 the ECOMOG (Economic Community Monitoring Group) and ECOWAS (Economic Community of West African States) intervention force counterattacked the AFRC junta leading to its defeat. President Kabbah returned to power and the country was progressively pacified following the 1999 Lomé Peace Accord and a United Nations peacekeeping mission (UNAMSIL) ensuring a return to democracy in 2002. In May 2002 President Kabbah was re-elected to a 5-year term in a landslide victory.

Sierra Leone's current economy is still suffering the consequences of this decade of civil war and displacement (up to two million people according to the Country Strategy Paper (CSP) 2007 were displaced). While some progress has been made in terms of economic and political stability the country is far from recovering or from being close to a sustained growth path (PRSP II, 2009). The necessary resources and capacities to support Sierra Leones political and socio-economic recovery are largely missing. It is in this context that the present study draws its attention to rural smallholders who represent the vast majority of the rural population in one of the world's poorest countries.

Next, we will review general aspects of Sierra Leone concerning its population, health and education, key macroeconomic indicators, labour and major productive sectors.

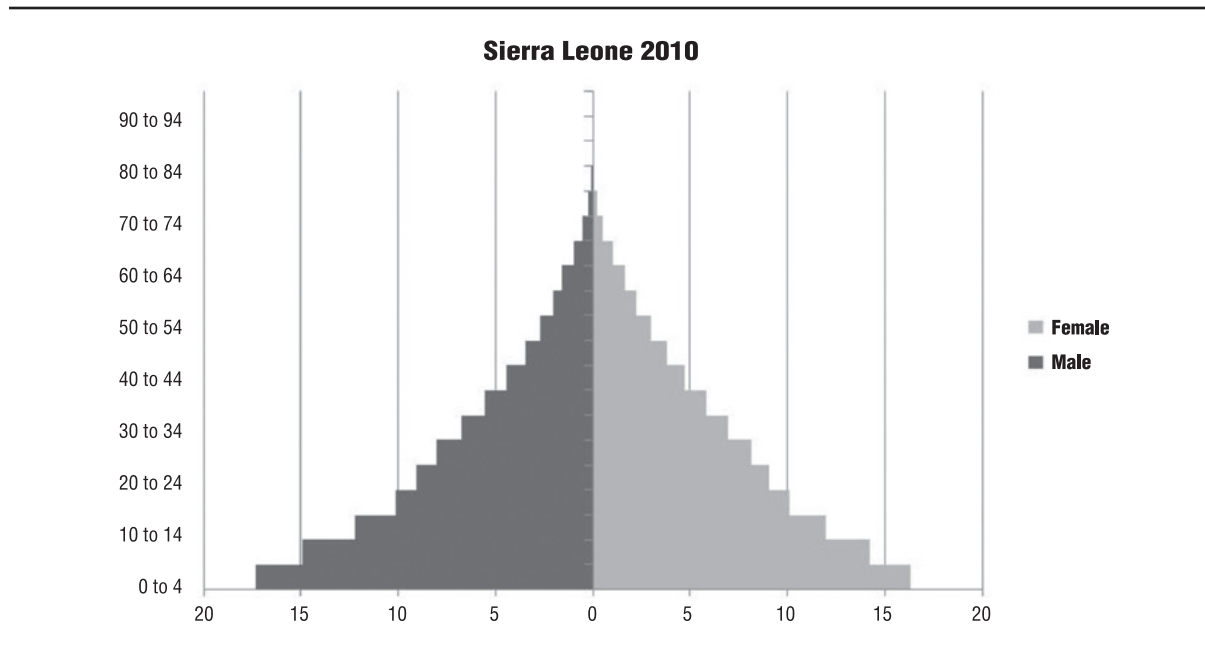
2.2 Population

As mentioned in the introduction, the Sierra Leones population is estimated at 6.7 million in 2008 and it is mainly young with 6% over 60,

2 The Mendes, Temnes and Limbas are the three largest groups comprising 60% of the population.

3 UNAMSIL (United Nation peace keeping mission in Sierra Leone) (<http://www.un.org/en/peacekeeping/missions/past/unamsil/background.html>: Accessed September 2010).

Figure 2. Structure of the population of Sierra Leone in 2008



Source: World Population Prospects 2008 (UN).

Table 1. Distribution of farming population by region and vulnerability level

	Vulnerability Level					Total
	Very low	Low	Moderate	High	Very High	
Eastern	282551	95505	218773	25530	60073	682432
Northern	531574	214272	52498	150474	45273	994091
Southern	346093	38444	78589	41575	1725	506426
Western	11210	0	13350	21380	8085	54025
Total	1171428	348221	363210	238959	115156	2236974

	Very low	Low	Moderate	High	Very High	Total
Eastern	24%	27%	60%	11%	52%	31%
Northern	45%	62%	14%	63%	39%	44%
Southern	30%	11%	22%	17%	1%	23%
Western	1%	0%	4%	9%	7%	2%
Total	100%	100%	100%	100%	100%	100%

Source: FAO Vulnerability Assessment 2003.

34.7% under 15 and 59.3% between 15 and 59 (CWIQ, 2007). The result is the pyramidal structure (Figure 2) of the age distribution including the youth bulge, typical for the pre-industrial/industrialising world which is in the first stage of demographic transition (in contrast

to the elliptic shapes of industrialised/service-based economies, with stationary or even contracting population growth and increased life expectancy). About 55% of the population are Muslims while 30% are Christians; the remaining 15% has indigenous beliefs (Jalloh, 2006).

Although fertility rates are high in the country (estimated at 6.5 births per woman), life expectancy was recorded at 47.3 years in 2007 (UNDP, 2009). This results in a population growth rate of 2.5%, as estimated in 2008. If this is compared to GDP growth rate of 5.5% in the same year (World Bank, 2009), it means that the economic growth is potentially sufficient to stabilise the overall level of impoverishment of the population.

Data from the Ministry of Agriculture, Forestry and Food Security (MAFFS) survey showed that in 2004, agricultural population was estimated at 4,976,871 (i.e. roughly two thirds of total population) of which 45% were women. Likewise, it was reported the great majority (70 – 80%) of households were engaged in full-time farming (Jalloh, 2006). According to FAO (2003), highest vulnerability levels due to market exposure (i.e. agricultural price volatility) experienced by the farming population of Sierra Leone are found in the Northern and in the Eastern regions where the majority of (semi)subsistence farmers are located. In fact, 75% of the total farming population lives in these two regions where the highest percentages of vulnerability are found (Table 1); 52% of the farming population categorised as having “very high” vulnerability live in the Eastern region, followed by 39% in the Northern region.

2.3 Health

The state of health of Sierra Leone's population is poor (Table 2). Maternal, infant and child mortality rates are the worst globally (in 2006 child mortality was estimated between 286 (male) and 252 (female) per 1,000 live births (WHO, 2009) and the incidence of diseases such as HIV/AIDS, typhoid, malaria, and tuberculosis is growing). Life expectancy at birth is estimated between 42 (female) and 39 (male) years (WHO, 2009)⁴, the 8th worst position worldwide, with poverty aggravating the health situation in the first place (Ministry of Health and Sanitation, 2007).

Healthcare is essentially provided by the government, accompanied by international health programs. However, medical care is generally not free of charge in Sierra Leone, and poorer families are often unable to pay user or prescription fees. The utilisation rate of health care facilities by the general population is estimated at 0.5 contacts per capita per annum, implying that on average only one-half of the population attends a health care facility during the year (UNDP, 2007). Only the Western Area (i.e. Freetown) meets the WHO recommended staffing ratio of one doctor per 12 000 persons; while in the Kailahun District (Eastern region) the ratio is of 1/191 340 (UNDP, 2007).

Table 2. Sierra Leone Health Indicators

Indicator	Prevalence (%)
Underweight among under-5	25
Stunting among under-5	40
HIV among 15-49 years old	1,7 [1,3-2,4]
Access to Health Services (% of population)	40
Access to Safe Water (% of population)	47
Access to Sanitation (% of population)	11

Sources: SLIHS, 2007; CWIQ, 2007; UNDP, 2007; UNICEF, 2008; UNAIDS, 2008.

⁴ WHO values of Life Expectancy at birth are slightly different from, but consistent with, those provided by UNDP (2009)

Diseases such as malaria and tuberculosis are prevalent and widespread, and recently the HIV/AIDS epidemic has been posing a particularly serious challenge (UNDP, 2007). The 2008 prevalence of HIV/AIDS in the population is higher than the world average of less than 1% but lower than the average of 6% for Sub-Saharan Africa (UNAIDS, 2008). The country also suffers from epidemic outbreaks of diseases including yellow fever, cholera, Lassa fever and meningitis (Ministry of Health and Sanitation, 2007).

The sanitation situation is also precarious. 83% of households in Sierra Leone use pit latrines, buckets, bush and rivers/streams as their sanitation systems for waste disposal, posing serious health and environmental problems for communities. In the urban areas, sanitation problems arise mainly from poor systems of solid waste disposal. According to Jalloh (2006) it is a common practice for many household to dispose of refuse by dumping on roadside, in drainages or in backyards.

2.4 Education

Education in Sierra Leone is compulsory for six years at the primary level and for three years at the junior secondary level. A shortage of schools and teachers has made full implementation impossible (Wang, 2007). Two thirds of the adult population of the country is illiterate: the adult literacy rate is 47.9% for males, and 27% for females (CWIQ, 2007). Since the end of the war, the situation has improved considerably, with an estimated primary school enrolment of 74.8% for children 6-11 years old (CWIQ, 2007).

Nonetheless, access to education remains highly unequal. During the 2000/2001 academic year, there were a total of 2,704 primary schools in the country and it was only in the Western region that private schools existed. In all the regions, the male population engaged in education was

greater than that of females, particularly in the Northern region, while the gap was closest in the Western region. In terms of pupil to teacher ratio, the national average was 1:37, ranging from 1:23 in the Western region to 1:46 in the Eastern region. A similar situation prevails concerning secondary schools (Jalloh, 2006).

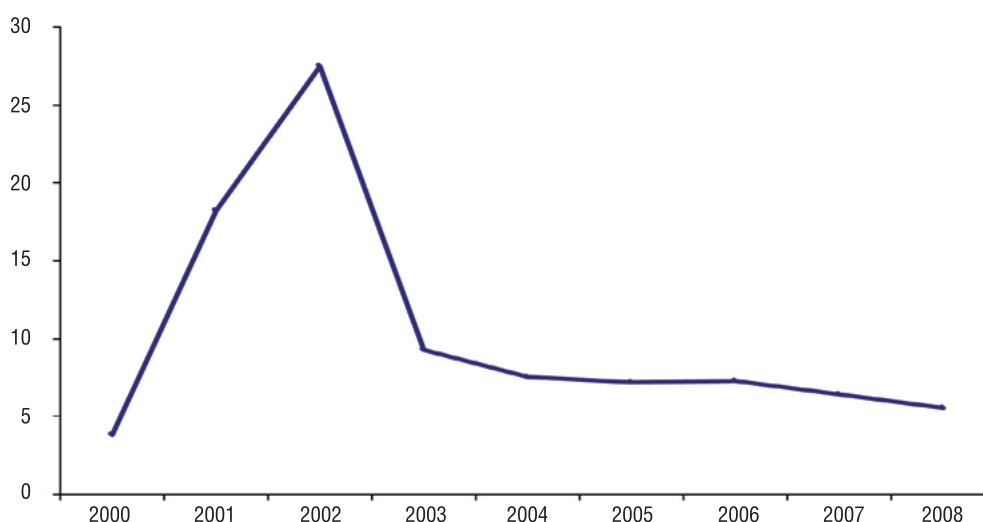
2.5 Macroeconomics

Since 2000, Sierra Leone's economy has recovered strongly, with an annual GDP growth of 5.5% in 2008 (World Bank, 2009). Figure 3 reflects the trend of the recovery since the years of civil unrest which was initially high given the dramatic decline of the economy during the prolonged period of conflict.

Sierra Leone presents a rich potential for economic recovery and future development particularly with respect to its wealth of natural and agricultural resources, large deposits of minerals (diamonds, gold, iron ore, rutile and bauxite), deep natural harbour, a long coastline and favourable ecosystems for productive agriculture and fisheries PRSP (2009). Still, the past conflict weighs heavily upon the current economic situation, as the poor infrastructure, weak education system, lack of markets and the weak capacity to manage resources for the benefit of all its citizens are major obstacles to the economic recovery (CSP, 2007).

In spite of its potential in terms of natural and agricultural resources, Sierra Leone's poverty is deep and widespread. The economy is small, relatively open, depending on foreign trade and external sources for investment, consumer goods and industrial inputs. To put the country situation into context it is necessary to review some global indexes. For example, its Human Development Index (0.365) is in position 180th out of 182 in the world ranking. In terms of GDP, Sierra Leone ranks 175th out of the same group of countries. In addition, with a GDP per capita estimated at

Figure 3. Economic Growth in Sierra Leone (percentage change of GDP)



Source: The World Bank: World Development Indicators 2009.

766 US\$ PPP⁵ in 2008, Sierra Leone remains not only one of the (economically) smallest and poorest, but it would seem that Sierra Leone is not particularly efficient in converting its economic resources into social well-being (UNDP, 2009). Lastly, its Human Poverty Index (HPI-1) of 47.7% reaches position 128th out of 135 countries (UNDP, 2009). According to the 2004 Integrated Household Survey (SLIHS, 2007) 70% of the population was living in poverty and 26% in extreme poverty. Given these figures and the general conditions of the country, UNDP (2007, xii) argues that Sierra Leone will not be able to reach the Millennium Development Goals.

Regarding other key macroeconomic variables⁶ it is worth highlighting that while economic growth has been impressive, particularly in the early years of the 2000's, Sierra Leone has struggled to control inflation.

Both, increased food and oil prices accelerated inflation in 2007 and throughout 2008. The 12 month inflation rate for June 2008 increased to 16.8 percent from 13.8 percent in December 2007 and 8.3 percent in December 2006. More specifically, according to data from Statistics Sierra Leone, Freetown consumer prices for imported rice showed an accelerating rate of inflation: the cost of imported rice in December 2007 was 21 percent higher than in the preceding December while the June 2008 price was 49 percent higher than the preceding June. The Government tried to limit some of these price increases in 2008 by reducing import tariffs on rice, flour, and petroleum products (World Bank, 2009). However, the external current account deficit (including official transfers) increased to 8.4% of GDP in 2008 (World Bank, 2009) from 3.5% of GDP in 2006 following a slight deterioration in the terms of trade (IMF, 2009). At the end of September 2008, official reserves declined to 212 million US\$ (or 4.6 months of import coverage) (IMF, 2009)⁷.

The main challenges to economic growth are poor infrastructure, including lack of access

5 The 2008 estimated GDP per capita varies according to the multiple sources: 350 US\$ (PRSP II, 2009), 725 US\$ (IMF, 2009).

6 National data for key economic indicators should be carefully considered since there are still shortcomings in the collection and estimation of balance of payments and national accounts data. Although the authorities are cooperating fully in providing and disseminating data, efforts should be maintained to improve the timeliness and quality of economic and financial data (IMF, 2009).

7 Estimated at 209 million US\$ or 5.1 months by the World Bank (2009).

to energy supplies⁸, a low-skilled and poorly trained labour force and inefficient regulatory environments for business and the private sector. According to the World Bank's index for ease of doing business, Sierra Leone was ranked 156th out of 181 countries in 2009.

Exchange rates and Price transmission

Increasing agricultural exports and reducing food imports both depend critically on the exchange rate, as well as the efficiency of price transmission to farmers. During the period from mid-1970s to the end of the 1980s restrictive import licensing system, rationed foreign exchange, administered setting of the exchange rate characterised Sierra Leone's trade and payments regime. Consequently, wide disparity prevailed between the official and market exchange rate, which was a reflection of the shortage of foreign exchange and overvaluation of the domestic currency (Jalloh, 2006).

In 1989 the Government of Sierra Leone began to implement a Structural Adjustment Programme (SAP), which sought to establish fiscal and monetary discipline, liberalize and open the economy and create an enabling environment in which the private sector could thrive. The immediate result was that the domestic currency depreciated sharply in 1990, and continued to depreciate each year, between 1990 and 2000. The SAP ushered in the liberalisation of markets and removal of subsidies and price controls. This coincided with a relatively large budget deficit due to emergency defense spending and the payment of arrears on foreign and domestic debt that resulted in a short term burst in domestic prices, sending inflation rates soaring to 102 and 117% in 1990 and 1991, respectively. Prices rose sharply in 1997 following the AFRC coup, and again in 1999 after the rebel incursion of Freetown. However, since then, relatively stable exchange rate, sound

fiscal management, combined with low effective demand have resulted in low inflation rate of – 2.8 % in 2000, 3.4 % in 2001 and –3.1% in 2002 (Jalloh, 2006). Yet, as commented above, under critical external shocks as the recent food and oil price crisis (2008), Sierra Leone suffered an inflationary spiral.

2.6 Labour

Active population was estimated at 50% of the total population in 2004 (UNDP, 2007). More than two-thirds of the active population works in farming, forestry and fishing (Table 3). Agriculture is thus the largest provider of employment in Sierra Leone supplying jobs to an estimated 2.5 million.

For most people, there are few options beyond farming, fishing or mining. Paid employees are a minority; most of them are employed in the informal⁹ sector, where women and youth are disfavoured. Women's average earnings are about half those of men. 7% of the economically active population is under 15 years old (SLIHS, 2007).

2.7 Major Sectors

The economic recovery from the very low post-war level is explained to a large extent by a return to normality. Since the end of the war, growth has been concentrated in the informal, agricultural, fishing and services sectors that represent the major part of the economy (World

⁸ Less than 10% of Sierra Leone's population has access to electricity; lack of supply and extremely high electricity prices hamper private investment (CSP, 2007).

⁹ The informal sector is broadly characterised as consisting of units engaged in the production of goods or services with the primary objective of generating employment and incomes to the persons concerned. These units typically operate at a low level of organisation, with little or no division between labour and capital as factors of production and on a small scale. Labour relations - where they exist - are based mostly on casual employment, kinship or personal and social relations rather than contractual arrangements with formal guarantees (International Labour Organization, 1993).

Table 3. Employed labour force by sector and sex (%)

Industry or sector	Total	Male	Female	Industry or sector	Male	Female
Crop Farming	64.5	61.4	68.2	Hotels/ Restaurants	0.3	0.3
Livestock	0.4	0.4	0.4	Transport, Storage & Communication	0.8	1.5
Poultry	0.1	0.1	0.1	Financial Intermediation	0.4	0.4
Hunting	0.1	0.1	0.1	Real Estate	0.6	0.6
Forestry	0.3	0.4	0.2	Public admin. (1)	1.4	2.2
Fishing	2.7	3.4	1.9	Education	2.0	2.5
Mining	3.6	6.0	1.1	Health & Social Work	1.0	1.0
Manufacturing	0.5	0.7	0.2	Other Community & Social Services	4.4	4.5
Electricity, Gas & Water	0.4	0.7	0.1	Private house hold paid employee	4.4	0.4
Construction	2.0	2.9	1.1	Extra Territorial (2)	0.2	0.3
Trade /Repair	14.0	10.0	17.5			

Note (1): Public administration & Defense, compulsory social security.

Note (2): Extraterritorial Organisations and Bodies.

Source: SLIHS, 2007.

Table 4. Sectorial contributions to GDP (in % GDP)

	2005	2006	2007
Agriculture	72.1	37.4	41.2
Services	26.0	57.7	33.0
Mining	-3.4	0.2	17.2
Manufacturing	1.1	4.2	1.0
Electricity and Water	-1.0	-0.3	-0.9
Construction	5.1	0.8	8.5
Total GDP	100	100	100

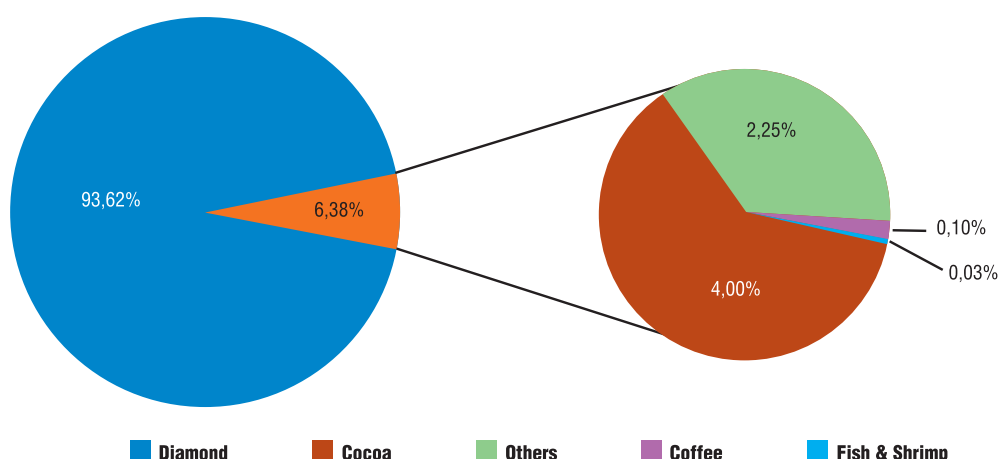
Source: IMF, 2008.

Bank, 2009), followed by the mining and manufacturing sectors (Table 4).

As portrayed in Table 4, agriculture accounts for about 42% of GDP in 2007, with the bulk

of the population engaged in subsistence arable farming. Services amount for a 33% and mining a 17.2%, although this sector provides the majority of exports and significant foreign exchange earnings (UNDP, 2007: xi).

Figure 4. Composition of exports from Sierra Leone in 2005



Source: Own calculations based on Statistics Sierra Leone, 2008.

Sierra Leonean exports are almost exclusively based on diamonds as shown in Figure 4. Nevertheless in recent years, the export of other minerals and especially of cash crops is being encouraged. However, with diamond exports alone, mining contributes over 90% of exports a total value of 408 861.4 million Leones¹⁰ in 2005 (Statistics Sierra Leone, 2008). Export growth was positive for all products in 2007 but fell in 2008 due to technical problems with the Kimberlite diamond and Rutile mining operations (World Bank, 2009).

Despite the importance of mining for exports, the country's economy is primarily based on agriculture. Agricultural production has increased since the end of the civil war and has significant potential for sustained economic growth and job creation throughout the country. According to the first (2003) and the second (2009) Poverty Reduction Strategy Papers, this sector is a major pillar for the future development of the country. The analysis of this particular sector will be developed in the next chapter.

To summarize, Sierra Leone is characterised by the following key traits:

- Approximately two-thirds of the population is estimated to live in rural areas. About 70 % of the population lives below the poverty line, most in severe poverty. 26 % of the population is food poor, i.e. they cannot afford a basic diet.
- Sierra Leone has a very young population, with about 42 % under 15 years of age and almost 75% under 35 years of age. 60% of the youth (non-school going 15-year olds to 35-year old adults) is either unemployed or underemployed.

According to FAO representatives in the country, addressing this serious unemployment and poverty situation, and fully exploiting Sierra Leone's considerable potential for the development of agriculture, agro-based industries, mining, fisheries, hydro-power and tourism will be a precondition if the country is to move from post-conflict recovery to sustainable peace, stability and economic growth¹¹.

10 10000 Leones equates to approximately 1.86 EUR (September 2010).

11 FAO Representation in Sierra Leone Website on <http://coin.fao.org/cms/world/sierraleone/CountryInformation.html>

■ 3 The Agricultural Sector

In this section, the contributions of the agricultural sector to the economy (3.1) and its key characteristics in terms of agro-ecological zones and farming systems (3.2) are addressed. Likewise, the technical and institutional aspects of farm households in Sierra Leone are brought forward (3.3). A review of domestic policies related to agriculture in the post-conflict era is presented along with an examination of food security issues (3.4). To conclude sectorial challenges are analysed (3.5).

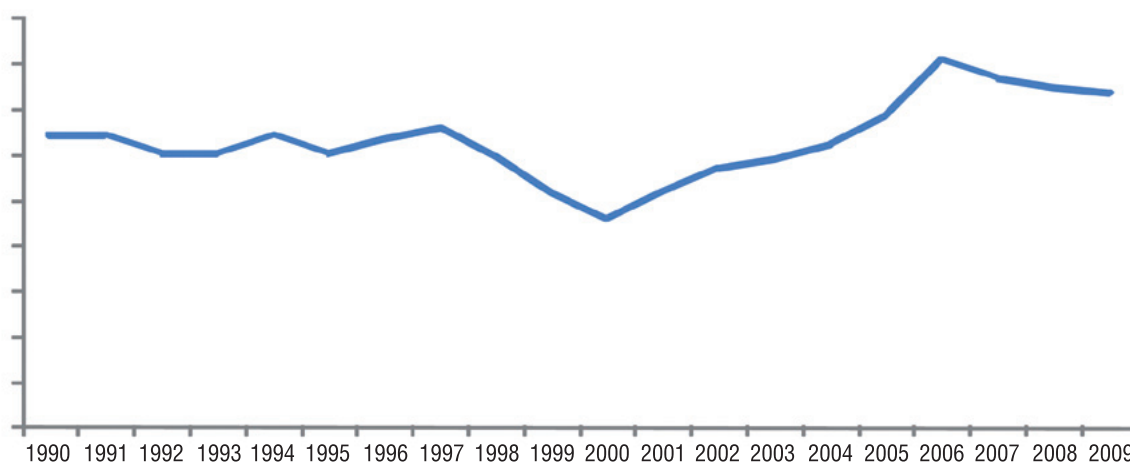
3.1 Agriculture in the Economy

During the 1991-2002 conflict, the agricultural sector was severely affected. On one hand, agricultural roads were abandoned for long periods of time and rendered impassable. On the other hand, farms were devastated and fleeing farmers lost many of their assets,

including production inputs and capital (such as seeds, planting materials, tools, and machinery, livestock and work oxen). To illustrate the impact of the war it is interesting to note that in 1991, 70% of the population was devoted to agricultural production; however, by the end of war in 2002, the significant displacement of the rural population resulted in an estimated farming population of 51%. Figure 5 portrays the consequent decline in national agricultural production during this time period.

According to MAFFS (2001) the country has a total of 5,365,000 ha of arable land, which represents 74.1% of the total area of the country. Jalloh (2006) argues that between 10 and 12 percent of potentially arable land is being cultivated and that there would be enough land to accommodate expansion in farming to increase food production. However, if one takes into consideration that in Sierra Leone the dominant

■ Figure 5. Agricultural Production Index per capita. Sierra Leone 1985 - 2009



Note: The FAO indices of agricultural production show the relative level of the aggregate volume of agricultural production for each year in comparison with the base period 1999-2001. They are based on the sum of price-weighted quantities of different agricultural commodities produced after deductions of quantities used as seed and feed weighted in a similar manner. The resulting aggregate represents, therefore, disposable production for any use except as seed and feed.

Source: FAOSTAT (2010)

agrarian system is that of *shifting cultivation* or *slash and burn*¹² where it is indispensable to keep *idle* or *fallow* land in order to allow forest regeneration, restore soil fertility and sustain the agrarian production in the long term, the true availability of arable land is significantly reduced. Consequently, it can be argued that although land and water resources are relatively abundant, the majority of farmers operate smallholdings of 0.5 to 2 cropped hectares while keeping potential arable land under fallow (in section 3.2 the nature of this agrarian system is further explained). The latter partially explains why agriculture in Sierra Leone despite being the largest single employer, has contributed less than 50% to GDP in 2006 and 2007 (Table 4).

According to the literature review and data survey, the majority of farm households in Sierra Leone engaged in crop production (which amounted to approximately 400.000 farm families) are managing plots which do not exceed 2 cropped hectares (Jalloh, 2006). There is however no information on the percentage of land and labour under larger farm complexes or plantations and of whether an actual dual farm structure is in place in the country.

Local expert knowledge (Dr. Alpha Lakoh) indicates that the existence of large farms is very limited in the country. In the case of rice producers about 5 farmers are said to own farms which vary between 1000 and 2000 ha; while a few more farms are said to have 200-5000 ha on rice production. Only 4 farms focused on oil palm and/or sugar cane production are said to be above 30000 ha¹³.

According to Dr. Alpha Lakoh, issues of land grabbing/acquisition are neither widespread nor advanced in Sierra Leone and he attributes this to the government's policy of supporting only land leasing

which guarantees the population's traditional right to own land. However, in the recently published (2009) government strategy document NSADP (National Sustainable Agriculture Development Plan 2010 -2030) there is a component related to an increase in land leasing/acquisition as a mean to enhance agricultural investment and opportunities in the country.

Early in 2011, close to 500 000 ha of farmland (10% of arable land in the country) had been leased or were under negotiation for lease in Sierra Leone (Oakland Institute, 2011). Land regulation in Sierra Leone contemplates that any payment for land leasing are shared between various national, regional, district and local authorities. These land leases (mostly fallow lands) are usually tied to compensation in terms of fixed rent, and employment in the newly formed large farms. A review of the literature on land acquisition processes in Sierra Leone reveals three main issues (German et al, 2010): 1) Compensatory agreements may not be high enough to compensate the change in rural livelihoods 2) Individuals not belonging to landowning families who rent land on annual basis will be left out from any land leasing/acquisition compensation or payment. (Salazar (2004) indicates that these non-clan members constitute 20 to 40 percent of chiefdom populations) 3) Not enough transparency in land negotiation and agreements. According to the Oakland Institute (2011), the regulatory framework for the negotiation of land investments is extremely weak and the impact assessments developed by the Sierra Leone Environmental Protection Agency (SLEPA) are non-binding and investors have not been held accountable to them. One extreme situation takes place in the Maelim Chiefdom where landowning families protest since 2011 against SocFin (leasing 6,475 ha for oil palm and rubber). Locals claim not to have been informed nor participated in any of the negotiations for the 50 year lease which has been agreed.

From a historical perspective, it appears that the development of large plantations was never successfully implemented in the country and

12 See section 3.2, *infra*.

13 Concerning medium size farms ranging between 5 and 20 ha, Dr. Lakoh indicates that their number is also reduced and farmers frequently engage in coffee or cocoa cultivation.

the issue of land grabbing is quickly becoming a highly sensitive topic. Frankema (2011) argues that the present land distribution scheme dominated by smallholders was substantially determined by the pre-colonial political and institutional context which was not dramatically altered during the British Protectorate. The author emphasises that “a plantation economy did not develop in Sierra Leone and the enthusiasm of the native population for engaging in commercial agriculture never compared to that of Malayan peasantry”. Martin (1991) indicates that large State farms were adopted by the Government of Sierra Leone in order to produce export crops in the 1950s and 1960s, but they were abandoned in few years (p. 42). By 1970 (nine years after independence), the Land Gini coefficient was 43.6 in Sierra Leone, i.e. far below the world average of 59.7 for the same time period¹⁴. Lastly, government sources from the mid 2000’s also reinforce the evidence discussed above: “large-scale plantations are not common and the majority of farmers have undertaken tree crop plantations with holdings ranging from 1 to 5 ha” (MAFFS & MFMR, 2004). In the same line, Sesay *et al.* (2004) indicate that large estates of plantation tree crops or mechanised field crop production, ranging from 20 to several hundred hectares, are mostly government owned or are receiving direct government support in the form of access to tractors (particularly large rice producers). The qualitative evidence introduced suggests that the farming sector in Sierra Leone is highly dominated by smallholders but that there is also an increasing trend in land leasing/acquisition agreements in the country.

3.1.1 Crop Production

According to Sesay (2008) national crop production represents two-thirds of agricultural GDP. The Northern and Eastern regions of the

country are considered the most productive regions due to the larger agricultural areas under cultivation (WFP, 2005). Most of the land under cultivation is dedicated to food crops with rice as the principle crop. Rice is commonly cultivated under mixed cropping with cassava, maize, millet, groundnut and sweet potatoes in varying proportions (MAFFS 2009a).

Cassava became particularly popular after the war; it grows quickly virtually anywhere and so serves as a quick food producing crop that can contribute to a certain degree of food security. Despite this, cassava is notoriously low in nutritive value, so that its role in continuously improving food security, particular at the national or aggregate level is limited (Unruh and Turray, 2006).

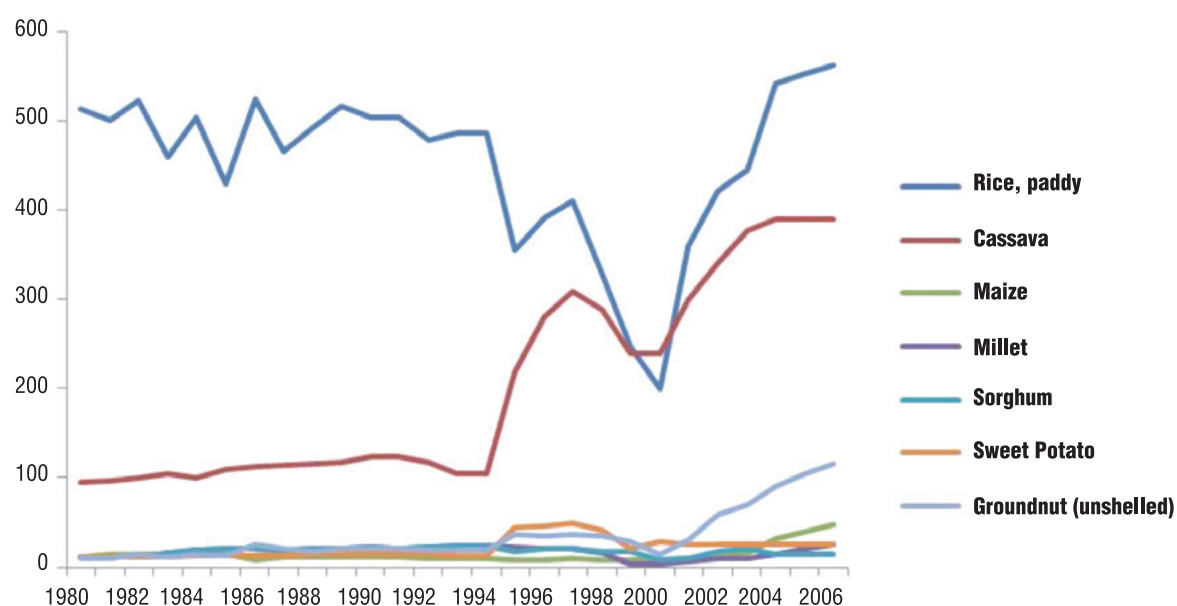
It should be highlighted that the production of root crops and tubers (mainly cassava and sweet potato) exceeds the national nutritional requirement (PRSP II, 2009). Figure 6 presents the production of major annual crops (thousand of metric tons) between 1980 and 2006. It shows that after 2000 part of annual crops production has been markedly increasing, particularly rice, cassava, groundnut and maize. Between 2003 and 2006 (i.e. after the civil war) food production has steadily increased as portrayed in Figure 7.

Nutrient adequacy rose from 56% to 71% and rice self-sufficiency in particular increased from 63% to 72% (MAFFS 2009a) (Table 5). Consequently, the annual consumption of rice per capita in 2009 (104 kg) in Sierra Leone is amongst the highest in Sub-Saharan Africa (NRDS, 2009). It is estimated that domestic production of rice currently (2008) accounts for up to 72% of the total annual national requirement for rice of 569,000 mt. (Table 5).

Figure 8 summarises national rice production and requirements from 1997 to 2015. It shows that self-sufficiency has been increasing since 2000, that under this trend production should meet requirement in 2011, and surplus should augment in the period 2011-2015.

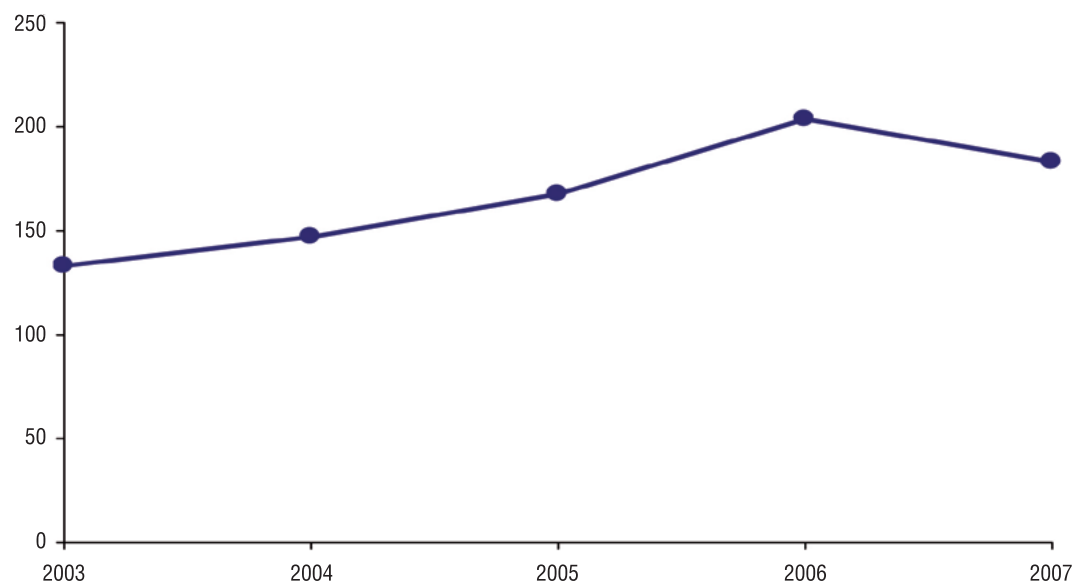
¹⁴ Frankema (2011) reports that in Malaysia (where large rubber plantations were quickly introduced and extended during the British Protectorate period), the Land Gini coefficient was 68 in 1960.

Figure 6. Production of major annual crops (thousand of metric tons) in Sierra Leone 1980 - 2006



Source: IFPRI (2009).

Figure 7. Food production Index (1999-2001 = 100)



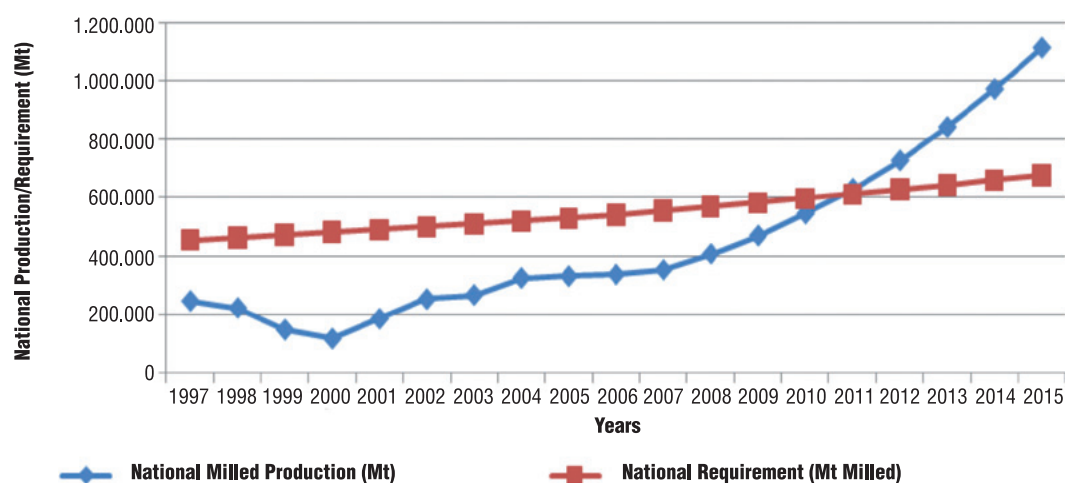
Source: World Bank. World Development Indicators 2010.

Table 5. National Rice Production and Self-sufficiency (1997 – 2008) - Sierra Leone

Year	Area (Ha)	Yield (Mt/Ha)	Production (Mt)	Milled Equivalent (Mt)	Population	National Requirement (Mt Milled)	Self-Sufficiency (%)
1997	360.789	1,14	411.300	246.780	4.382.360	455.765	54,15
1998	320.517	1,16	371.800	223.080	4.465.625	464.425	48,03
1999	212.137	1,17	248.200	148.920	4.550.472	473.249	31,47
2000	166.387	1,19	198.000	118.800	4.636.931	482.241	24,63
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

Source: MAFFS.

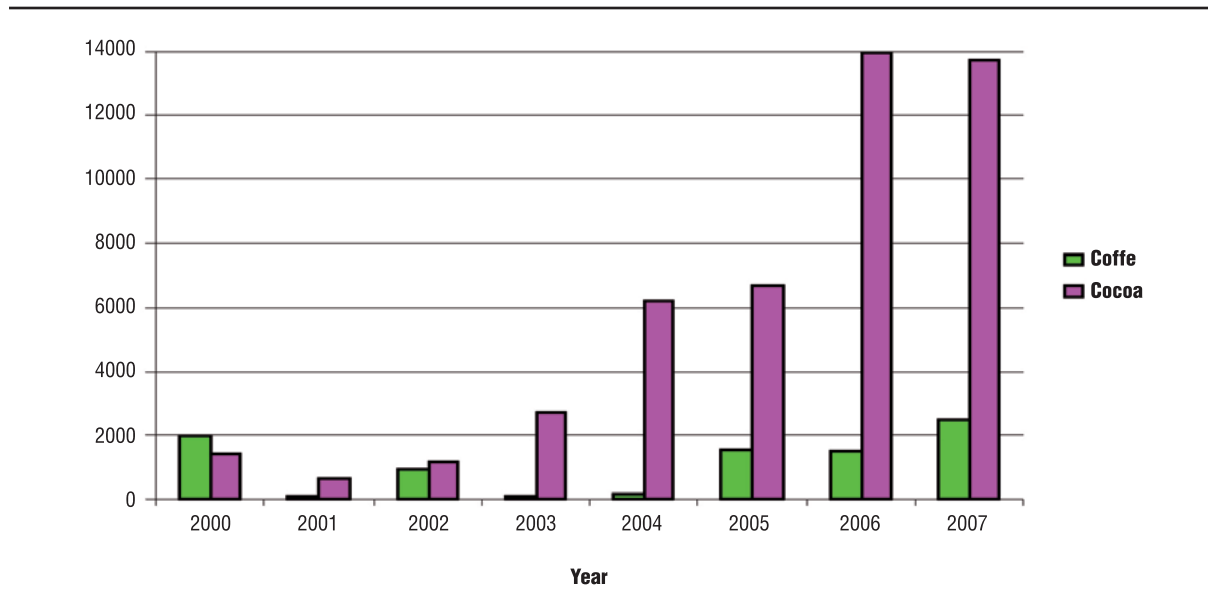
Figure 8. Sierra Leone rice production and requirement in metric tons



Note: 2009 - 2015 figures are projections.

Source: EDS (2009).

Figure 9. Sierra Leone export volume of tree crops in metric tons



Source: MAFFS, 2008.

Tree crop plantations in the Eastern region constitute the bulk of agricultural exports. Coffee and cocoa are the major tree crops, and are grown almost exclusively for export, while oil palm tree is mainly produced for local consumption. Other relevant exports include kola nut followed by rubber, cashew, orange and mango.

The area under cultivation and the associated production of export tree crop are constantly increasing, particularly in the case of cocoa, which is actively supported by international development programs (Figure 9).

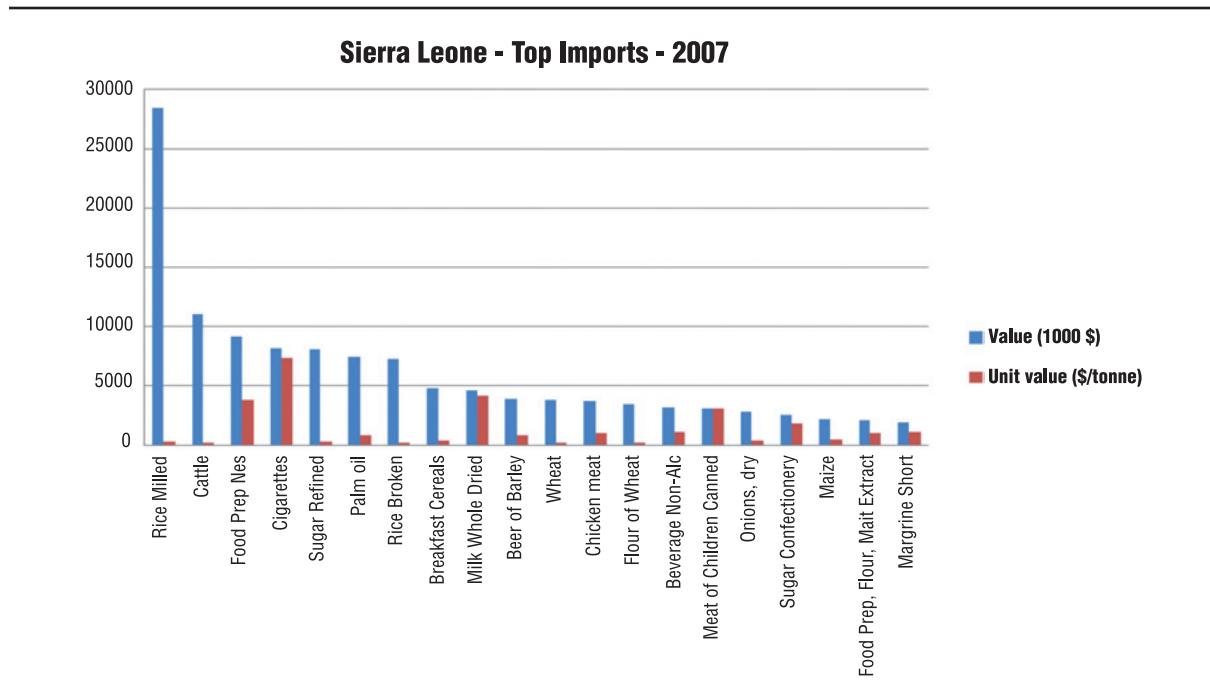
Likewise, the agricultural sector is considered an important source of foreign exchange earnings. In 2005, the sector accounted for approximately 15% and 5% of imports and exports, respectively.¹⁶ Figure 10 and Figure 11 describe top import and export goods, respectively. Among imports, milled rice constitutes the most important in terms of value. In a distant second position, cattle, prepared food, cigarettes and refined sugar are found. Regarding

exports, cocoa beans occupy an undisputed first position, followed by coffee.

The total value of agricultural exports was 13.67 million US\$ in 2007 (PRSP II, 2009), of which cocoa is accounted for by 85% (MAFFS, 2009a). Production is expected to increase considerably following full rehabilitation of cocoa and coffee plantations, and the introduction of more efficient processing methods resulting in the potential for improved product quality and hence better earnings on the world market (NSADP, 2009). So far, export earnings from coffee increased by 268% from 2005 to 2007, with export earnings from cocoa increased by 101% over the same period (PRSP II, 2009). This sustained increase in coffee exports can be attributed to favourable world market prices (PRSP II, 2009) associated with recent government efforts in conjunction with international agency support, e.g. the USTP initiative which have resulted in the recovery of the export crop sub-sector, in particular due to increased production levels and better quality control measures (Action Aid International Sierra Leone, 2009).

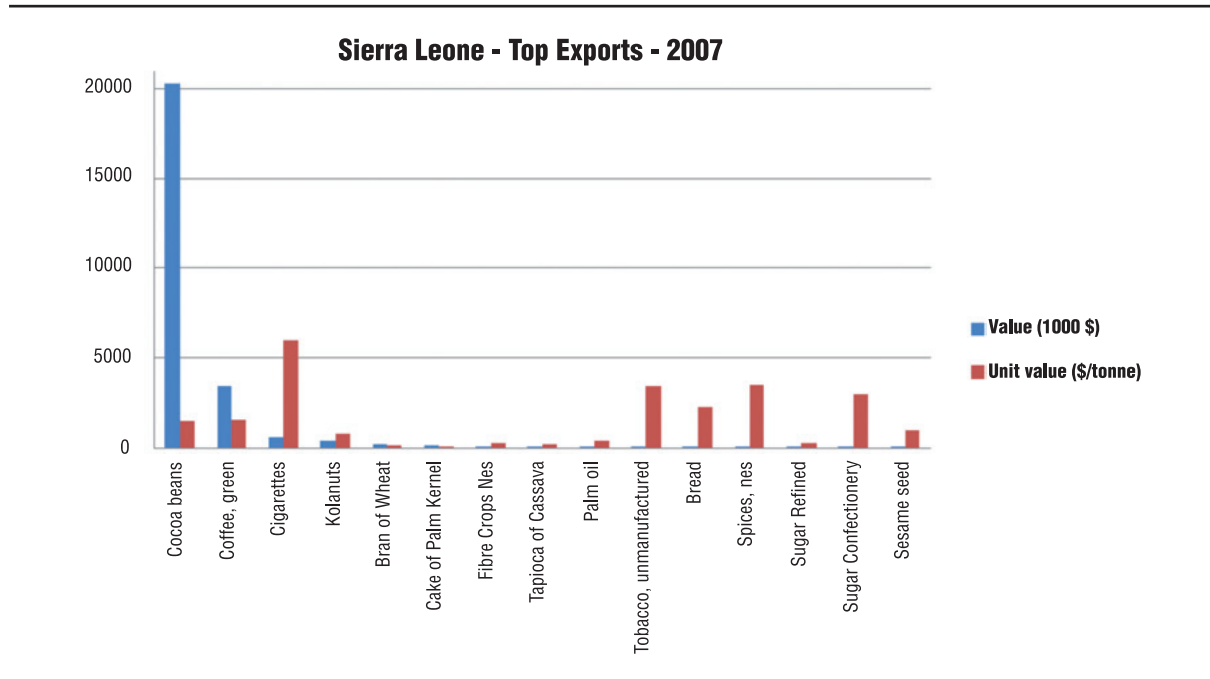
¹⁶ Government of Sierra Leone (2008): Annual statistical digests 2005/2006

Figure 10. Top imports – Sierra Leone – 2007



F = FAO estimates, Fc = calculated data and R = Estimated data using trading partners database.
Source: FAOSTAT (accessed on 04/05/09).

Figure 11. Top exports – Sierra Leone – 2007



Source: FAOSTAT (accessed on 25/06/10).

3.1.2 Livestock, Fishery and Forestry

Livestock

Almost 90% of Sierra Leone's cattle are in the Northern region and owned by the Fula or Fulani ethnic group who represent about 5% of the country's population. All the ruminants are indigenous populations of well adapted trypano-tolerant animals¹⁷. Birth rates are low (45%), mortality is high and off take is only 7%, due mainly to deficiencies and uncontrolled parasites and diseases. In comparison to the rest of countries in the

Western African sub-region, Sierra Leone has relatively a small number of livestock heads (Table 6, Figure 12).

Open grazing is generally practiced with cattle driven away in search of fresh fields by herd boys during the day and kept in wooden fence enclosures during the night. During the dry season when fresh grass is scarce, cattle are let loose for about three to four months until the rains commence and fresh grass is again abundant, then they are gathered and controlled. There is high risk of crop damage by cows during the dry season often causing conflicts among families in the villages. Cows are milked by

Table 6. Livestock (heads) per major category in selected countries of Western Africa (2008)

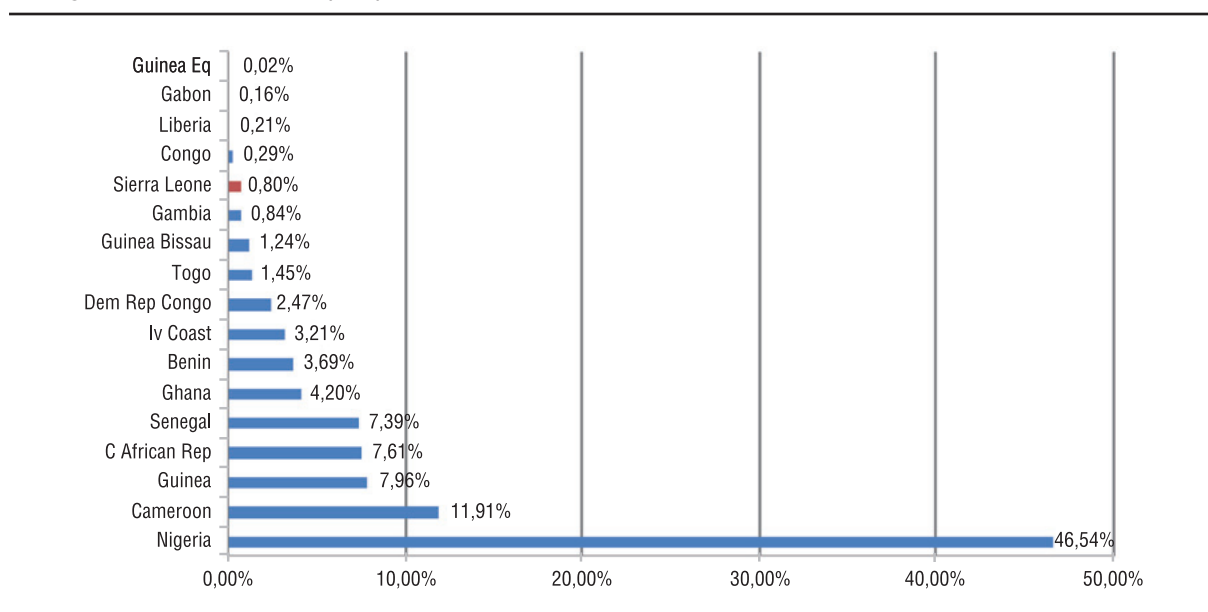
COUNTRY	CATTLE	GOATS	PIGS	SHEEP	TOTAL (Sheep Equivalent)
BENIN	1905000	1472250	341000	792750	17846000
CAMEROON	6000000	4400000	1350000	3800000	57550000
C AFRICAN REP	3950000	4069000	800000	294000	36763000
CONGO	115000	295000	68712	100000	1383712
DEM REP CONGO	752630	4046100	965130	902270	11934540
GABON	36500	92000	215000	196000	795000
GAMBIA	432000	380000	27000	209500	4072500
GHANA	1438000	4625000	521000	3642000	20292000
GUINEA	4408956	1696087	86431	1418886	38473052
GUINEA BISSAU	599200	392700	401300	388750	5976350
GUINEA EQ	5100	9100	6300	38000	94200
IV COAST	1537750	1281680	320000	1631230	15534910
LIBERIA	38500	285000	199500	241000	1033500
NIGERIA	16293200	53800400	6908030	33874300	224928330
SENEGAL	3207697	4470562	325747	5241352	35699237
SIERRA LEONE	350000	540000	52000	470000	3862000
TOGO	366350	1508100	582400	2001500	7022800

Note: Buffaloes are not found in Western Africa. To compute the total in sheep equivalent terms the category of "cattle" was multiplied by 8 while the remaining were multiplied by 1, i.e. same conversion factors as those used by Coelli et al (2005).

Source: FAOSTAT

17 The predominant breed of cattle in the country is Ndama; Sheep breed is Djallonke and goats are West African Dwarf.

Figure 12. Livestock (Ship-equivalent %) in selected countries of Western Africa



Source: Own calculations from table 6.

women during the lactating period and every second day as yields diminish. The milk is processed into butter and yoghurt which they sell in nearby markets or along the road sides. Women have the responsibility for looking after calves. Although its productivity is low, it is a hardy breed (i.e. trypano-tolerant) that is well-adapted to the prevailing ecological and socio-economic conditions (Jalloh, 2006).

Poultry are the most widely owned form of livestock and also the most numerous. Poultry mostly comprise domestic fowl, although there are smaller numbers of Guinea fowl and Muscovy ducks. Pigs are also widely distributed with many found in urban areas. The country's livestock population has been very severely depleted during the conflict and many years will be required to rebuild stock numbers to pre-war level. In the early 2000's, livestock contributed 4% of agricultural GDP (MAFF, 2001).

According to Unruh and Turray (2006) the decimation of livestock population during the war is a particular food security concern in the country. *"Livestock herds of reproductive utility require long periods to recover. Presently a single*

female cow in reproductive age can cost one million Leones (\$350 - \$400 USD). During the war the RUF shot a great deal of livestock, both for food and to decimate the countryside. In the north of the country the Fulani lost a great deal of livestock and moved their remaining herds across the border into Guinea. For the most part the Fulani herders have yet to return to be able to contribute to recovery of the national herd. Prior to the war ox traction was common in some areas, particularly in the north. Goat and poultry restocking programs are currently underway, and these can contribute to food security more quickly than cattle restocking programs; although cattle could also assist in related farming activities, primarily ploughing and transportation" (p 5, 2006).

Fishing

Along its coastline of 570 km and the continental shelf area of 25,600 km², Sierra Leone is rich with marine resources. It is also well endowed with inland waters (rivers, lakes, and flood plains) which support a large number of aquatic organisms. Fisheries are dominated by artisanal marine capture systems, and by small

scale fishing in inland waters. Industrial fishing is mainly done by foreign fleets. Aquaculture is not yet of significance. Total catch is currently estimated at 65,000 mt with artisanal production accounting for up to 70%. The fisheries sub-sector contributes 21% of agricultural GDP (MAFF, 2001).

From before the war, the government started exploiting this resource in partnership with foreign governments and companies who are mainly providing the vessels. Fish exports from Sierra Leone are made up of fish products manufactured by industrial fishing trawlers operating offshore. Foreign-owned vessels fish in Sierra Leone waters through joint arrangements with Sierra Leonean nationals. They comprise demersal, pelagic and shrimp trawlers as well as purse seine vessels fishing for tuna and herring. According to Jalloh (2006) the absence of home-based industrial fishing vessels and land based infrastructure and facilities to catch and process fish, limits the country's ability to maximize benefits from this resource.

Fishing is carried out largely by local canoes which exploit the inshore waters and the three large estuaries in the north-west and south of the country. There are an estimated 20,000 full time fisher (2.7% of active population in 2007 as reported in Table 3) men operating with some 6,000 boats of different sizes and designs. The level of boat motorisation is about 16%. A variety of fishing gears are in use (ring nets, drift nets, beach seines, cast nets, hook and line). The bulk of the fish produced by the artisanal sector is consumed locally. (Jalloh, 2006)

Forestry

Only 5% of the total land area is currently covered by closed forest (approximately, 640,000 ha), the remainder having being converted by cultivation mainly to bush fallow and to secondary forest re-growth; and in some areas, to derived savannah. The productive timber area is estimated at about 180,250 ha. The

greatest potential in the forestry sub-sector is the edaphic and climatic conditions, which provide favourable natural growth rates. Saw-log-sized timber can be obtained from *Gmelina arborea* in about 15 years, from pines in 25 years and from local hardwoods such as *Termilina species* in 35 years (MAFFS, 2001).

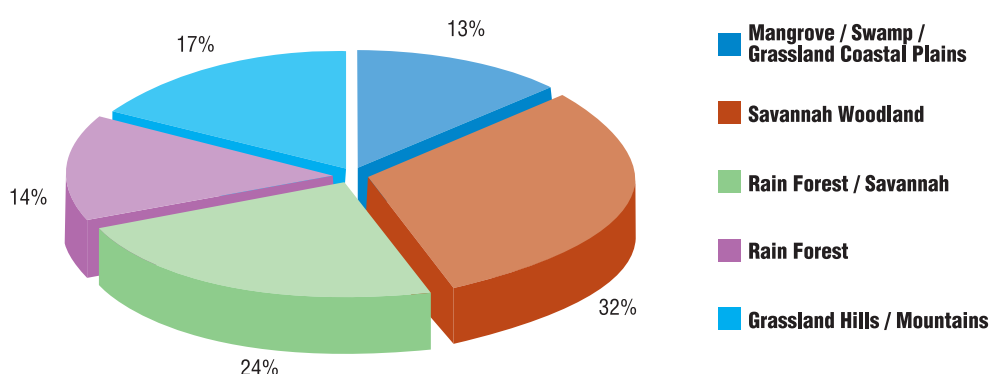
Fuel wood and charcoal production is the most important forestry activity and provides a supplementary source of income for most farmers. It is estimated that the country would require at least 30% of total land area to be under forest in order to be self-sufficient in wood. Forest reserves under the government comprise about 4 % of the country, and currently represent almost the only reliable source of timber. The contribution of forestry to the agricultural sectors GDP has varied between 9 % and 13 % since 1984/85 (Jalloh, 2006).

3.2 Agro-Ecologies, Agricultural Production and Agrarian System

Sierra Leone belongs to the humid climate zone of tropical Africa and it is thus characterised by a mix of rainforest and savannah woodland in 70% of its territory (see Figure 13 and Table 7). The climate in Sierra Leone is monsoon-type humid tropical with two distinct seasons. The rainy season spans from May to October and the dry season goes from November to April. Annual rainfall averages about 3000 millimetres, ranging from a low of 2000 millimetres in the North to a high of 4000 millimetres in the South. The average monthly temperature ranges from 23 to 29 degrees Celsius, with a maximum of 36 degrees in the lowlands towards the end of the dry season and a minimum of 15 degrees in the highlands at the beginning of the dry season (IFPRI, 2009).

Rainforest is the predominant natural vegetation in humid tropical areas (in Sierra Leone, rainforest is present in nearly 38% of the territory). In this eco-system, nutrients are partially

Figure 13. Agro-Ecological Regions in Sierra Leone (%)



Source: Own calculations. Data taken from Table 7: UNDP/FAO, Land Resources Survey, 1979 (in the Agricultural Sector Review – Main Report – June 2004) & IFPRI (2009).

Table 7. Agro-Ecological Regions in Sierra Leone

	Area (KM2)	Dominant Landform	Altitude	Average Temp. (OC)	Rainfall (mm.)	Average L GP DAYS	Dominant Vegetation
MANGROVE/ SWAMP/ GRASSLAND/ COASTAL PLAIN	11,016	Estuarine swamps, alluvial plains, beach ridges and coastal terraces.	< 150	27.9	3000	260 ± 10	Mangrove, swamp and grassland.
WOODLAND SAVANNA	27,993	Drainage depressions, undulating plains, low plateau and hills.	150-300	28.2	2280	255 ± 10	Lophira Savannah, Savannah woodland, mixed tree Savannah upland grassland and forest re-growth.
RAIN FOREST/ SAVANNAH	20,712	Plateau with undulating high lying plains, rolling hills.	150-300	28.5	2730	270 – 300	Savannah woodland, grassland and forest re-growth.
RAIN FOREST	12,579	Plateau with undulating plains, rolling plains and hills.	300-600	28.6	2660	314 ± 9	Forest and forest re-growth.
GRASSLAND HILLS / MOUNTAINS	14,723	Highly dissected hill ridges	> 600				Mountain grassland. Upland Grassland

Source: Adapted from UNDP/FAO, Land Resources Survey, 1979 (in the Agricultural Sector Review – Main Report – June 2004) & IFPRI (2009).

absorbed in the vegetation and not only in the soils. Soils are often leached, resulting in acid soils with problems of aluminium toxicity (Powell and William, 1993). Major crops in the humid tropics are maize, plantains, and tree crops.

Although permanent (i.e. non shifting) tree cropping under forest (mainly in terms of cash tree crops such as coffee and cocoa) are present in the country, the most widespread agrarian system¹⁸ in Sierra Leone is that of *shifting cultivation*. Under this agrarian system, also known as the *slash and burn* system, the vegetation is cleared by felling of trees, burning, and planting of crops for a specific period of one or two years. The nutrients of the ash provide a rapid, initially lush growth of crop plants. However, much of the ash and the nutrients are lost through runoff or through leaching. Another portion of the nutrients are lost with the harvest of the agricultural crops. Only a portion of the nutrients are recycled.

After harvesting the planted crops, the land is left uncultivated or *idle* for natural regeneration and quickly forms secondary forest (Mazoyer and Roudart, 2006). According to Grigg (1974) if regeneration takes place between 20-25 years it is denominated *forest-fallow*, between 6 to 10 years *bush-fallow* and between 1-2 years *short-fallow*. In the case of Sierra Leone the idle intervals have been continuously decreasing since 1960's when a 20 year period was sustained. Nowadays the idle period is closer to the bush-fallow levels between 4 and 7 years (NSADP, 2009). Consequently, the soil fertility is not fully restored, contributing to the decline in yields¹⁹.

Planted crops under the shifting cultivation system include sorghum, millet, maize, benniseed, groundnut and other grain pulses, cassava, sweet potato, and vegetable traditionally grown in mixed stands, with rainfed upland rice dominating (IFPRI, 2009). A common practice under this agrarian system is that of keeping some land for *permanent home gardens* (i.e. natural forest is replaced and household waste is used as nutrients). Garden production includes sweet potatoes, groundnuts and occasionally plantain trees. *Lowland rice production* is also common and the following rice cropping processes may be identified:

- a) *Traditional wet-rice cultivation* which exploits natural flooding during summer rains.
- b) *Rain fed lowland*.
- c) *River basin cultivation*: along the Niger River in West Africa.
- d) *Irrigated rice*: modern intensive form of rice cultivation which assures optimal flooding (about 5 cm) throughout the growing season(s), often long enough to allow double cropping.

The original vegetation in the sub-humid tropical zones is woodland with medium to tall grass ground cover, nowadays turned into woodland savannas (covering 32% of Sierra Leone's territory). Several plant species are grown in these areas, with rice and maize as major crops. Tubers are also common. Production is mainly utilised for the household's member self-consumption, and it is residually marketed.

Rice is the major food crop present in *mixed cropping*. The ratio of rice to other crops is approximately 3:1 (MAFFS & MFMR, 2004). *Mixed cropping* or *intercropping* is carefully coupled with *relay cropping*²⁰. Cassava has

18 In the Guidelines for Agrarian Systems Diagnosis (FAO 1999) the following definition by Mazoyer is given for an Agrarian system: "a mode of exploiting the environment historically created and sustainable; adapted to the bioclimatic conditions of a given space and responsive to the social conditions and needs of that moment". Several production systems together and the interactions between them make up an agrarian system.

19 Several authors have already pointed out the danger of the expansion of cropping and the reduction in fallowing (idle period) as it raises the risk of environmental degradation (Rothenberg, 1980; Mazoyer and Roudart, 2006).

20 Relay cropping is a multiple cropping technique where the second crop is planted before the first having been harvested.

become the second most important food crop grown both for its tubers and its leaves. Sweet potatoes groundnuts and different vegetables are always grown in varying proportions, mostly for family consumption although they can be used by women as cash crops for family income (Sesay *et al.*, 2004). Cassava and sweet potato are substitutes for rice for many households in Sierra Leone, especially in rural areas (NSADP, 2009).

According to Jalloh (2006) the *shifting cultivation* agrarian system predominates in Sierra Leone. "All the major food crops are cropped through this system and up to 15 and more different crops (sorghum, millet, maize, fundi (*digitaria*), benniseed, groundnuts, cowpeas, root crops and tubers including cassava, sweet potato, and yam together with a host of vegetables) are traditionally grown in mixed stands, with upland rice dominating" (Jalloh, 2006, p 11). Even though this traditional system of farming has served the people well for centuries, increasing population pressure and falling soil fertility are necessitating a revaluation of the system. According to the NSADP (2009), the government would like to discourage this system and is in favour of a higher value permanent cropping system under with more sustainable tree crops and food crop intercropping²¹. This strategy, which is aimed at better preserving and exploiting land and forest resources, focuses on a move towards permanent cultivation of food crops in the lowlands (see definition below), promotion of inorganic fertilization as well as land leasing to secure economies of scales in the production of exportable mono-crops (such as sugar cane).

Figure 14 shows the increase of agricultural land, and deforestation since the end of the civil war while Figure 15 provides an overview of top

agricultural goods produced in the country in terms of volume and value.

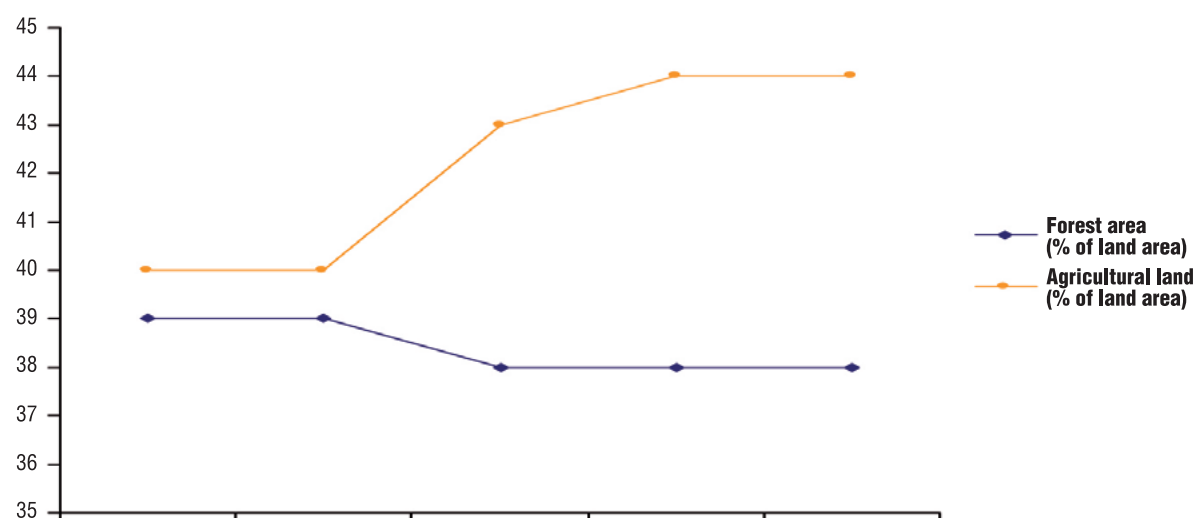
In the *shifting cultivation* system there is significant pressure on manual labour as cultivation involves clearing (or partly clearing) of woody vegetation and/or burning. Likewise, there is a relatively low level of livestock (due, among other reasons, to trypano-somiasis and other diseases²²), a situation which also contributes to substantial nutrient requirements of crops and forages in these zones as idle periods are shortened. Consequently, in Sierra Leone, farm households are generally constrained by the unavailability of necessary resources. The area they can cultivate is severely limited first by the need to keep idle land and second by the amount and quality of available capital and labour for the area under cultivation. The hoe, axe and cutlass are the main implements while labour is mainly supplied by family members. The widespread use of unimproved crop varieties and animal breeds, limited use of fertilizer, coupled with unimproved cultural practices adversely affect agricultural production. As stated, food 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 (Jalloh, 2006).

According to the Ministry of Agriculture, the country can be further sub-divided into two main agricultural areas given different altitudes and water resource availability (Figure 16): *The uplands* (which range from the savannah type grasslands to the tropical rain forest comprising 80% of arable land) and *the lowlands* (inland valley swamps, bolilands, mangrove swamp and riverain grasslands which represent the remaining 20%). *The uplands* are mainly found in the Eastern side of the country and include the following districts: Kono, Kenema and Kailahun (in the Eastern region), Koinadugu, and the Eastern parts of Tonkolili and Bombali (in the Northern region).

21 The government pursues this objective (as explained later under sub-section 3.4.1) through development programmes based on the improvement of rural infrastructure and agricultural extension services, farmer capacity building and support to productivity enhancing activities (i.e. mechanization, credit access, etc.)

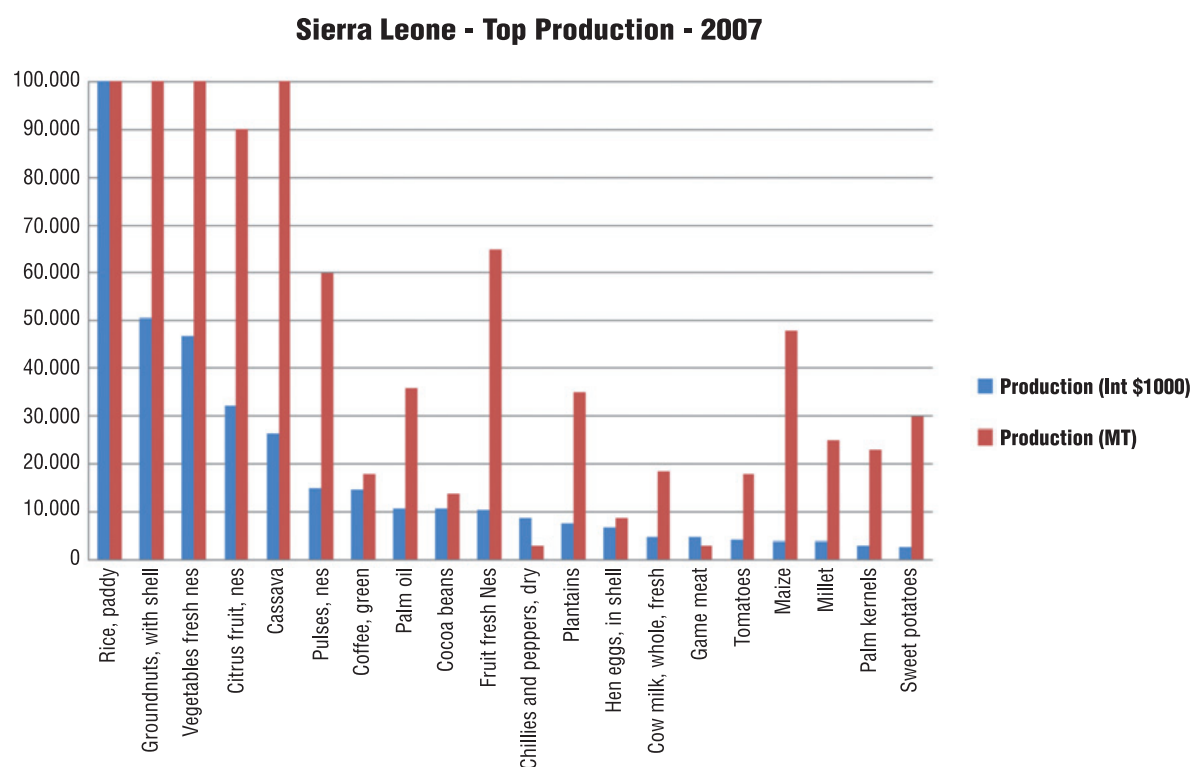
22 According to Powell and William (1993), when livestock production occurs, it usually involves dwarf trypano-tolerant small ruminants such as goats.

Figure 14. Forest area and Agricultural land in percentage of total land



Source: World Bank (2010) World Development Indicators..

Figure 15. Top agricultural goods production – Sierra Leone – 2007



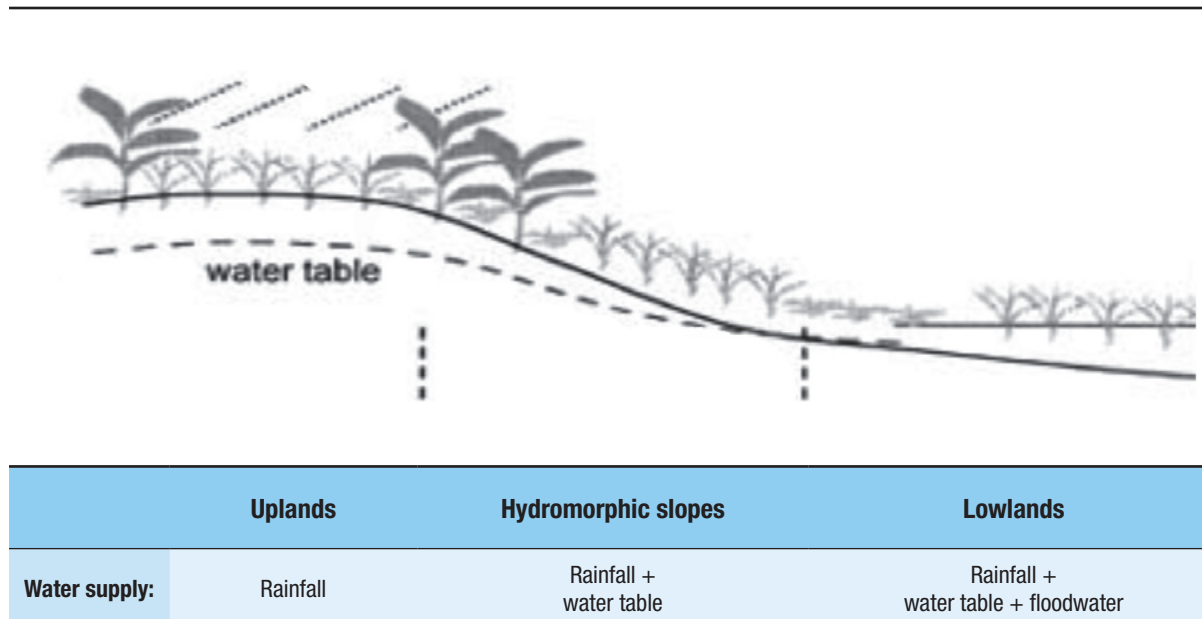
F = FAO estimates and Fc = calculated data.

Source: FAOSTAT (accessed on 25/06/10).

The lowlands are found in the remaining districts of the Northern region (Kambia, Port Loko) and the districts of the Southern region (i.e. rest of the

country is Bo, Bonthe, Moyamba and Pujehun). The latter indicates that, at least in the Northern and Eastern regions, there is a natural continuum

Figure 16. The upland-lowland continuum.



Source: FAO (2004)

Table 8. Total arable land per agricultural area in Sierra Leone (2001) & Annual average of area under production per agricultural area

Ecologies	Specific area (ha)	% of total arable area	Area Under Production Annually	
			ha	% of specific area
Uplands	4 200 000	78,3	280 000	6.7
Lowlands	1 165 000	21,7	155 000	13.3
Lowland: Inland Valley Swamp	690 000	12,9	100 000	14.5
Lowland: Boliland	200 000	3,7	10 000	5.0
Lowland: Mangrove Swamp	145 000	2,7	25 000	17.2
Lowland: Riverain Grassland	130 000	2,4	20 000	15.4
Total Arable Land	5 365 000	100	435 000	8.1

Source: MAFFS, 2001

Source: UNDP/FAO, 1979 Land Resources Survey, 1979 (in the Agricultural Sector Review – Main Report – June 2004).

between uplands and lowlands and many smallholders are likely to manage plots under both ecologies.

Present government policy for increased food production is geared towards rice intensification in the lowlands and tree crops and annual

crops (not adapted to lowland conditions) in the upland. According to the government, agriculture in Sierra Leone is in transition moving from a predominantly subsistence shifting cultivation in the uplands to a settled agriculture in the lowlands, especially in the inland valley swamps, bolilands and riverain areas (NSADP, 2009). Table 8, provides an overview of total area and

available arable land for each category; as well as the average amount of total cultivated area per year and its percentage in terms of total arable land (also per category).

The different agricultural areas described above determine the choice of crop mix (mainly depending on natural soil fertility and the availability of irrigation water)²³.

The Uplands

The uplands represent almost 80% of total arable land. They are less fertile and less apt for agriculture on a sustainable basis than the lowlands. Upland soils are largely feralitic, highly leached with low fertility, extending from the savannah grasslands in the North to the tropical rain forests in the South and East. The land is suitable for the *permanent* production of tree crops (such as cocoa and coffee) grown in the forested areas in the South and East of the country and food crops, such as rice, cassava, maize, sweet potatoes, and vegetables) (GoSL 2005b).

The *tree crops* of major economic importance are cocoa, coffee and oil palm. Oil palm is considered a subsistence crop, while coffee and cocoa are grown only for export. Large-scale plantations are not common and the majority of farmers have undertaken tree crop plantations with holdings ranging from 1 to 5 ha (MAFFS & MFMR, 2004). The tree crop plantations are developed under the shade of natural vegetation. In general, old plantations which were abandoned during the war are currently under rehabilitation, instead of establishing new plantations (field observation by project team). This is mainly due to the high sunk costs related to planting new trees which have substantially larger growing periods. Thus, cocoa and coffee plantations, mostly grown in the forest ecosystems that are predominant in the Eastern region of the country, tend to be low in productivity. In the

Northern region priority is given to palm, but also to citrus, mango and other fruit trees. Only minimal processing of cocoa beans takes place within the country prior to export. In the first instance, farmers leave the beans to ferment for 5-6 days either on the ground or in large rattan baskets, dried, and finally bagged. Small-scale farmers do not have access to mechanical hullers. As for the processing of coffee, the cherries are sun-dried and the beans hulled manually in the main growing areas. The bulk of oil is processed traditionally with a labour-intensive system (field observation by project team).

In the *uplands*, shifting cultivation of *food crops*, (i.e. mainly rice) are grown on mixed plots in the first year following clearing of bush fallow. Upland *slash and burn* cultivation includes many stages before harvesting and storage, with the overall labour requirements for an entire cycle of these cropping operations amounting to 185 man-days/ha on average (MAFFS & MFMR, 2004). As described earlier in this section, after a crop cycle of 2-3 years, the land is then left to lay fallow in order to regenerate forest, organic matter, soil structure and nutrients. Due to increasing population pressure resulting from the traditional land tenure system, changes in the economic situation and technological progress, the idle intervals have progressively shortened from an average of 20 years in the 1960s to approximately 4-7 years in recent years (NSADP, 2009). As a consequence, soils in the *uplands* are systematically becoming less fertile.

The Lowlands

The lowlands are more fertile and present a considerable potential for intensive cultivation. The maximum lowland area cropped in one year has been reported to be about 170,000 ha in 1995 (MANR&F, 1996).

In the *lowlands* rice is the dominant crop (since most of the other crops cannot tolerate the waterlogged conditions). Rice is also the main staple crop for over 90% of the population in

23 A. Lakoh, (Njala University, 2010) and FAO – IFAD (2006), Rural Finance and Community Improvement Programme (RFCIP).

Sierra Leone and is grown by almost 80% of all small-scale farming households.

The *lowlands* are cropped with rice on a more permanent basis, although some shifting cultivation is also practiced in these areas. A second crop, normally groundnut and/or vegetables, is grown during the dry season, generally on a small portion of the plot. Lowland labour requirements for swamp rice-cropping amounts to 309 man-days/ha on average (MAFFS & MFMR, 2004). The high potential of crop production in the lowlands is generally well recognised by farmers. However, because lowland cropping does not allow for crop diversification, with corresponding higher labour requirements, farmers attach more importance to the upland plot, maintaining the lowland plot only as a complementary part of their own farming system. Between the Northern and the Eastern regions, it may be said that the Eastern region represents three quarters of the rice-cultivated area of the Northern region.

The lowlands are divided into: *inland valley swamps*, *bolilands* (i.e. naturally grassy drainage depressions), *riverain grassland* and *mangrove* (used for the cultivation of rice invariably under flooded conditions).

The Inland Valley Swamps

Inland Valley Swamps (IVS) are encountered across the country and account for almost 13% of cultivable land and are generally highly fertile. They are generally narrow, flat bottomed, seasonally flooded valleys, varying in size from 10 to 200 hectares. Typically, valley swamps are drained by sluggish streams and floods for several months during the rainy season. They are ideal for flooded rice cultivation in the rainy season and some vegetable production during the dry (FAO, 1996). More specifically, vegetables include ground nut or cassava, whose cycle allow to plant them during the dry season when the water table drops but remains wet enough to allow

the production of short duration crops. Yet, some IVS are perennially flooded or at least remain wet enough to allow for the cropping of rice multiple times throughout the year. Thus intensive agricultural production of food crops is practiced, especially in the western side of the Northern region and in urban and peri-urban areas.

The Bolilands

The Bolilands are seasonally flooded shaped depressions that are found mainly in the central plains of the Northern region, especially in the districts of Bombali and Tonkolili. This ecology accounts for almost 4% of the cultivable land. Their drainage is very poor and most of the soils are highly acidic (FAO, 1996). Although inherently poor in fertility, Bolilands are suitable for large scale production of rice in the rainy season. Small scale household rice cultivation is widespread, but mechanised rice production is also practiced.

The Riverain Grasslands

The Riverain Grasslands, located in the Southern region (Bonthe and Pujehun Districts) on the alluvial flood plains of the Waanje and Sewa rivers, account for about 2.4% of agricultural lands and are flooded during the rainy season (FAO, 1996). They are relatively fertile and suitable for rice production.

The Mangrove Swamps

Mangrove Swamps are estimated to cover almost 3% of the usable land along the coast, being subject to sea water flooding during the rainy season. During the dry season, the soil becomes very acid. Fertility is moderate to medium. Mangrove Swamps are suitable for rice production, but the crop is subject to various depths of flooding. Serious diseases are absent, but weeds are a major problem as well as damage by crabs (FAO, 1996). Mangroves are found along the coast in the districts of Kambia and Port Loko in the North

and in the districts of Bonthe, Moyamba and Pujehun in the Southern region.

3.3 Chiefdoms & Farm Households: Institutional and Technical aspects

The average farm household in Sierra Leone cultivates 1.56 hectare. 56% of the farms have less or equal to 1 ha and the majority of holdings range from 0.5 to 2 ha operating as basic subsistence food production units (FAO, 2005). There is however, a group of medium-sized farms, typically of 4 to 15 hectares, usually owned by chiefs or local notables where food production is complemented by (cash) tree crops, and in some districts, by large scale livestock rearing or fishing activities. As stated previously, large estates of plantation tree crops or mechanised field crop production, ranging from 20 to several hundred hectares, are mostly government owned, but are all nearly now defunct or in an advanced state of dereliction (Sesay *et al.*, 2004). Following Grigg (1974), the two distinctive features of plantation crop production in tropical Africa are the lateness of its development and the relative unimportance of the plantation both in the past and in the present. In West Africa peasants have dominated the production of export crops and the plantation (i.e. large private/public estates operating mono-cropping systems) was and still is of lesser importance as argued by Frankema (2011) and Martin (1991). Although currently there appears to be a new wave of land acquisition/leasing agreements (Oakland Institute, 2011)

In most of cases small farmers (who represent the majority of the agricultural sector) manage different plots, of which 60-80% is located in the upland according, and 20-40% is in the lowlands (NSADP, 2009). Consequently, farms can include tree crop cultivation, usually in a larger upland plot, and a smaller plot in the lowlands. Farmers thus attempt to meet immediate household food requirements and sell any surplus to the local community.

According to Sesay *et al.* (2004) farm size is determined mainly by the limitations of household labour availability, the soil fertility in the framework of the rotational *slash and burn* land use system, and the acreage that can be managed by manual methods based on the hoe and cutlass. These productive constraints are often associated to the shortage of cash income and indebtedness; the non-monetary nature of the household economy; and the remoteness and paucity of social and welfare services available in rural areas.

3.3.1 Land Tenure

Among shifting cultivators land tenure is usually considered communal (i.e. land belongs to the tribe rather than to individuals) and there are frequently cooperative elements in working the land, particularly in clearing the vegetation. Boundaries with neighbouring groups are well defined physical features (Grigg, 1974). In the case of Sierra Leone private land tenure systems are only common in the Western region (near the capital city) where land is largely traded. In the rest of regions, a more traditional land tenure system (typified by holdings and leasehold of communal land) and under the control of chiefdoms is widespread.

Land tenure in Sierra Leone is held in communal ownership under customary tenure and is regulated by traditional rules. Land is a heritage entrusted to the community of a village. The belief that land exists for the following three categories: the dead, the living and the unborn. Consequently, land cannot be permanently alienated. This is a fundamental feature of the culture, which has a strong impact on landholding in rural Sierra Leone influencing current land tenure, food security and investment (Unruh and Turray, 2006). This concept is directly correlated to the need of possessing idle land in order to support the *shifting cultivation* system prevalent in the country. In other words, the need to shift fields frequently requires a great deal of land, and decreases the willingness of landowning farmers

to grant land to others on a secure basis, due to the need to have those lands available for their own shifting cultivation needs. Consequently, outright sale is forbidden within chiefdoms²⁴, but in principle rental for long periods is possible. The Sierra Leonean State authorises leasing for a maximum of 60 years (MAFFS & MFMR, 2004).

Yet, in practical terms, individuals not belonging to a land-owning family (also denominated as “strangers”) are usually only allowed access to land on an annual basis and cultivating beyond this one year time period is forbidden. Rent payment is usually made in the form of a token which is a part of the harvested output; mainly annual staple crops as there are also prohibitions against tree planting. This is because in Africa, trees are seen as a sign of permanent occupation and *de facto* ownership (FAO, 1999). The restriction also includes any permanent or semi-permanent improvements (such as investment in irrigation system) which could later be used to claim ownership. Individuals in rented lands are also subject to capricious decisions on the part of the customary landholder whenever there is a desire to retrieve land from temporary allocation. According to Salazar (2004) these “strangers” constitute 20 to 40 percent of chiefdom populations and they usually have to “frequently re-beg for land in the same or other locations each year”.

Unfortunately, it is very difficult to record many of these informal transactions or arrangement. Indeed, landowning families seem to transact land and the cost in time, money, and difficulties to formalise such transactions with the State (Ministry of Lands) are beyond what many landowning families are willing to consider, even if benefits increase from such registration (Unruh and Turray, 2006).

Lastly, the current land holding system (and the absence of official property titles) also makes it rather difficult for banks and other financial institutions to provide farm credit. This is mainly because the individual’s right only to usufruct does not provide the needed security. Even within landowning families, the individual cannot mortgage the land on which he works without the consent of the family leader and the authorities of the chiefdom. Moreover, even if the farmer gets the consent, the financial institutions, in case of default in payment, cannot sell the land to any purchaser, unless this person is a member of the same family (NRDS, 2009). Consequently, there is an obvious lack of land market in rural areas in Sierra Leone. Still, whenever grants are given, these are meant to support annual crops; loans for irrigation, drainage facilities, levelling fields, tree crops, construction of processing facilities, farm equipment are generally not considered (Unruh and Turray, 2006). To this situation it must be added the point of view of landowning family members who believe that using land as collateral for a loan is too great a risk. Besides, according to the principles which guide their communal access to land, any given loan to improve a parcel of land is expected to benefit the entire extended family and not only the individual in question.

3.3.2 Social Structure. Traditional Chieftaincy Structure and Role of the Paramount Chief

Rural lands in Sierra Leone are owned by families, under a chieftaincy structure (i.e. chiefdoms), that plays an important administrative and custodian role. The family is difficult to define because there are paternal and maternal associations qualifying a set of people to have land rights in more than one village territory. In addition, the family includes extended families or lineages composed of the ancestors, the living, and the unborn generations (MAFFS & MFMR, 2004). The chiefdoms of Sierra Leone (149) are the third-level units of administration in the country (after the provinces/regions and districts). The chiefdoms as institutions have a colonial

24 According to Unruh and Turray (2006) it is impossible to get all family members together to agree to a transfer or sale, given that most of them are not yet born, or death.

origin. According to Fanthorpe (1998) the British created small chiefdoms in order to facilitate tax collection, often dismantling large pre-colonial polities in the process. While chiefdoms vary in size, the families are tied to specific areas within a given chiefdom. Chiefdoms are commonly divided into plots belonging to each extended family member. Generally, these family plots do not increase over time as the family becomes larger and larger, and consequently, the descendants of each subsequent generation inherit increasingly small parcels within the family plot. Parcelisation leads to a continual reduction in size of the nuclear family's land share which can lead to land shortages.

Chiefdoms are comprised of an internal hierarchy, often with section chiefs at different administrative levels. However, the most important role in relation to land matters, settlement issues and political representation is held by the "*Paramount Chief*". Traditionally, no significant land matters are final unless the *Paramount Chief* approves. While the *Paramount Chiefs* hold the land in trust for those in the chiefdom, there are prominent landowning families. Usually, landowning families are those who are able to trace their ancestry back to early arrivals in the area. It is not clear in the academic literature whether these ruling families proceed mainly from pre-colonial high political status or whether family mandate was gained by collaborating with the British administration which promoted their socio-political ascension (Fanthorpe, 1998). Allocation of land within extended families is usually accomplished by the leadership of the family in question, with a variety of possible arrangements regarding permanence of allocation, crops (both annual and perennial), and labour. Nonetheless, it is possible to find chiefs which also have significant influence over the sharing of land even among members of the prominent landowning families. According to Unruh and Turray (2006) the chiefs are also able (though landowning families) to allocate land to refugees from Liberia and elsewhere in West Africa in the same way that "strangers" (Salazar,

2004) (i.e. those from outside a chiefdom) are provided rented land within a chiefdom.

The relative importance of the *Paramount Chief* has grown following the civil war; especially since many internally displaced individuals are attempting to access (or re-access) land. As is the case in many post-war scenarios, this "return" is complicated, and is linked to issues of: restitution, squatting, one's land being occupied for years by others (thus potentially qualifying for any "adverse possession" claim in a land or property law), conflict, and issues of legitimate or illegitimate claims, as well as issues of food security. The *Paramount Chief* thus has an important role in deciding which claims are valid and presiding over disputes while keeping in mind issues of welfare, equity, long term occupation and absence, evidence, and compensation for improvements. Consequently, Chiefs have become quite aware of their enhanced role in local governance, but also of the social changes that have occurred in their chiefdoms during and since the end of the war (Unruh and Turray, 2006). In other words, the Chieftaincy Structure, and by extension the customary land tenure system (as an approach to land administration) appears to have re-strengthened itself significantly after the war.

Labour shortage at peak production periods has characterised agriculture in Sierra Leone for many years. Therefore, it had been common in chiefdoms to form labour gangs of both men and women to address this. According to Unruh and Turray (2006) one variation of communal labour effort is for families to add one or more of their older children to a group of labourers and then receive one or two days of the group's labour on the family's land in exchange. However, labour shortages have intensified since the war because of the difficulty in keeping young men in the villages and motivated to participate in agricultural activities, particularly those who have had combat experience. Village community structures do not, in general, empower young people, and many have looked for alternative employment, not always with much success. In

the Northern region, this labour shortage means that farmers are unable to harvest the entirety of their crop, and are obliged to leave part of their crop in the fields.²⁵

As Unruh and Turray (2006) highlight the post-war reduction in labour availability has not been replaced by mechanised farming thus leading to the cultivation of even smaller plots and the associated problems in food production as surplus is not enough to feed the now larger (post war) urban population. Such post-war situation has led to significant changes in rural social relations, for now it is more widely recognised the strategic value of labour for timely agricultural practices and food security issues. The impacts of such changes are that agricultural labour is now much more costly, and much less likely to operate within any obligatory framework, and that traditional forms of “forced” labour have been replaced by a process of negotiation to engage labour. This approach is supported by the government. This new context has also provided the opportunity for marginalised groups (particularly within landowning families) to exercise rights regarding land that might not have occurred otherwise, such as land access for youth and women’s groups.

3.3.3 Household and Division of Labour

An average household is composed of 6.5 persons (NRDS, 2009). The household head is generally male. A woman can be head only in the absence of a male in the household. Although both men and women have important roles in the agriculture sector, there is considerable gender differentiation in the tasks undertaken. Men clear land and plough, women weed and both harvest. This means that men’s input is more intensive at given times, often when there are likely to be labour bottlenecks, and women’s is more spread out throughout the growing season,

though crucial for realising good yields. During and after the war, more women have had to take on the primary responsibility for food production, because men had been killed, disabled or had not returned to their home villages. According to Sesay (2008) women produce 60% of food crops and handle processing and storage. Traditionally women also grow vegetables and groundnuts in home gardens, and undertake the marketing of these crops. A baseline study, undertaken by CARE in Fakunya, Kamajei and Gbonkolenken chiefdoms in the Moyamba and Tonkolili districts respectively, indicated that 82% of marketing societies, related to garden productions, are for women producers (Sesay *et al.*, 2004).

3.3.4 Production at the Farm Household Level

Sierra Leonean farming is generally characterised by low input / low output production (NSADP, 2009). Most farm operations are carried out using hand tools such as hoes and cutlasses. Farm (hired) labour can be expensive (and particularly acute are the labour shortages for cash crops): the daily salary for a male worker may reach up to 7000 SLL (field observation by project team). Thus households depend largely on family labour. Concerning the machinery which was used in rural areas to process palm oil, can mangos and process other cash crops it was destroyed or removed during the war and has yet to be replaced. Access to tractors is also highly limited. (Unruh and Turray, 2006)

As mentioned previously, *mixed cropping* (or *intercropping*) is a widespread production process under the *shifting cultivation* system. It is extensively used (particularly for farmers in *the uplands*) for a number of reasons which include: lighter labour input requirements and more balanced gender/age division of responsibilities, risk minimisation, improved pest and disease management and availability of food over a longer period of time. Risk minimisation is given priority over other targets (including return/income maximisation) which characterize the majority of African smallholder farming systems. (NSADP, 2009)

²⁵ Field observation during validation by the project team (Alpha Lakoh, Baudouin Michel, Gisèle Hites, Sergio Gomez y Paloma and Frank Sammeth, December 2009).

The use of yield increasing technologies is scarce. Fertilizer use amounts to 4 kg/ha, which is very low when compared to wider applications of 9 kg/ha average for Sub-Saharan Africa (NSADP, 2009). Most farmers rely upon the natural fertility of the soil since fertilizers are usually either unavailable or unaffordable. In fact, fertilizer imports are particularly low since the Government of Sierra Leone moved out of the fertilizer supply business and demand virtually collapsed. The low consumption rates in Sierra Leone may have adverse implications for poverty alleviation and agricultural productivity in most of the rice ecologies as farmers have adopted cropping systems based on low input use along with shortened idle. Aggregate potential demand for fertilizer is estimated at about 390,000 metric tons. Potential demand based on land use for rice and other food crops is estimated at 145,000 metric tons of urea and NPK (MAFFS and MFMR 2004).

The use of improved planting materials and production methods is also low (FAO, 2005), especially for cocoa and coffee (e.g. low densities, high age of the orchards, use of old cultivars and uncertified propagating stocks, lack of maintenance, inadequate cultivation methods).

As explained in the Agricultural sector review and agricultural development strategy

(MAFFS, 2004): *The majority of farmers rely on seed from open pollinated varieties that are saved from previous harvests (the farmer seed system). Generally, seed is not differentiated from grain for consumption through formal standards. But many farmers harvest selected plants (panicle harvesting) for seed or separate grain to be used as seed at some point either before or after harvest. Seed is also sourced through a variety of other methods including begging, barter, loan or direct purchase. The quality of the seed acquired from these variable sources is normally based on trust or "social norms of reciprocity".*

Most farmers obtain planting materials for tree crops by saving their own seed and nursing seedlings in small beds or pots close to their dwelling houses. For plantations, input requirements, particularly seedling for tree crops, have been met using three different approaches:

- a) Improved high yielding varieties multiplied in established nurseries
- b) Importation of hybrids and improved cloned materials, and
- c) Multiplication of local materials of "unselected and unknown parentage" otherwise known as 'volunteer seeds'.

Table 9. Yield of Major Crops in Sierra Leone (2008)

Crop	Yield (ton/ha)
Cassava (Upland Sole Crop)	6.37
Sweet Potato (Upland Sole Crop)	3.77
Groundnut (Upland Second Crop)	0,68
Maize (Upland Second Crop)	0,84
Cowpea (Upland Sole Crop)	0,49
All Rice Ecologies	1,43
Upland Rice	0,70
Boliland Rice	0,72
VS Rice	1,58
Riverain Rice	1,56
Mangrove Rice	2,61

Source: EDS (2009).

Table 10. Crop yield level in West Africa, rainfed (2000 – 2004 average, ton/ha)

	Cocoa	Coffee	Oil Palm	Maize	Cassava	Sweet Potato	Rice	Rice irrigated
Burkina Faso	NA	NA	NA	1.6	2.0	8.2	1.0	3.2
Chad	NA	NA	NA	0.7	11.7	2.6	0.9	2.6
Gambia	NA	NA	NA	1.4	3.0	NA	1.8	3.0
Guinea Bissau	NA	NA	NA	1.3	15.3	NA	1.1	2.6
Mali	NA	NA	NA	1.1	11.0	13.9	0.9	2.6
Mauritania	NA	NA	NA	0.9	NA	1.0	NA	4.5
Niger	NA	NA	NA	0.8	21.0	15.4	2.8	5.6
Senegal	NA	NA	0.8	1.5	5.6	5.0	1.1	4.2
Guinea	0.4	0.4	0.2	1.1	5.1	3.0	1.4	3.3
Sierra Leone	0.4	1.1	1.0	0.9	5.3	2.5	1.4	2.3
Ivory Coast	0.6	0.4	0.3	0.9	5.1	2.2	2.1	5.6
Ghana	0.5	0.2	0.3	1.5	9.5	1.4	2.0	3.3
Togo	0.3	0.3	0.8	1.2	6.0	1.1	1.9	3.4
Benin	0.3	0.2	0.8	1.1	8.8	5.1	1.9	2.6
Nigeria	0.2	0.9	0.2	1.2	11.4	4.2	1.0	2.8
Cameroon	0.5	0.3	0.8	1.3	8.7	5.0	1.6	4.0
Central African Republic	0.4	0.5	0.6	1.0	2.9	NA	1.9	NA
Gabon	0.1	0.3	NA	1.5	5.1	1.8	2.0	NA
Congo	0.3	0.3	0.4	0.8	9.1	6.8	0.7	NA
Democratic Rep of Congo	0.3	0.4	0.3	0.8	8.1	5.0	0.7	2.6
West Africa Average	0.2	0.3	0.4	1.1	7.7	4.2	1.4	2.9

NA: Not available.

Source: IFPRI (2006).

New varieties are generally acquired by small-scale farmers from several channels including social networks, itinerant traders, NGOs, the extension services, and from participatory variety trials in which it has been shown that farmers have the capacity to make selections that are akin to those of researchers in the national research stations. Notwithstanding crop yields (tons per hectare) remain low for major crops as portrayed in Table 9.

Moreover, according to IFPRI (International Food Policy Research Institute) estimates from 2002-2004, Sierra Leone yields for rainfed crops are relatively lower for staples but higher for tree crops in comparison to the West African

average (Table 10). In the case of irrigated rice, the yield for Sierra Leone is also below the yield for the West African region. In any case, the yield comparisons indicate that the Sierra Leonean farm households which are focused on subsistence agriculture of staple crops are the least efficient compared to the average in West Africa, while the opposite can be stated with reference to the Sierra Leonean farm household focusing on cash crops.

Another important constraint to take into consideration is that estimations indicate that the average post harvest losses can be up to 40% (MAFFS, 2009b; NSADP, 2009). This number can be even higher for perishable

crops such as vegetables, fruits, cassava, and sweet potatoes. In certain situations losses can sometimes rise above 50% (MAFFS, 2009b). Poor post-harvest handling, storage facilities and transportation are the main causes of such high loss rates.

3.4 Agriculture - Related Governmental Policies in Post War Sierra Leone

3.4.1 Development policies

The country's post-conflict development agenda is summarised in the following documents: *National Recovery Strategy* (NRS, 2002), *Interim Poverty Reduction Strategy Paper* (IPRSP, 2006), *Vision 2025 and Poverty Reduction Strategy Paper* (PRSP, 2005-2007) first and second phases. In turn, these have been integrated into international development agendas like the *Millennium Development Goals* (MDGs, 2005) and the *New Partnership for African Development* (NEPAD, founded in 2001).

Although IPRSP and NRS did not have agriculture specific programmes, their objectives (i.e. state consolidation, peace building, reconciliation, enforcement of human rights, resettlement, economic stimulus and provision of basic social services) provided the basics for sectorial growth. Unlike the IPRSP and the NRS, the PRSP had agriculture specific objectives concerning food security and job creation in rural areas. In this respect, four key priorities were identified: policy framework and capacity building, increasing food production, improvement of rural services and rural infrastructure. According to Sesay *et al.* (2004) these priorities include the following initiatives:

Effective Policy Framework and Capacity Building:

- Re-organisation and training of agriculture staff and other relevant service providers.

- Farmer empowerment through local capacity building to organise themselves, effectively express their demands for the various support services they require and take steps towards a more commercially oriented approach to agriculture.

- Promotion of matching grant – for small investment schemes.

Increasing Food Production:

- Rehabilitation of the infrastructure necessary for the production and distribution of good quality planting material.
- Promotion of improved rice cultivars and alternative root crops to fill the hunger gap.
- Development of a localised community based system of seed multiplication on a semi-commercial basis, which could also encourage entry of the private sector into this market.
- Mechanisation programme support in order to cultivate suitable large land areas in low land ecologies to bring about accelerated productivity using improved farming practices to achieve increased rice production, and to encourage youths back into the rural sector. It should be geared towards strengthening private investment in machine hire services.
- Facilitate access to and management of credit from bank(s).
- In the livestock sector, rehabilitation of laboratories and veterinary clinics as well as of abattoirs.
- The fisheries sector needs to boost the Monitoring, Control and Surveillance (MCS) activities under the Artisanal Fisheries Development Project for Sierra Leone to protect its marine fisheries resources and

bring about increased fish supplies to the domestic and export market and contribute to poverty reduction.

Improving rural services:

- Extension services: create a demand-driven semiautonomous extension system to take over from the current dysfunctional government system. This will build on initiatives such as the present Farmer Field Schools, to involve a number of different stakeholders: the private sector, NGOs and research and training institutes.
- Research system: restructure by bringing all research programmes under a unified management structure, the Sierra Leone Agricultural Research Institute, to develop and implement a National Collaborative Agricultural Research Programme. Research will be primarily adaptive, and respond to the needs expressed by farmers in the areas of crop production, livestock, fisheries, post-harvest technology, natural resource management and agricultural policy.
- Rural finance: restructure so as to ensure access by farmers, both men and women, to provide credit for input use and seasonal credit. Credit will also be required for equipment purchase, and credit lines should be organised for farmer's association and small-scale farmer groups, and to encourage the participation of other private sector investors in various aspects of the livestock industry. These service delivery programmes should be developed in collaboration with farmers.

Rural Infrastructure:

- Roads, this programme will be undertaken by central and district roads, transportation and works departments as part of an expected wider, national intervention to bring the country up to a recognizable international standard of provision. Maintenance of all but the major

roads will be the responsibility of district councils, and it is necessary that suitable funds are made available for this purpose.

- Irrigation and drainage works rehabilitation, and handling and storage facilities; it is recommended that these should be implemented through districts, chiefdoms and farmer groups, to be financed mainly by loans, with a significant beneficiary contribution.

Towards the end of 2009, the GoSL published The National Sustainable Agriculture Development Plan (NSADP) which follows from the second generation PRSP, the Agenda for Change and the Vision of commercialising agriculture, forestry, fisheries and livestock through linking small to large farmers to market economies (NSADP, 2009). The Plan therefore not only reorganises precedent efforts and policies in the agricultural sector but sets four specific major sub-programmes that have the specific objective of increasing agriculture sector growth from 2% to 6% per annum by 2015. As with past documents, the NSADP is in line with the first Millennium Development Goal and World Food Summit targets (NSADP, 2009). The four sub-programmes include:

- Commercialisation of key commodities including a small-holder commercialisation scheme and medium and large farm producer's promotion scheme.
- Agriculture infrastructure with focus on rehabilitation and upgrading of feeder roads, development of irrigable swamps, rehabilitation and modernisation of storage and processing facilities and rehabilitation and construction of research centres and MAFFS/MFMR facilities.
- Private sector promotion which will focus on policies and legislation to encourage sustainable domestic and international investments in the agricultural and fisheries sector.

- Sector coordination and management to improve transparent, efficient and effective sector coordination and management.

The latter is accompanied by a change in cultivation methods for the major agricultural areas of Sierra Leone: *“A gradual shift will be encouraged from damaging and low yielding but diversified slash and burn upland rice systems towards more stable perennial and tree crops with inter-planting of rice and diverse crops including livestock”* (NSADP, 2009). Simultaneously the government intends to promote in the uplands the cultivation of legumes that allow improving the quality of the soil while fixing nitrogen and enhancing its fertility. For the cultivation of tree crops, the government plans to address long-term land security issues and lease holding payments to communities.

In the case of the inland valley rice system (IVS), the introduction of water control structures and cropping systems that have both rice and legumes are envisaged in the NSADP. For this purpose, non-photoperiod sensitive varieties will be emphasised for double cropping (rice-rice and rice-legume). In this area, land security issues will also be resolved mainly to foster the long term investment in water control structures.

3.4.2 Agricultural taxation and tariff policies

According to Jalloh (2006) the key features in the Income Tax Act and Tariff Regime with relevance to agriculture for import duties may be summarised as follows:

- Lower duty rate of 5% on raw materials and inputs, capital goods and social products including all basic educational materials, pharmaceutical products for primary health care and agricultural machinery;
- Import duty rate of 20% for immediate and 30% for final goods as defined in the tariff;
- Duty draw back system for imported inputs and all exports;
- Elimination of export taxes for export-oriented industries;
- Zero duty rate on imports of raw materials for industries with a market share of 60% or more for that product;
- Sales tax rate of 20% on all imports, except capital goods;
- Domestic sales tax of 20% on domestic output. However, companies with turnover of less than Le 200 million are exempt from paying domestic sales tax on outputs; these companies are instead required to pay sales tax on only imported inputs;
- Import duty on rice is 15%.

For income tax they are:

- Reduced corporate tax of 35% is payable by all companies;
- Income earned from rice farming is exempt from tax for a period of 10 years from the date of commencement of the activity for both incorporated and unincorporated businesses;
- The threshold for income tax on employment income is Le 1 million, while the top marginal rate of tax for employees, the self-employed and property owners is 35%, which applies to most small scale farmers;
- Payment of payroll tax for foreigners currently ranges from Le 250,000 – Le 1 million;
- The amount of investment allowance to be deducted from business income is 5% of the cost of the relevant asset;

- Repatriation of after tax profits or dividends is subject to the payment of withholding tax of 10%;
- Repatriation of original loan or interest payment thereon, known-how fees and other services at the exchange rate prevailing at the time of repatriation;
- Capital allowance deduction is allowed for depreciation of a taxpayer's depreciable assets.

The most significant effect of the tariff regime is an excise tax on imported fuel of 50 %, the landed cost of petrol and 41 % for diesel. This affects tradable costs of all inputs, as well as marketing and processing costs. Materials directly related to the production in all the sub-sectors (crops, livestock, fisheries and forestry), however, face reduced import duties. Specific machinery (tractors, and appliances, harvesters, veterinary drugs and implements) can be imported at a lower duty rate of 5 %, compared to 50 – 100 % for luxury cars. Concerning protectionist measures, as stated above, rice is subject to 15 % import duty. Nonetheless, (at the moment of writing) with the ongoing negotiations for a common external tariff harmonisation for the ECOWAS²⁶ and UEMOA²⁷ regions, the government would no longer be able to influence tariffs on both agricultural inputs and outputs.

3.4.3 Rice: Government support and intervention

The government through the Ministry of Trade, the Rice Department, the Rice Corporation, and the Sierra Leone Produce Marketing Board (SLPMB) has been deeply involved in rice trading. According to the report issued by IFPRI (2009) the local rice operation of the SLPMB was rather unsatisfactory as less and less local rice was sold

to it because of the unattractive floor prices set by the government for local rice. Starting in 1987, the monopoly of SLPMB in the rice trade declined considerably when its foreign reserves from cocoa and coffee trade plummeted due to low world prices; it thus ceased operation. Consequently, by the late 1980s, the private sector had assumed a dominant role in the marketing of both local and imported rice in Sierra Leone. However, the estimated proportion of local rice that has been marketed since the 1980s has averaged about 20 percent of annual production, implying that most of the rice produced locally is consumed by farm households (IFPRI, 2009).

Since the war, the marketing of rice in Sierra Leone has not fundamentally changed, except that the volumes of local rice production are much lower and of reduced quality (given the absence of sufficient milling facilities²⁸) now than before the war. In fact, although the rate of self-sufficiency in rice increased in Sierra Leone between 2002 and 2007, the country still imports substantial proportion of rice, which has increased from 120 000 tons per annum during the pre-war period to 230 000 tons post war, a quantity short of the national requirement of 530 000 tons of milled rice per annum (MAFFS, 2009 & FAOSTAT).

The market structure for rice and other major agricultural commodities sold by farmers in Sierra Leone (i.e. maize, cassava, groundnuts, and vegetables) generally follows a producer-wholesaler-retailer-consumer pattern.

3.5 Sector Constraints and Challenges

Although Sierra Leone is naturally endowed with adequate land, water and climatic conditions (to enable the agricultural sector to contribute to high economic growth and food security) the national context is one of the most

26 The Economic Community of West African States (ECOWAS) is a regional group of fifteen West African countries

27 The West African Economic and Monetary Union (also known as UEMOA from its name in French, Union économique et monétaire ouest-africaine)

28 In 2004, a total of 53 small scale rice mills existed in Sierra Leone. 60% of these mills were located in the Northern region (National Rice Development Strategy. Sierra Leone, 2009)

severely deprived in Sub-Saharan Africa in terms of institutional facilities (FAO, 2005). The majority of the farmers in Sierra Leone operate as basic subsistence food production units, who, for the most part, do not use improved techniques and inputs. Crop production is thus characterised by low yields and productivity insufficient to supply the food requirements of their farm households. The slow growth of the sector (all crops included) may therefore be attributed to the interplay of several factors influencing farmers' behaviour²⁹ and farm productivity.

3.5.1 Poverty & Food Insecurity

Rural areas in Sierra Leone have the highest levels of poverty in the country, and this is closely

linked to the situation in the agriculture sector. In the 2004 Sierra Leone Integrated Household Survey, 37% of the survey participants blamed their poverty on "poor access to assets and services, climatic and market conditions in the agriculture sector," as opposed to 32% on "business conditions," and 27% as a "direct result of the war." Although agriculture -related factors are not at the top of the most frequently mentioned characteristics and causes of poverty, infertile land, poor harvests and lack of agricultural tools are all regularly mentioned; "while having cash crop plantations" are mentioned as an important element of well-being. (Sesay *et al*, 2004)

In some districts, such as Tonkolili, Koinadugu and Pujehun, about 50% of household

Table 11. Average annual consumption per household by district (in Leones)

District	Food Purchases	Own production	Total	% Consumption from own production
Bo	995,232	715,118	1710,350	41,81%
Bonthe	910,517	379,453	1289,970	29,42%
Moyamba	1183,441	693,217	1876,658	36,94%
Pujehun	956,562	988,413	1944,975	50,82%
Kailahun	713,654	554,446	1268,100	43,72%
Kenema	829,861	307,047	1136,908	27,01%
Kono	1133,343	825,458	1958,801	42,14%
Bombali	744,451	496,880	1241,331	40,03%
Kambia	1529,847	668,281	2198,128	30,40%
Koinadugu	909,429	962,337	1871,766	51,41%
Porto Loko	1282,879	566,595	1849,474	30,64%
Tonkolili	799,715	885,010	1684,725	52,53%
Western Urban	2773,500	2,985	2776,485	0,11%
Western Rural	2132,890	138,215	2271,105	6,09%
Total	1208,987	576,900	1785,887	32,30%

Source: Sierra Leone Integrated Household Survey 2004 from Sesay *et al*. (2004).

²⁹ According to Sesay *et al* (2004) the fact that in most instances agricultural policies have been formulated without the participation of the farmers themselves has implied that farmers remain unclear about the intentions or usefulness of such agricultural policies. As a result, even if such policies may be good for the farmers, they may not have the desired effect, since there is lack of trust and feeling of ownership by the anticipated beneficiaries.

Table 12. Food production targets and achievements (2005 – 2007)

Year	Crop	Rice (Paddy) Production (Mt)	Cassava Production (Mt)	Sweet Potato Production(Mt)	Groundnut Production (Mt)
2005	Target	540	1,935,221	160,856	95,684
	Actual	552	2,287,060	191,498	167,2
	% Achievement	102	118	119	175
2006	Target	875	2,100,000	185,368	110,265
	Actual	875	2,973,100	168,129	115,203
	% Achievement	100	142	91	104
2007	Target	875	2,100,000	168,129	115,203
	Actual	637,983	1,236,852	158,219	118,849
	% Achievement	73	59	94	103

Source: MAFFS: *The Food Security Policy for Sierra Leone* (2007).

consumption is met from own production, whereas in the Western Area, which is largely urban, almost all food consumed is purchased. This variation reflects remoteness (Tonkolili, Koinadugu and Pujehun) and proximity (Western) to markets, and the extent to which districts have recovered after the war (Table 11). Table 12 summarises some of the targets set under the Food Security Policy for the period 2005-2007 and reveals the underachievement in key crops such as rice, cassava and sweet potato by 2007.

In 2009 Sierra Leone was one of the eight countries identified by the FAO as most vulnerable to the recent global food prices crisis (FAO, 2009). This is mainly due to the fact that the rural population in Sierra Leone is characterised by spending just over half their income exclusively on food (FAO, 2009). According to World Bank data (2008) 21% of the population in 2003/04 was unable to meet minimum daily caloric requirements. FAO also estimated that 51% of the population at the time was chronically malnourished (FAOSTAT, Food Security Statistics)

3.5.2 Crop production constraints

Productivity improvement in agriculture rests on the removal of a number of structural

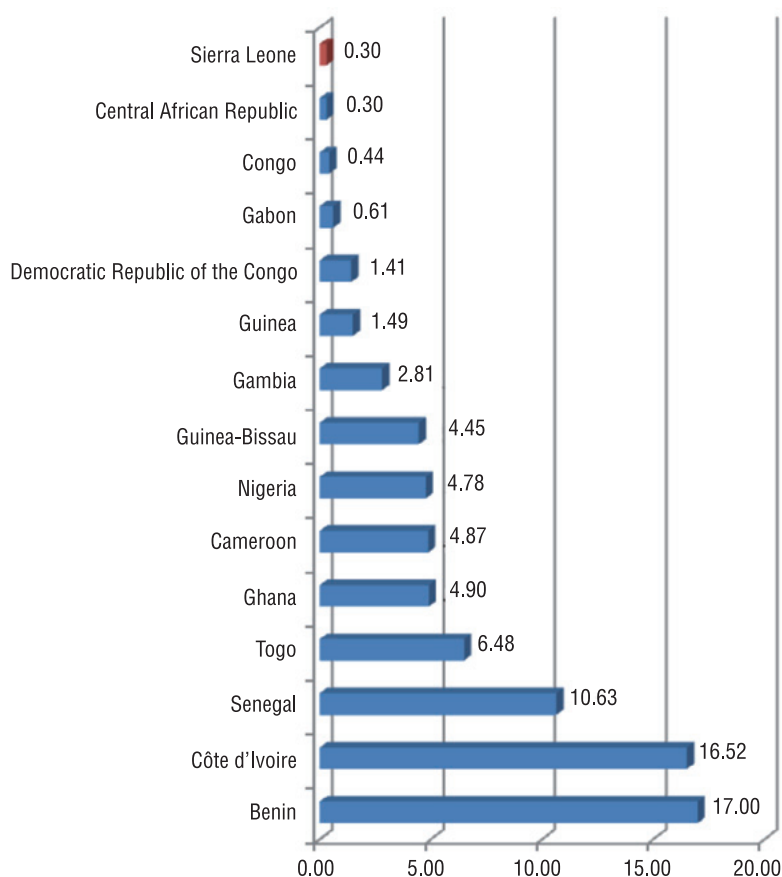
constraints affecting the sector. The key constraints are the adherence to the subsistence method of farming, rudimentary tools, vulnerability to climate, pest and market conditions as well as high rate of illiteracy, which increases the risk factor facing intensive agriculture activities. There is lack of significant and committed inflow of private investment into the sector. Each of these aspects is separately addressed under the following headings of inputs use and markets, output markets, infrastructure and investment.

Input use and markets

The low use of purchased inputs, including tools, seeds and technology is largely due to widespread poverty amongst farming population. The use of purchased inputs is, for the most part, very low in Sierra Leone.

Fertilizer usage was less than half that for Sub-Saharan Africa (SSA) in the mid 1990s, and has fallen since then. In the past, government tried to encourage fertilizer use with heavy subsidies, mainly in development project areas. Although the government has now moved out of fertilizer supply, there has been only limited interest by the private sector in taking this over. Regarding agrochemicals the distribution outlets in the major production areas are virtually non-existent, and

■ Figure 17. Average consumption of fertilizers (kg per hectare)



NB: Fertilizer Consumption (Nitrogen, Potash and Phosphate) in kg / Number of hectares of arable land and permanent crops.
Source: FAOSTAT (2011).

farmers have to go into Freetown to buy imported agrochemicals. Figure 17 illustrates the low fertilizer consumption level per hectare in Sierra Leone in comparison with selected countries in West Africa for the year 2002 shortly after the civil conflict ended. Under this scenario, Sierra Leone portrayed the lowest level.

Seeds and planting materials are the most important input for most farmers, and discussions show that the unavailability of planting materials at the right time is the single most frequent complaint that farmers have (Sesay *et al*, 2004). The seed market in Sierra Leone comprises of a formal and non-formal sector. There are several supply channels identified in the 2003/04 Sierra Leone Household Integrated Survey. Table 13 illustrates the importance of the access to seeds through the private sector (73.1%) while the access to seeds via aid (i.e. NGO's)

represents a very minor proportion (1.2%). Access through governmental services (0.7%) is usually provided on a cost recovery basis (GoSL, 2005b). The category under "other" (24.4%) comprises access to seeds through own stock, exchanges, etc. (ibid).

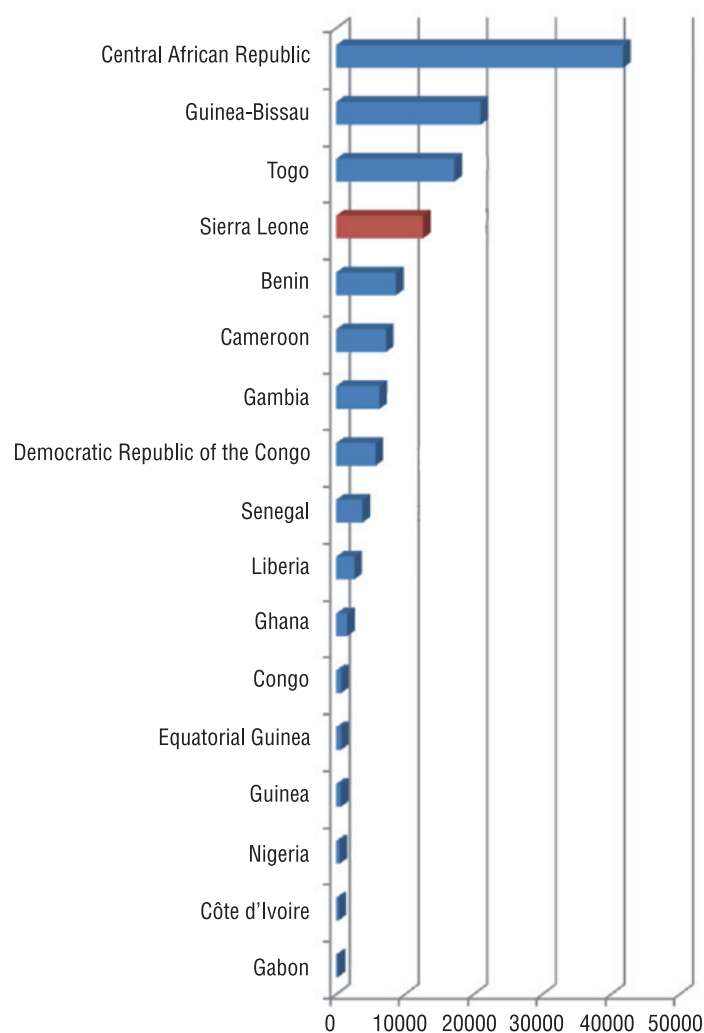
Government of Sierra Leone (GoSL) has established a Seed Multiplication Project with assistance from German Technical Cooperation (GTZ) and a number of donors are supporting NGO intervention in input markets, in particular with seed provision, as part of the rehabilitation effort. Government has been supplying planting materials at low or, effectively, no price since the war, as have many NGOs. The challenge is to phase out free distribution and move towards local commercial markets for planting materials to encourage farmers to produce at community level, and increase the interest of the private sector.

■ Table 13. Use of seeds by households in 2003/2004 (% of households per different supply channel used)

Input	Purchase to Private Sectors	Access through Cooperative	Ministry of Agriculture Extension Service	NGO	Other	Total
Seeds	73.1	0.6	0.7	1.2	24.4	100

Source: HIS 2003/04.

■ Figure 18. Number of agricultural workers per tractor in use. Selected countries of Western Africa (2007)



NB: Total economically active population in agriculture / Number of tractors in use.

Source: FAOSTAT (2011).

In the case of agricultural *machinery* access has also been limited in Sierra Leone. Figure 18 compares the number of agricultural workers per tractor in use for selected countries in Western Africa. The ratio in Sierra Leone is among the highest of the region with Central African Republic, Guinea Bissau and Togo.

Apart from grants and concessions from foreign governments, the market for agricultural machinery has been dominated by the private sector. A few private firms handle importation of tractors and accompanying implements, selling directly to farmers who provide private tractor hiring services to other farmers. Table 14,

Table 14. National Requirement for Machinery and Agrochemicals 2009 – 2012

No	Description	Unit	2007	2008	2009	2010	2011	2012	Notes.
1	National Population	Million	5.2	5.3	5.4	5.5	5.6	5.7	1.9% Annual growth rate
2	Milled equivalent – National req.	000Mt	486.7	496.1	505.4	514.8	524.2	533.5	Annual p.c. 104kg & deflate by 10%
3	Self Sufficiency Ratio	%	60.0	75.0	85.0	100.0	110.0	120.0	2007 deflated by 10% s
3.1	Milled Equivalent	000Mt	292.0	372.1	429.6	514.8	576.6	640.2	
3.2	Paddy	000Mt	449.3	572.4	661.0	792.0	887.0	985.0	
4	Average Yield	Mt/Ha	1.0	1.2	1.3	1.5	2.0	2.5	National Average
5	Total area to cultivate	000Ha	449.3	477.0	508.4	528.0	443.5	394.0	
6	Area for Mechanical Cultivation	000Ha	269.6	286.2	305.1	316.8	266.1	236.4	60% total area
7	Share of labour-saving technology (7.1 + 7.2 = 100)								
7.1	Tractors	%		75	75.0	80.0	80.0	80.0	
7.2	Power Tillers	%		25	25	20	20	20	
8	Area for Tractors	000Ha		214.7	228.8	253.4	212.9	189.1	
9	Area of Power Tillers	000Ha		71.6	76.3	63.4	53.2	47.3	
11	Milling Machines for mechanisation	Number	30	716	826	990	1848	1231	0.5Mt/Hr at 8hrs/day for 4days a month at 5mth
	Incremental	Number		686	111	164	858	-617	
12	Agrochemicals								For mechanisation
12.1	Fertilizers	000Bag		1145	1220	1267	1064	946	4 Bags per acre
12.2	Insecticides	000L		161	172	178	150	133	30% Area or 0.75 L/Acre or 1.875L/Ha
12.3	Herbicides	000L		161	172	178	150	133	30% Area or 0.75 L/Acre

NB: Mt: metric tons, Ha: Hectare, Hr: hour, litter100 pounds, L: litter

Source: Synopsis, Challenges, Potential and Vision for Agriculture in Sierra Leone with emphasis on Rice Production - Dr. Joseph Sam. Sesay Minister of Agriculture, Forestry & Food Security of Sierra Leone - June 2008

illustrates national estimated requirements for machinery and agrochemicals between 2009 and 2012. According to MAFF the area for mechanical cultivation alone should increase a 60% by 2012.

Small, subsistence farms have a limited capability to absorb, utilise and manage *credit*. Small farmers are generally disadvantaged regarding access to agricultural financial services due to lack of collateral (i.e. land possession)

(NSADP, 2009), which is usually a requirement by lending institutions. Although some NGOs provide micro-credit facilities these services are few with potential provision usually too small for any meaningful investment in production. Jalloh (2006) argues that it would therefore be preferable that any financial assistance to be provided to small farmer groups should be in the form of matching grants rather than loans. “Grants would only be approved for the provision of advisory

services or for investments that were subject to rigorous feasibility and sustainability testing". There is thus a clear need for the development of a variety of financial options, from improved informal savings clubs, to access to formal bank credit, to meet the differing needs of the farmer, from seasonal credit to tide the farmer through until harvest time, to funds to finance increased mechanisation (FAO, 2005). However, this also depends on the appropriate functioning of rural land markets (i.e. land as effective collateral for obtaining credit). Yet this is in contradiction with the customary land tenure principles present in the different Chiefdoms of Sierra Leone. Likewise, land in general is not as easily available as sometimes referred to in the literature (mainly government reports) as under the *shifting cultivation* system a substantial percentage of land must be kept idle in order to secure forest/soil regeneration.

According to NSADP (2009), improved technology inputs continue to be available only to farmers participating in development projects, who constitute a minority of resource poor farmers. Consequently, the lack of purchasing power and the inadequacy, or ineffectiveness, of government support programmes through extension services at national level and to some extent the slow pace of adoption of improved technologies by farmers (who for the most part, according to MFMR, exhibit very poor technical and agronomic knowledge) have contributed to the poor performance of the sector. Moreover, it appears that the continuation of the input subsidy policy up to the late 1990s gave the impression that there was limited demand for agricultural inputs and that smallholder farmers could not afford these inputs. But the fact is that entering the agricultural input supply sector with the devastated road infrastructure and the numerous resource-poor farmers that have limited capital and poor purchasing power (all factors constraining the development of entrepreneurial capability) is a risky and unattractive investment option for many private sector participants. As a result, private sector participation has increased rather slowly and relatively cautiously (MAAF and MFMR 2004).

As already mentioned, *labour shortages* at peak production periods have been characteristic of agriculture in Sierra Leone for many years, but have been intensified since the war, because of difficulties in keeping youths, males in particular, in the villages and participating in farming. Likewise, the participation of *women* in decision-making at household and national levels is marginal (Sesay *et al*, 2004).

As yet the incidence of HIV/AIDS in Sierra Leone is still just below the level of pandemic proportions, and is more prevalent in urban rather than rural areas. However, there is a strong possibility that in the next few years, this will start to have a serious impact on farm households' labour availability, through increased morbidity and mortality. In addition this is likely to put more pressure on women's time, both as care givers, and in terms of their domestic and production responsibilities (Jalloh, 2006)

Output markets: *Imported and Local Rice Prices*

The structure of agricultural output marketing in Sierra Leone has not changed much since the early 1990s when market reforms were initiated. Private sector firms, mainly small operators, continue to dominate the food crop marketing system while large private sector operatives have generally been limited to very few areas due to factors such as deplorable road networks (Jalloh, 2006).

Prior to the civil war, chiefdoms had a major periodic market. In addition there were daily markets in the major towns, making market access easy for all communities. During the civil war most of these periodic markets were burnt or vandalised, and many communities were unsafe for normal economic activity. Some of the community markets have since been re-built or rehabilitated with the assistance of donors and NGOs (e.g. Magburaka and Daru markets). In the mid 2000, some major periodic markets (e.g. Joru market and Koindu international market) were still not open (Sesay *et al*, 2004).

Table 15. Price of Local vs. Imported Rice in Sierra Leone per 50kg Bag

(Per 50 kg Bag)	Freetown	Up-Country Average
Local Rice	SLL 80,000	SLL 66,000
Imported Rice	SLL 65,000	SLL 72,000

Source: Freetown Interview: November 2006 Economic Policy and Research Unit, Ministry of Finance Government of Sierra Leone May 2007 (Data from Fieldwork, November 2006).

Rice, the major food crop, has been marketed by the private sector since the early 1990s. It is important to highlight that according to several government reports (NRDS, 2009; Economic Policy and Research Unit, Ministry of Finance of Sierra Leone 2007) local rice is sold at a premium price in the country's capital market. Table 15 presents the price differentials for local and imported rice in Sierra Leone (per 50kg Bag) between Freetown and the Up-Country Average.

In Freetown, the price of local rice is generally about 15 to 20 percent higher than the price of comparable grades of imported rice. This reflects the high technological capacity from foreign producers whose economies of scales allow them to introduce rice into Freetown (and other low income country capitals) at levels which are below or close to the price of domestic rice. The latter is in principle determined by the local production costs. It is argued that the price differential is also accentuated by the fact that local rice is preferred to imported rice for its taste and the belief that it is more nutritious than imported rice for it has been parboiled (NRDS, 2009). Consequently, an unmet demand in Freetown (due to the limited supply of local rice in the Western region) contributes to local rice selling at a premium in the capital (Ministry of Finance, 2007).. However, substitution of local with imported rice may increase in the future due to (i) growing appreciation of non parboiled imported rice by the younger generation of the population and urban dwellers (NRDS, 2009), and (ii) the expected import tariff reduction that may result from tariff harmonisation occurring in the framework of ECOWAS and UEMOA regions (see the above section on Agricultural taxation and tariff policies).

Outside Freetown, local rice is cheaper than the imported rice by about 8 to 10 percent. The latter reflects that the cost of production of local rice is lower than imported rice which has to be transported up-country. Therefore, in these rural markets, imported rice would not be traded at all were domestic rice production high enough (Economic Policy and Research Unit, Ministry of Finance Government of Sierra Leone, 2007). In other words, the higher price of imported rice in the country side is reflecting both transport costs and potentially the stress price paid by rural households whenever their consumption of local rice has been hampered due to local harvest loss or reduced yields.

According to the report of the Ministry of Finance (2007), the price differential for local rice between the capital city and the country side (approximately of SLL 15000 per 50kg bag) is not entirely explained in terms of transport costs which average SLL 2,000 from Makeni up to SLL 4,000 from Kono or Kenema per 50kg bag. The latter implies that a mixture of not only transport costs but also preferences in demand for local rice and the high variability/uncertainty in the domestic supply would better explain the price differentials for local rice between the capital city and up-country areas.

It is also reported that during rainy season average transport prices may increase substantially (by 40 to 50 percent) particularly in the most remote areas (Table 16) The latter implies that almost all of the observed price differential between imported rice in Freetown and up-country (SLL 7,000 per 50kg bag) would be highly dependent on transport costs which reach SLL 4500 in Kono headquarter during the

Table 16. Freetown to District headquarters: Price in Le for one 50kg bag

	Makeni	Kabal	Bo	Kenema	Kono
Dry Season	SLL 2000	SLL 2500	SLL 3000	SLL 3500	SLL 3500
Rainy Season	SLL 2000	SLL 2500	SLL 3500	SLL 4000	SLL 4500
Average	SLL 2000	SLL 2500	SLL 3250	SLL 3750	SLL 4000

Source: Freetown Interview; December 2006 Economic Policy and Research Unit, Ministry of Finance Government of Sierra Leone May 2007 (Data from Fieldwork, November 2006).

rainy seasons. Consequently, the preference for local rice in rural areas would obey not only a preference for taste or nutrition but the fact that in low harvest years, consumers must rely in the more expensive imported substitute.

Other food crops have a similar marketing system, entirely in the hands of the private sector. Palm oil is generally marketed by itinerant traders who purchase the oil from village processors and resell to retailers in urban areas. Production and marketing of traditional export crops has collapsed during and since the war. Gradually some of the coffee and cocoa farms have been rehabilitated and buying sectors have been reactivated by private agents in a number of areas. (NSADP, 2009)

There is potential for adding value to agricultural output through increased processing, for both domestic and export markets. However, there is need to improve infrastructure, market information (including information on prices, services, packaging, conforming to international product standards etc.) across the country.

Infrastructure & Investment

Rural infrastructure is poor. The rate of investment in Sierra Leonean infrastructure is lower than the Sub-Saharan African average, with progressively lower levels of percentage GDP spending between the years 2005 and 2007 (Table 17).

Adequate physical infrastructure in rural areas is a crucial requirement for high rates of growth to be achieved in the rural economy. Poor or inexistent roads, particularly feeder roads, make access to rural villages and farms difficult, especially during the rainy season. This primary constraint, faced by service providers to the sector, contributes to inefficient delivery of support services to farming communities. Moreover, the inadequate state of the overall road network restricts access to major markets (FAO, 2005). Output markets are underdeveloped with most farmers depending on occasional local markets or intermediaries for the sale of their produce. Farm-gate prices are therefore low, further complicated with high levels of

Table 17. Sierra Leone and Sub-Saharan Africa investment spending on infrastructure, 2005-2007

Investment spending (% of GDP)						
	Sierra Leone			Sub-Saharan Africa		
Year	2005	2006	2007	2005	2006	2007
Total investment	17,4	15,5	13,5	20,2	21,6	22,2
Public investment	5,8	5,1	3,5	6,8	7,4	7,7
Private investment	11,6	10,4	10,0	13,4	13,4	14,6

Source: IMF (2009)

post-harvest losses due to spoilage. Facilities for value addition are inadequate. Processing facilities for most commodities are either not available, inefficient or not accessible. The quality of produce such as cocoa and coffee is usually affected as a result of poor processing technologies and methods. In other words, the impact of poor infrastructure undermines efforts by farmers to move towards a more commercial approach to their activities, thus impeding the development of the agricultural sector and its potential impact on poverty.

3.5.3 Concluding remarks

The growth of the agricultural sector in Sierra Leone is hampered by a series of specific constraints of which the most relevant have been addressed in this section i.e. manual systems of farming with low use of inputs (mainly fertilizers) and increasing levels of land/soil degradation (i.e. reducing idle period in the *shifting cultivation* system); low participation of farmers in decision-making, especially women and non-locals at

chiefdom level (“strangers”) (Salazar, 2004); inefficient network of physical infrastructure, further weakened by a decade of conflict; weak or near total absence of agricultural support services (poor research and extension linkages, marketing structures, rural finance and poor community based and farmers organisations) and poor post-harvest systems.

Clearly, agricultural policies in Sierra Leone may strengthen their positive impact on the farming sector focusing towards exploiting the country’s comparative advantage in those food crops that may contribute to food security and income growth. According to Jalloh (2006) the Ministry should formulate policies specific to rice and cocoa production focusing on yield increase, pest control, labour saving technologies and increase investment into research and extension service especially for these crops. However, such policies should be aimed at dealing with the specific constraints of small subsistence farmers which constitute the majority in the agricultural sector of Sierra Leone.

■ 4 EU Support Programmes for Rice and Tree Crop Production (STABEX)

In 2005, the Government of Sierra Leone, in its effort to achieve its food security goals and accelerate economic recovery, requested use of the balance of the 8th EDF STABEX funds for the rehabilitation of tree crop plantations and rice production (see details on STABEX and other Funds in Sierra Leone in Box 2). Consequently, a Framework of Mutual Obligations (FMO) was signed between

the European Commission (EC) and the Government of Sierra Leone in 2006 (National Authorising Office, 2007). Under USTP, project value reached 4,378,000 EUR and the execution period elapsed from October 2007 to December 2009. In this section, the objectives and priority issues of initiatives developed with STABEX funds are described along with the associated initial achievements.

Box 2: The Use of STABEX Transfer Project

Rice is a dietary staple for most Sierra Leoneans but rice cultivation in Sierra Leone is dominated by small scale subsistence farms that cannot produce enough to feed everybody and as a result the country depends largely on imported rice to feed its populace.

With funds from the European Union and ActionAid International Sierra Leone, the Use of STABEX Transfer Project, will address the constraints faced by farmers in accessing farm tools and processing equipment and techniques, high quality seeds, limited seed storage facilities, employment opportunities for women and youths and markets.

The project will target 9500 farmers of which 4275 (45%) will be women farmers.

This project is part of the European Union's agenda to contribute to and support government in achieving food security.

It will be used to construct local markets, provide seed rice and farm tools, rice milling machines and rehabilitate roads leading to the production areas.

The project will be implemented using participatory methods, through farmer's groups and government extension staff. This will ensure local ownership and sustainability.

Some of the key activities will include, mobilising communities, strengthening farmer's groups, training extension staff attached to the Ministry of Agriculture, Forestry and Food Security, group members and farmers, procurement and distribution of inputs such as seeds, tools and processing equipments, construction of cooperative seed stores, and building the capacity of new and existing networks and alliances of farmers cooperatives.

Sources:

ActionAid Sierra Leone - <http://www.actionaid.org/sierraleone/index.aspx?PageID=3920>

4.1 Objectives of the STABEX funded programmes and priority issues

The main objective of the STABEX funded programmes in Sierra Leone between 2007 and 2009 has been to increase rural incomes and improve the livelihood of smallholders through improved production and marketing of basic food commodities (rice) and export commodities (cocoa and coffee) (National Authorising Office, 2007). Two separate implementing agencies were selected. Action Aid addressed rice cultivation in the Northern districts of Bombali and Tonkolili, while the The Deutsche Welthungerhilfe worked in the Eastern districts of Kenema, Kailahun and Kono supporting cash crop production in the area. Each implementing agency operated through local farmer organisations. Next the specific activities undertaken in the rice and tree crop sectors are further analyzed.

4.1.1 Support to food crop production: rice

As mentioned, the support was focussed on rice production and marketing in the two Northern districts of Bombali and Tonkolili, and included targeted support to rice production, processing and marketing, including the strengthening of farmers associations and of local extension services. The project was entrusted to Action Aid International - Sierra Leone. The project worked with 9500 farmers (and a budget close to 2.5 million Euros) on enhancing the livelihood of farming households through increased rice productivity and postharvest activities (ActionAid, 2009). These 9500 farm households represent approximately 2.4% of the existing farm households in Sierra Leone (approximately 400 000 farm households according to Jalloh, 2006).

The following objectives and activities were addressed:

- Increasing rice production by:
 - organising training for MAFFS and farmer groups

- organising plot demonstrations/multiplication training
- distributing recovered seeds for 2009 planting

- Decreasing post harvest losses and improving post harvest processing by:
 - organising training on the operation of rice mills
 - rehabilitating and constructing drying facilities and store rooms
 - establishing a quality control scheme
- Increasing the quantity of high grade products for export and improving the marketing of rice by:
 - rehabilitating feeder roads with the construction of culverts
 - rehabilitating and building market centres
- Improving the collection and dissemination of market-related information by:
 - monitoring rice market dynamics
 - conducting a study on the dynamics of the marketing of rice /rice marketing dynamics
 - transferring rice market data to farmers
- Strengthening rice farmer associations by:
 - providing assistance, carrying out feasibility studies and setting up business plans
 - organising farmer exchange visits to other rice projects in Sierra Leone and other relevant countries
 - organising farmer association meetings

4.1.2 Support to cash crop production: cocoa and coffee

The objectives were to raise the income and to improve the overall well-being of farming households through increased production and enhanced marketing of cocoa and coffee in the districts of Kenema, Kailahun and Kono (Eastern region of the country). Considering the

international market situation with high demand for the commodity, priority was placed on support to cocoa production. The project was implemented by the German NGO Welthungerhilfe (Welthungerhilfe, 2007). The project worked with 3500 farmers or 0.9% of the farm households of Sierra Leone (and a budget of 1.8 million Euros).

The following objectives and activities were addressed:

- Increasing the production of cocoa and coffee by:
 - training staff and farmers in Farmer Field Schools
 - supporting the rehabilitation of plantations together with the MAFFS
 - promoting ecologically sustainable agro-forestry
- Improving cocoa and coffee quality by:
 - training staff and farmers
 - installing facilities for fermentation, drying and storage
 - establishing a quality control system
 - testing of quality Robusta coffee
 - developing a cocoa growing manual
- Improving the marketing of cocoa and coffee by
 - obtaining organic and fair trade certification
 - undertaking a market study
 - providing transport and improving feeder roads
 - assisting farmers in local marketing and associations in export, and
 - promoting Sierra Leone products (internationally)
- Strengthening farmer associations by:
 - promoting self-help initiatives (e.g. formation of new associations/cooperatives or farmer groups, exchange visits)
 - Integration of institutions at the village, ward and district levels. Support to fair trade requirements

- Creating an enabling environment for private sector investment by:
 - assisting associations/cooperatives to access credit
 - motivating exporters to invest in profitable, high quality exports

4.2 Initial Achievements of STABEX programmes

In this section we briefly summarize the attainments of the STABEX programme, as reported in project monitoring documents. In the following sub-sections project outcomes are described and evaluated according to data gathered directly from beneficiaries via face-to-face interviews (Action Aid, 2009).

4.2.1 Rice

According to the report (Action Aid, 2009), all project activities have been completed and the following achievements were highlighted as key events:

- Three quarters of targeted farmers had access to improved rice seed and almost all of them increased their farm land area by 50%. Almost all targeted farmers increased their rice production despite no access to fertilizers.
- In the two districts, five large community storage facilities have been constructed or rehabilitated to improve harvest preservation. Rice haulers, 18 drying floors, tarpaulins and threshers with winnowers have been provided to improve the quality of post-harvest rice produce. Three quarters of targeted farmers have thus realised an increase in the quality and grade of their rice.
- One hundred km of feeder roads and 6 major culverts have been rehabilitated and constructed to improve access to major

markets. Five market points are being constructed in strategic locations where regular markets are held. So far farmers have raised their marketable income by 50% as a result of the project, half of them having increased their income by at least 10% from the sale of their marketable rice. Farmer's cooperatives were strengthened through the organisation of 380 farmers groups under 2 cooperatives: The Bombali District Women Farmers Cooperative Association (BODWOFCA) and The Tonkolili Farmers Multipurpose Cooperative Society (TFMCS).

- As well as provision of farm tools, these cooperatives have received six relevant training courses on topics including leadership skills, handling of post-harvest machinery, and improved agricultural practices.
- More than 500 metric tons of "pa kiamp" rice seed was supplied to farmers on a non-profit loan recovery basis. An average seed recovery rate of 80% from the 2008 seed supply resulted in the availability of sufficient seed supply for the 2009 season with cooperative management being charged with the responsibility of ensuring that a seed bank for their members is maintained year after year.

However, one major constraint for the sustainability of the project is that the project targeted too few farmers of those in need to be effective at the district or even the chiefdom levels.

4.2.2 Cocoa and coffee

The project supported the rehabilitation of cocoa and coffee plantations, and main results include the following (Welthungerhilfe, 2007):

- Productive cocoa area increased from 76% to 82% and productive coffee area increased from 44% to 82% during the project period.

Almost all targeted households growing cocoa increased their cocoa production and more than 80% of those growing coffee increased their coffee production.

- The project supported improved cocoa processing via provision of specific training courses, fermentation baskets and drying tables.
- Eighteen market stores were built or renovated within cooperatives operation areas. Equipment such as moisture meters, weighing scales and seed test cutters were provided. The stores are used as buying centres and means of transportation were also provided by the project.
- Information on international prices was made available to cooperatives. In addition, crop pre-finance was provided to help cooperatives pay for produce on a cash payment basis. The project facilitated the connections between cooperatives, exporters and buyers. Feeder roads leading to potential market locations/villages were rehabilitated by providing basic assorted tools at the community level to mend and help upgrade and improve dilapidated parts. 352 farmers of the Millennium cooperative received organic certification in October 2009, corresponding to about 10% of the original targeted group. In 2008, with the support of the project, the Millennium cooperative produced some containers of good quality cocoa/coffee for which a higher price was paid as compared to previous years. A workshop was organised for the three cooperatives on reformation and revitalisation according to the national cooperative society act. Training was provided on the establishment of cooperatives, management and principles of production, quality management and marketing. Three office structures, one for each cooperative, were built and equipped with office furniture. The 3 cooperatives have a total of 4955 members of which 25% are female-headed

households. The cooperatives were put into contact with overseas buyers, and Fair-Trade and Organic certifiers. Following this initiative other traders started paying higher prices for improved quality cocoa while previously traders were buying without attention to quality issues or characteristics. The effects of increased production, improved quality, and higher prices paid by project-supported cooperatives contributed to increasing overall household incomes. However, such increases in household income cannot be wholly attributed to the project. Other relevant factors, including weather conditions particularly favourable to high yields in cocoa and coffee production, and increase of commodity prices on world markets, are also recognised as contributing factors. According to project estimates, at the farm level one extra bag of cocoa production equals 62

euro per year and one extra bag of coffee amounts to 48 euro per year, thus if higher prices for good quality are obtained (which imply a 15 to 30% increase on premiums), farmer households could perceive additional income of 64 to 128 euro per year (Deutsche Welthungerhilfe, 2009).

Overall, the results of the project as expressed in the evaluation reports of both implementing agencies are generally good, but not all expected benefits have materialised. Volumes bought by the cooperatives are still low and there is no premium yet for organic cocoa. As for the STABEX-rice project, the major constraint to the sustainability of the project according to the implementing agency is that the initiative targeted too few farm households to be really effective at the district or chiefdom level.

■ 5 Survey Methodology

In this section, the methodological approach followed to set up the farm-level survey in selected rural areas of Sierra Leone is fully described. Equally, the technical evaluation followed to analyze the performance of smallholders (in terms of economic viability, productivity and degree of achieved food security) is presented in detail. Sub-section 5.1 introduces the area surveyed, the sample selection mechanism, the data collection process and the main collected variables. Sub-section 5.2 addresses the key theoretical concepts and calculation procedures which guide the analysis of the survey quantitative data.

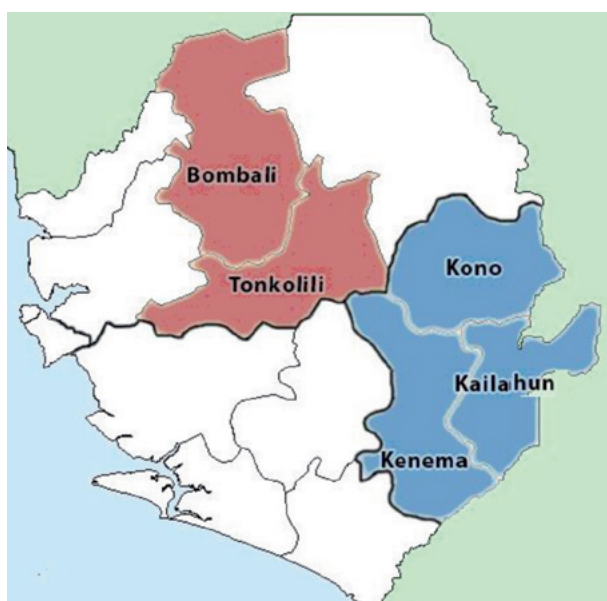
5.1 Study Area

The aim of the survey is to identify the major factors that may contribute to improving

the economic viability and productivity of smallholders in the context of rural poverty alleviation. As discussed in Section 4, the USTP financed activities based on this precise aim in five districts belonging to the Northern and Eastern regions of Sierra Leone. For this reason, the survey is conducted in the same regions which represent the key components of the national agricultural sector. On the one hand, tree crops found mainly in the Eastern districts, are a major source of income and foreign exchange; on the other hand, rice, the national staple food, is the dominant crop in the Northern districts. The five districts selected for the survey are illustrated in Figure 19.

In the survey (as in the case of the STABEX funded development programmes), special focus was granted to the following types of agricultural areas (and associated cropping systems):

■ Figure 19. The five districts identified for the survey



Source: Own elaboration

Northern districts: Bombali and Tonkolili.

Eastern districts: Kono, Kailahun and Kenema.

- 1) Upland land forest tree cropping system (mainly coffee and cocoa)
- 2) Upland land food cropping system (mainly rice)
- 3) Lowland (Inland Valley Swamp and Boliland) food cropping system (mainly rice)

While a certain degree of overlapping in terms of cropping orientation is present in the five districts (given the nature of the agrarian system in Sierra Leone), there is a strong differentiation between the Northern and Eastern regions. Rice production is the most prominent feature of household production in the North. Cocoa and coffee are dominant crops in the Eastern districts (Action Aid, 2008, 2009; Welthungerhilfe, 2007, 2009).

Lastly, besides the socio-economic and farm-level production aspects the survey addresses also questions on how relevant the different STABEX

funded development and poverty reduction initiatives were to farm households (in qualitative terms).

5.1.1 Sample Size and Selection

Three related criteria were taken into consideration in defining the sample size. First, the sample needed to be sufficiently inclusive, so that not only the five districts involved were equally represented (based on the number of supported farms) but that the most common types of farm households engaged in the different cropping systems could be integrated. This is particularly relevant, as in Sierra Leone, inter-cropping practices are widespread. Second, the sample had to be large enough to lend itself to statistical inferences. Third, a control group of farm households not benefitting from any type of support was introduced and randomly selected across all five districts in the proportion of the total sample size in the Northern and Eastern regions. Both purposive and stratified random

Table 18. Distribution of sample observation

REGION	DISTRICT	CHIEFDOM	Number of VILLAGES	Total number of RESPONDENTS	Number of respondents in CONTROL GROUP
Northern region	Bombali	Magbaeiamba Nдохан	4	79	1
		Bombali Sehora	4	118	14
	Tonkolili	Kholifa Rowalla	8	98	2
		Tane	3	106	20
Eastern region	Kono	Gorama Kono	4	65	10
	Kenema	Nongowa	6	47	5
		Lower Bambara	2	19	0
		Peje West	3	27	1
	Kailahun	Yawei	3	28	0
		Upper Bambara	1	11	1
		Mandu	1	6	1
Total	5	11	39	604	55

sampling techniques were employed to select the farming households to interview. Table 18 summarises the distribution of observations per district, chiefdom and village.

Thus the total sample size of farm households is 604 out of which 549 benefitted from some type of support (based on the STABEX funded initiatives); the remaining 55 comprise farm households which were not involved in any aid programme. It is worthwhile to highlight that since more farm households were targeted under the STABEX funded project in the Northern region (9500) than in the Eastern region (3500), the sample size reflects this proportion.

5.1.2 Data Collection

Data was obtained from two main sources: primary field survey data from farm households and exploitation of existing secondary data from reports of international organisations and statistics from Sierra Leone Statistics Centre.

In the case of primary data, face to face interviews were conducted using multiple choice questionnaires. Two questionnaires (Appendices I and II) were presented to the heads of the farming households. The first one collected information on demographic and social variables and the second one on production data. These questionnaires were pre-tested in one of the target communities in Kenema district. In order to conduct the survey, six interviewers (enumerators) were selected among the students of Njala University and received three days of specific training by the project coordinators. The preliminary field visit to test the questionnaires was organised on 20 farms with the duration of two weeks in March 2009, and it was followed by an expert meeting to validate the questionnaires.

The first questionnaire (A) gathered data concerning general socio-economic characteristics of the household and its farming activities. The number of households visited per day was on average 5 per enumerator. The

number of households surveyed per village was on average around 10 in the Eastern districts and between 20 and 30 in the Northern districts. Questionnaire A was administered in March and April 2009. The duration of field visits for investigators was 3 weeks.

Questionnaire (A) was structured in five segments, the first three collecting socio-demographic data, the fourth one explicitly addressing the impact of STABEX funded activities in the surveyed districts and the fifth one capturing farm characteristics. The five segments are described below.

1. **Identification Information:** Region, District, Chiefdom, Section, Village and Household Number.
2. **Household demographic (per occupant):** Gender, Age, Main economic activity (agriculture, petty trading, paid employment, artisan, other), sources of income and ranking of relative importance (farm output, livestock, remittances, gifts, off-farm activities).
3. **Social Capital (of household head):** position in the community (section chief, village, chief, village headman, tribal authority, ordinary citizen, "stranger", other), membership to any farmer association (position in the association and number of memberships), perception of benefit gained from belonging to any organisation (great, little, none).
4. **STABEX Support:** Type of support received (among the list of cooperation activities undertaken), Adequacy of support received, Impact of support in terms of improvement in production and/or income, sustainability of support received, Perception of improvement to the community as a whole (better, same, worse).
5. **Farm Characteristics:** Types of crops and cultivated area (between January and December 2008) and any changes in planted

area with respect to previous year, Type of agricultural practices undertaken (yes – no: use of manure, soil cover, crop rotation, intercropping, fallowing, etc.), quality and availability of seeds, use of storage facilities (percentage of output stored and for how long), Externalities (plant disease or rain variations), Infrastructure (distance between plots, quality of roads, market access and project office, etc.).

The second questionnaire (B) collected farm input/output data including monetary terms when possible. This questionnaire was designed in two segments: Farm Expenditure and Yield Losses:

1. **Farm Expenditure:** Household and Hired Labour inputs per activity, Tools used and time in which these were acquired, Type of seeds (including number of seedlings and cuttings), Livestock (percentage consumed and percentage sold).
2. **Yield Losses:** Percentage of output loss per type of crop pre and post-harvest, List of main causes for output loss

In order to improve the accuracy of the data multiple visit method was used based on the collection of periodical data. The data was collected in three stages (one visit per month) in order to coincide with the farm production calendar. Part I of Questionnaire B on farm input data was administered in August and September 2009, and Part II of Questionnaire B on output data, started in November 2009 (since the main harvesting season is between August and October). The multiple visit interview schedule adopted in this study is expected to improve the reliability of the information provided by the respondents. Here, due to the high illiteracy rate and the culture of not keeping farm records, the assumption being made is that the shorter the memory recall period the higher the accuracy of the information provided. Interviews were held with household heads in their respective villages at times convenient to the respondents, usually in

the morning or evening hours. The approximate duration of interviews per questionnaire was around 1 hour.

5.2 Data Analysis and Presentation of Results

The survey data has been processed so that both qualitative and quantitative analyses may be carried out. The results obtained from the survey (which are discussed in the following Section 6) provide information on: (i) characteristics of farm households in terms of demographic structure, educational attainment, assets and resources (6.1), (ii) quantitative data on farm household economic performance, viability and input factor productivity (6.2 and 6.3) and (iii) a qualitative assessment of smallholders concerning the support they received under the two STABEX funded aid programmes (6.4). In the current sub-section, the approaches and computations undertaken to evaluate smallholders' performance are explained. In other words, the rationale used to guide the calculation methods for farm income, reproduction threshold and poverty level for the rural farm households of the Sierra Leone survey is thoroughly addressed.

To examine issues of farm viability and productivity the general guidelines presented under the Agrarian System Diagnosis (ASD) methodology (FAO 1999) were revised and adapted to the Sierra Leone survey at hand.³⁰ This method refers to the concept of agrarian systems defined as “a mode of exploiting the environment that is historically established and durable, a system of production forces adapted to the bio-climatic conditions of a given space and responding to the existing social needs” (Mazoyer, 1981). Several production systems together and the interactions between them make

³⁰ On theoretical and empirical studies related to the Agrarian System Diagnosis methodology cf., among others, Mazoyer, 1981, Dufumier, 1996, FAO, 1999, Mazoyer 2001, Mazoyer and Roudart, 2006, Gomez y Paloma et al., 2006, Moreau et al., 2011, Canali & Slaviero, 2010.

up an agrarian system. The household farming system³¹ is an element of the agrarian system and it illustrates how a production unit combines the different production factors (such as land, labour and technology). The ASD methodology provides an in depth analysis of the characterisation and economic performances of farming systems based on the regional socio-economic and agro-ecological conditions. This methodology was developed to study relatively small regions, where information and data are directly collectable as part of field investigations; thus fitting with the specific features of the present Sierra Leone study. Applying this methodology a descriptive and comparative analysis of the survey results is made between and within the two studied regions.

Based on ASD methodology, the smallholder characteristics were assessed not only by describing their demography, access to infrastructure and communication or community leadership and social participation at the village or chiefdom level, but also their differentiating farming resources and practices. To understand these socio-economic features of smallholders in different regions, the results of the survey are illustrated at region and district levels. However, to analyse viability and poverty at farm level, smallholders were grouped into different farm types depending on crop mix and crop production orientation (market or self-consumption). This categorisation based on the dominant cropping system is expected to shed light on the farm organisation and how it affects farm household capacity to sustain their farming systems and secure a minimum consumption level from farm output.

Next, a description of the approach implemented to evaluate the economic performance and viability of smallholders is

introduced in sub-section 5.2.1 and in sub-section 5.2.2 input factor productivity at farm level is discussed.

5.2.1 Calculation of economic performance

As stated, the evaluation of economic performance of smallholders includes viability, poverty and a productivity assessment. For this purpose, the calculation of the level of agricultural income of smallholders is a mandatory step in order to analyze economic viability with respect to a reproduction threshold and the capacity to fulfil basic consumption needs by introducing a poverty line. Below, the measurement principles and procedures of farm household income, reproduction threshold and poverty line are explained.

Farm household income calculation

A comprehensive measure of farm-household income is a key indicator which considers all household activities. However, given the focus of the survey, it is not possible to account for all non-farm income and thus agricultural production activities rather dominate farm household income calculation in this case.

Farm Net Income (FNI) is determined on a micro scale using technical and economic parameters, i.e. yield, off-farm prices of the produce, production costs and depreciation, it does not include policy parameters, such as (subsidies, credits, taxation³² and market policies). The *FNI* is based on the survey results obtained by subtracting all *Input Costs (IC)* (*Variable Costs and Fixed Costs*) from *Output Value (OV)* for each individual household (Equation 1). The *Farm Gross Margin (FGM)* is calculated as the difference between the *Output Value* and the *Variable Costs*. Based on the survey results, secondary data and expert knowledge the analyses provide information also concerning

31 A farming system is defined as a population of individual farms which have broadly similar resource endowments, enterprise patterns, family circumstances, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate (FAO 2001 Farming System and Poverty)

32 Smallholders in the survey are not subject to agricultural taxation. See Section 3.4.2 (Jalloh, 2006)

cash flows of the farm which is expressed by the indicator of *Farm Net Cash Income (FNCI)*.

$$FNI = OV - IC \quad [1]$$

Output Value (OV) represents all agricultural production: for sale, self-consumption and stocks. The output value for sale was calculated from the market prices declared in the survey of each household. It should be noted that stocks include the seeds which may be used as input in consequent production cycle.

$$OV = \sum_i (C_i * p_i) + \sum_j (L_j * p_j) \quad [2]$$

Where: C_i is crop i production, L_j is livestock j , p_i and p_j are crops and animals prevalent market prices respectively. Being $C_i = (yield_i * area_i)$, where $yield_i$ is yield/acre for crop i and area is the total number of acre per crop i .

Input Costs (IC) of the production is the sum of *Variable Costs* and *Fixed Costs*. *Variable Costs (VC)* are proportional to the amount of the production, such as labour ($Lab_{i,j}$) seeds, livestock maintenance costs (Equation 3).

$$VC = \sum_{i,j} (Lab_{i,j} * p_w + Seeds_i * p_i + L_j * p_{jm}) \quad [3]$$

Where: $Lab_{i,j}$ is the labour used for crop and livestock production, p_w is the wage of labour, $Seeds_i$ is the costs of seeds per crop type, L_j is the number of livestock and p_{jm} is the variable cost of the livestock maintenance.

Fixed Costs (FC) include the value of fixed assets such as land, tools, machinery, buildings and livestock purchase (Equation 4). Our survey results show hardly any machinery and building assets for production in the possession of smallholders, thus these components are not included in the calculation. Likewise, information on tree crops is not available in the survey. Therefore, it is not possible to estimate their sunk cost value.

$$FC = LRe_{nt} + \sum_i Tools_i * d_i + \sum_j L_j * d_j \quad [4]$$

Where: LRe_{nt} is the amount of rent paid per year for land rent, $Tools_i$ is the quantity of tools per tool type, d_i is the annual depreciation value of purchased tools, L_j is the number of purchased livestock and d_j is the annual depreciation of the purchased livestock. To account for the annual depreciation of fixed equipment and livestock a calculation on the basis of a linear depreciation was introduced as follows:

$$d = \frac{(Iv - Fv)}{n}$$

Where: d is the annual depreciation, Iv is the initial value, Fv is the final or residual value and n is the economic life expressed in years.

Initial value (Iv) corresponds to the observed market value of the fixed equipment, or livestock. In the case of the Sierra Leone survey, smallholders only reported to have small hand tools as fixed equipment, and purchase livestock for multiannual use. These tools are practically always used until the end of their life time. Therefore *Final value (Fv)* for such type of fixed equipment is valued at 0.

Farm Net Income indicators

Farm Net Income per acre:

By expressing the total farm area $A = \sum_i a_i$, where a_i is the utilised area per crop i (with the condition: $0 \leq A$) *Farm Net Income* can be expressed in the form a linear relationship with A :

$$FNI = (OV/A - VC/A) * A - FC \quad [5]$$

Where: $(OV/A - VC/A)$ is the angular coefficient and (FC) is the intercept. $FNI=f(A)$ linear function is positively sloped when $GO/A > VC/A$ or, in other words, when unitary production exceeds unitary variable costs to farm area.

Farm Net Income per working unit:

Dividing equation [5] by the working unit (WU), the linear relationship between farm net income per worker and the area worked per person is equal to the following function:

$$FNI/WU = (GO/A - VC/A) * A/WU - FC/WU \quad [6]$$

The number of working units (WU) per farm is obtained by adding the total reported numbers of hours devoted to each farm activity and dividing them by the full time working man power per year (equal to 1950 hours as estimated by ILO (1996) for agricultural sectors).

$WU = \sum_k (hr_k)$ where hr_k = total number of reported hours per activity

The latter includes all full time equivalent labourers per year independently of whether it is hired or household labour. The working hours of men, women and children are also directly aggregated as activities are usually gender and age specific.

Farm Net Income per household working unit:

Equation [6] includes all types of working units (i.e. both household and hired labour). It is also relevant to calculate FNI per household working unit (hhWU); that is excluding hired labour. Equation [6] can therefore be re-written as follows:

$$FNI/hhWU = (GO/A - VC/A) * A/hhWU - FC/hhWU \quad [7]$$

Farm Net Income per household unit:

Similarly, equation [6] can be expressed in terms of the total number of household units (hhUnit)

$$FNI/hhUnit = (FGO/A - VC/A) * A/hhUnit - FC/hhUnit \quad [8]$$

The number of household units (hhUnit) per farm is obtained by adding the total

reported numbers of household members (HU_m) transformed into adult equivalent members:

$$hhUnit = \sum_m W_m * HU_m$$

Adult equivalences use a weight assigned to each household member (W_m) based on needs, which is typically contingent on age (for example, children need fewer calories than adults), and takes into account the economies of scale of large households (Fagnäs and Wallace, 2007). For the case of the Sierra Leone survey, the adult equivalent transformation is based on the following standards: adult male = 1; adult female = 0.75; child 7- 10 years old = 0.69; child 4 – 6 years old = 0.62; child 0 – 3 years old = 0.45 (Ibid).

In the present study, the household is defined as a social unit where members share the same abode or hearth and it is usually the subset of a larger family (Ellis, 1993).

Equation [6], [7] and [8] are useful to establish comparisons between farms, farm types and/or farming systems. When analysing the area per working unit (A/WU) on the horizontal axis and FNI or physical output per working unit on the vertical axis it is possible to conduct labour productivity analysis. If we use household working unit ($hhWU$), it is then possible to assess overall farm viability. For the latter, a Reproduction Threshold (see section below) may be introduced. When comparing farm net income per household unit ($FNI/hhUnit$) against area per household unit ($A/hhUnit$), the returns obtained from engaging in farming activities and how these contribute to fulfil farm households' basic consumption needs can be assessed; thus serving to undertake a poverty assessment. It is important to consider that not all household members are engaged in farming activities to the same degree; consequently by drawing a distinction between these two units of analysis, such differences can be grasped.

The basic calculation of the farm household income is summarised in Table 19

Table 19. Basic Income Calculation

Economic Indicators	Calculations
Household Net Income (HNI)	= Farm Net Income + Off-farm Net Income
Farm Net Income (FNI)	= Output Value – Variable Costs – Fixed Costs
Farm Gross Margin (FGM)	= Output Value – Variable Costs
Farm Net Cash Income (FNCI)	= Value of Sales – Variable Costs in cash
Output Value (OV)	= Value of Sales + Value of Consumption + Value of Stocks
Value of Sales	= Production for Sale * Unit Price
Value of Consumption	= Production for Consumption * Unit Price
Value of Stocks	= Production for Stock * Unit Price
Farm Gross Production	= Production for Sale + Production for Consumption + Production for Stock
Production for Sale	= Crops for Sale + Livestock for Sale
Production for Consumption	= Crops for Consumption + Livestock for Consumption
Production for Stock	= Crops for Stock
Input Costs (IC)	= Variable Costs + Fixed Costs
Variable Costs (VC)	= Costs of Household labour + Costs of Hired labour + Costs of Seeds + Costs of Livestock maintenance
Fixed Costs (FC)	= Costs of Land rent + Costs of Tools + Costs of Livestock purchase

Two approaches to measure Farm Net Income

Concerning the Farm Net Income calculation two main approaches were used: Neoclassical Approach (NA) and Peasant Farming Approach (PF) (Table 20). One is based on the Neoclassical theory principles, which assume farms to pursue (as capitalist enterprises would) profit maximisation and operate under competitive market conditions (i.e. output/input price takers, high number of suppliers, zero information and transaction, markets not influenced by producers/consumers, no entry or exit barriers, etc.). A second approach takes into account key assumptions introduced by Chayanov (1966

translated from Russian and German editions first published in 1920) concerning peasant farming. The latter argues that the goal of peasant household is reproduction rather than profit maximisation (Ellis 1993, p. 53).

Sales under both approaches are valued at market price (as observed in the survey). While under the Neoclassical approach, *consumption and stocks* are also valued at the market price, under the Peasant Farming approach, these two components of the output are assumed to be valued at a 10% higher than the market prices. Several studies deal with the evaluation of the self subsistence production, where the output value of the staple food was generally valued near retail

price, which is higher than the market price, up to 20-40% higher in some cases (Chibnik 1978). In the case of Sierra Leone, a 10% difference was adopted since this is the prevailing price difference between local and imported rice when purchased in the rural areas. The assumption is that by relying on self-production farm households do not depend on imported rice to fulfil their needs (See section 3.5.2). In other words, this 10% adjustment in value comes from the fact that farm households prefer to secure their food and avoid risks and uncertainties of future unpredictable market economy.

In the Neoclassical approach all units of time, whether in housework, wage work or leisure, are valued at their opportunity cost in terms of the market wage (Ellis 1993; Boadway 2006). This means that marginal valuation of labour is equal to market wage. However this does not apply for the farmers operating in areas where labour market is limited/inexistent (Colman & Young 1989). According to Ellis (1993) it is more consistent and analytically useful to consider peasant households in terms of their only partial integration into the market economy and the incomplete markets within which they operate. In other words, following the second approach there are differences both in terms of the objectives guiding peasant behaviour and the impossibility to assume perfect competition in the labour markets. In fact, there is not only a practically non-existent or extremely constrained labour market but a complex institutional setting in which farm households rely for securing other forms of intangible goods and services (i.e. tacit safety nets) in a context of strong social (village) cohesion.

The highly constrained or non-existent labour market means that the household labour cannot be effectively valued at market opportunity wage, thus, it is assumed to be close to zero. This follows earlier approaches already applied for similar cases and circumstances (cf. Dasgupta, Marglin and Sen (1972) and Little and Mirrlees (1974)). When there is no labour market,

until the value of output reaches the minimum subsistence level, the marginal valuation of labour is equal to zero, and leisure cannot be valued at any price (Coman & Young 1989 p.156 top). On commercial farms (also defined as entrepreneurial farms, or capitalist farms), increases in labour input without concomitant income gains can lead to losses because profit equals output value minus outlay on materials minus wages, minus other payments (e.g. debt-interests, land rent). On family/peasant farms, however, increases in (family) labour inputs without corresponding increases in income do not necessarily lead to monetary losses because of the absence of wages. Thus, on family/peasant farms, valuing family labour as equal to the wages of hired workers is nonsensical (Chayanov (1920), on Chayanov theory cf. Chibnik (1989)).

As suggested above (and explained in Section 3), there is an important social aspect that needs to be taken into account which is that farm households in Sierra Leone are extremely integrated at village and chiefdom level. On the one hand, property rights are not assured (but rather enforced by the authority of the *Paramount Chief*) and the land is frequently rotated due to the shifting cultivation system in place (thus not giving them sufficient motivation to put extra efforts³³ nor invest³⁴ in one specific plot). On the other hand, all assets are perceived to have a common value and are thus frequently shared between the villagers beyond the household

33 According to survey evaluations by the Government of Sierra Leone (2007) "often farmer groups report very large amounts of labour to complete a given task, especially when the task was carried out by a gang or collective group. It may be that in these cases the task in question was completed in less than a full working day, or it may be that the pace of work in some groups is relaxed with the work treated as much as an opportunity to socialize as to get the job done, or simply that farmers just over-estimate and over-report the time taken". In other words, issues of free riding may also be taking place at the village level.

34 As stated earlier in Section 3, access to credit at the farm level is infrequent. First because to use land as collateral the individual would require the written permission of the extended family (the latter is an infrequent event) and second, all potential benefits would also have to be redistributed leaving the individual farmers with reduced return for its risk taking.

boundaries. This means that the labour, as the most important production factor, is also perceived to be common and shared. In fact, the practice of these villagers is to set up working groups which attend different plots on a rotational base. This sharing scheme implies that one day a farmer hires labour then the other day he/she goes to work on other plots as hired labour. In this sense, labour exchange within the village can be assumed to level out and be balanced on a yearly base. By following this practice, hired labour may also be assumed at zero wages in income calculations. However, in the case of cash tree cropping, it is more common to pay in monetary terms rather than through exchanges, particularly for peak collection periods where labour shortage occurs (Sesay *et al.*, 2004).

Rice as the main component of Sierra Leone's diet fulfils an indispensable role for achieving and maintaining food security, beyond its role as income generating commodity. In the case of self-subsistence producers, largely located in the Northern districts, it was confirmed that despite inter-cropping practices, rice is the dominant crop for own consumption. The latter is reinforced by

the lack of employment alternatives and no real off-farm job-market. For households who besides rice and other staples produce cash crops (coffee and cocoa), the hired labour costs were actually accounted for at the market equivalent wage rate, since (i) a labour market does exist in those areas, mainly in the Eastern districts, where production systems often include coffee and cocoa, and (ii) both cash commodities are mainly produced to be marketed and require substantial labour input during collection periods. The estimation of opportunity costs based on the actual labour market constraints of both the Northern and Eastern districts, together with the valuation of self-subsistence production allows for an improved analysis of the specific context of (semi)subsistence farming-based economies and comparison of costs and output value in real terms, alternatively to market prices.

As identified in the literature review, farm households access seeds mainly through private sector purchases (HIS 2003/04). However, farmers manage to secure approximately 24.4% of utilised seeds (see Table 13) without engaging in monetary transactions by relying either on own

Table 20. Comparative Summary of the assumptions on the income calculation approaches: Neoclassical Approach (NA) & Peasant Farming (PF) Approach

	Neoclassical Approach	Peasant Farming Approach
Objective	Profit Maximisation	Simple Reproduction of Household
Market Assumption	Competitive Markets	Competitive Product Market & No Labour Market
Output Valuation		
Sales	Market price	Market price
Consumption and Stocks	Market price	10% higher than market price
Input Cost Valuation		
Household Labour	Wage (Opportunity Cost)	No cost (Opportunity Cost = 0)
Hired Labour	Wage	No cost – Food cropping Wage – Cash tree cropping
Seeds	Market price	Market price
Livestock sale	Market price	Market price
Livestock purchase	Depreciation cost	Depreciation cost
Tools	Depreciation cost	Depreciation cost
Land rent	Market price equivalent of bushels of rice paid	Market price equivalent of bushels of rice paid

Note: Market price and the wage is the value as reported in the survey (see Appendix V).

stock or exchanges at the village level. Since own stocks are accounted in the output value and since exchanges imply a cost that is even for both parts, this means that for the measurement of variable costs seeds must be taken into account for their entire value independently of whether cash was involved in the transaction or not. Consequently, seeds are calculated in the same manner under both income calculation approaches. However, in the cash income calculation it is taken into account that approximately $\frac{1}{4}$ of seeds were acquired without entering into a monetary exchange. *Livestock purchases* were valued at market price (as reported in the survey) under both income calculation approaches.

Fixed costs were calculated for tools and land rent. The cost of tools was calculated on the basis of a linear depreciation of their market value over the number of years it has been utilised by smallholders. Land rent payment is usually made in the form of a token which is a part of the harvested output (FAO, 1999).

In the discussion of results, these two approaches are used for calculating *Farm Net Income*. FNI-NA is the income calculation based on Neoclassical Approach (NA) principles of complete markets and FNI-PF is based on the assumption that Peasant Farming (PF) relies on a partial integration to the market economy and faces incomplete market. Quantitative evidence suggests that the latter approach is closer to the context in which farm households produce and interact.

Reproduction Threshold

The Reproduction Threshold (RT)³⁵ is introduced as a benchmark for assessing the economic viability of different farming or production systems. For farm households, the RT is the minimum output/revenue level per Household Working Unit (hhWU) below which farmers are unable to adequately pay for all inputs

and to completely restore capital productivity in order to begin a new production cycle. Without any additional outside-farming income, farms can survive in the short run either by underpaying the labour and/or by not replacing the capital depreciation, but in the medium-to-long run such survival strategies will inevitably exclude some farms from the market. RT is strongly affected by national economic policies, international trade etc., and producers have very little hope of influencing. These thresholds can also differ by region. The macro-economic changes that have no immediate relationship with local farm production systems can completely modify thresholds and turn well-off producers into deprived ones.

Since farm net income is a micro-economic indicator, and the minimum acceptable income (RT) needs to be determined separately for each region by taking into consideration the general economic and social situation, the difference between these elements can link the farms' economic performance to the prevailing regional- and macro-economic and social conditions.

For the two regions, two different Reproduction Thresholds were identified. For the Northern region, where farms have hardly any opportunity work off-farm, it was assumed that the Reproduction Threshold is equal to zero Farm Net Income per household working unit (RT north). For the Eastern region, where some alternative work can be found outside the farm, the opportunity wage was defined as the minimum agricultural wage from off-farm work (RT east) attainable locally, therefore set to be equal to 700000 Leones³⁶ of Farm Net Income per household working unit.

A positive difference between NFI and RT (RT north as well as RT east) indicates that the

35 Refer to FAO (1999) for wider definitions of the Reproduction Threshold of a farming system.

36 The approximate days of the working opportunity outside the farms were assumed at around 60 - 100 working days per year (the average collection period for coffee cherries and cocoa pods) (Source HIS 2003/04).

farm provides (i) a minimum relative satisfactory livelihood for the farmer and (ii) a surplus for accumulation and investment. A negative difference means that the farm provides neither an investment opportunity nor acceptable living standards for the farmer, i.e. the farm activity is not viable. In this case, the farmer needs to improve his/her farming activities up to the status of economic viability. If the farmer cannot afford to do this, then alternative sources of income need to be sought out to supplement farm income. Under some economic thresholds, defined by specific constraints faced at household level, farmers will not have any choice other than to adopt unviable systems and most likely become indebted to survive (FAO 1999).

Based on ASD, the economic viability of smallholders is assessed by Farm Net Income per household working unit (FNI/hhWU) in relation with a significant farm indicator such as the utilised agricultural land area per working unit (area/hhWU). These economic analyses allow direct comparisons of the income levels that the different types of farms existing in these regions could attain, and show their degree of viability according to socio-economic criteria expressed by the farmers in the region.

This basic notion, used in the methodological approach of the present study, can be applied to interpret various agricultural sector dynamics, not only the viability of farming systems, but also aspects related to agricultural employment, rural emigration and incentives to promote economic and social development.

Poverty Line

The poverty line is determined in order to assess what is the proportion of the farm households which fall below this line and what are the characteristic of the farming systems adopted by households categorised as poor or extremely poor. In the particular case of the Sierra Leone survey (where off-farm income was not quantified), the poverty lines will reveal the

extent to which farming activities cover the basic needs of the farm household. For this purpose, the assessment is undertaken at Farm Net Income per household unit (FNI/hhUnit) or household member in adult equivalent terms.

In order to measure the level of poverty of smallholders in this study, the Poverty Line Approach as implemented by FAO (1999) was introduced. This requires the definition of basic needs in monetary terms in order to represent the poverty line. The poverty line is then compared to the farm household income, and those households who fall below this line are classified as poor. In the present study the Peasant Farming income measurement approach was selected to conduct the poverty analysis because it provides not only a more realistic overview of effective monetary transactions but it takes into full consideration the thinness of labour markets among other institutional constraints and arrangements of the surveyed smallholders.

Poverty can be defined qualitatively from a basic needs perspective as “the lack of basic needs and services such as food, money, shelter, clothing, health facilities, schools and safe drinking water” (FAO, 1999). Quantitatively, it can be further refined by distinguishing between Extreme or Food Poverty Line and Full Poverty Line. The Extreme (Food) Poverty Line was defined as the level of expenditures required to attain the minimum daily nutritional requirement of 2700 calories per adult equivalent. The Full Poverty Line, besides the basic food requirements, includes also the necessary non-food expenditures (such as shelter, access to safe water, education, health care).

Based on Integrated Household Survey of 2004 in Sierra Leone (PRSP, 2005) these expenditures are Le 377,045 (121)³⁷ per year (Le 1,033 per day = 0.33) for food needs, and Le 770,678 (247) per year (Le 2,111 per day

37 Yearly average currency exchange rate: <http://www.oanda.com/currency/average> (Accessed: 2 May 2012)

= 0.72) for non-food requirements. In order to calculate the equivalent poverty line for the year of our survey (2009), the inflation over this time period was taken into account. The inflation rate based on consumer price index was taken from the calculations of the World Bank³⁸. According to this, for the year 2009 the Extreme (Food) Poverty and Full Poverty Lines can be expressed in monetary terms as Le 648,079 (i.e. 160) and Le 1324,670 (i.e. 326) per year – Le 1776 (0.44) and Le 3425 (0.89) per day –, per adult equivalent, respectively. A household whose expenditure cannot cover the basic food needs is considered to be “food poor”; and when the expenditure does not cover both the basic food and non-food requirements is considered to be “poor”.

In order to calculate how many of the surveyed households are falling below these lines the total household income should be determined. This includes income from farm production and also income from off-farm activities. In this study detailed information is available on the income coming from the households’ farm production, however only qualitative data has been collected for the income from off-farm sources. As stated, with this information we can quantify to what extent the income from agricultural production covers the basic needs of the smallholders and then determine the level of self-subsistence. Those households who fall below these poverty lines considered as poor, unless they do cover their basic needs from other income sources. The poorer the household (from a farming perspective) is the more important will be other source of income, not necessarily coming from the farm.

5.2.2 Input factor productivity of smallholders

Productivity is the ratio of some (or all) valued outputs that an organisation produces to some (or all) inputs used in the production

process (Jacobs, *et al*, 2006). In the present case study, smallholders’ productivity is determined in terms of their most important production factors: labour and land.

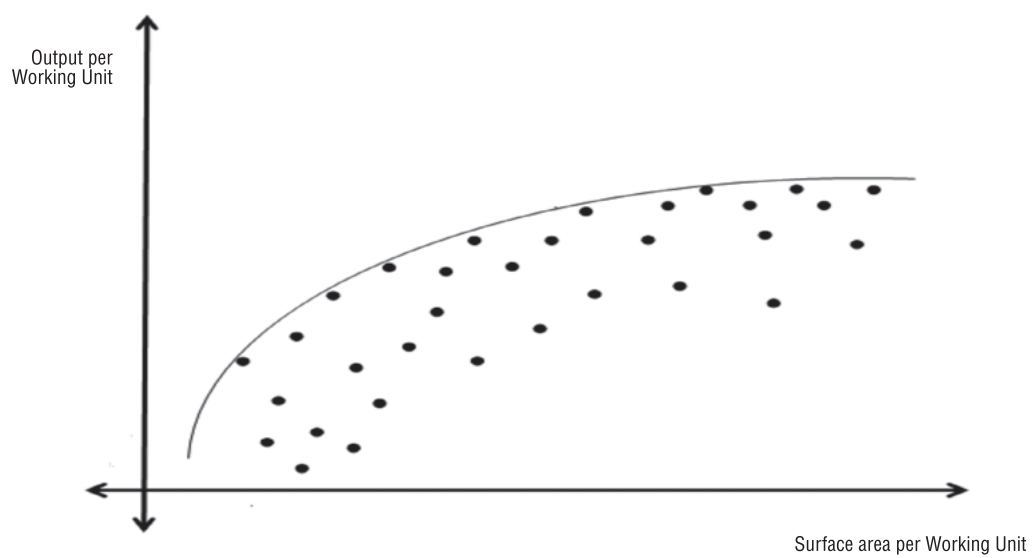
To illustrate the situation of farm households in the survey, productivity is understood as a measure of output from a production process, per unit of input (i.e. an apparent or partial measurement). Consequently, labour productivity is measured as a ratio of output (in monetary or physical terms) per working unit (full time equivalent per year), and land productivity as a ratio of output per acre.

Generally speaking, technical efficiency refers to the ability to minimise input use in the production of a given output vector, or the ability to obtain maximum output from a given input vector (Kumbhakar and Knox Lovell, 2000). Besides, the input factor productivity ratios described above, a rough measure of technical efficiency per type of crop is also introduced by comparing output per worker and surface area available per worker as illustrated in Figure 20.

Mazoyer (2001) also employs this comparative procedure to unveil the differences in terms of varying technological constraints in agriculture. Since in the Sierra Leone survey technology access is rather homogenous throughout the sample, the comparisons are drawn crop type. This provides information on how farm households producing the same crop perform between one another; as well as information at regional level to compare overall performance between regions. Thus, a best management practice within regions may be observed, and the characteristics of the best performing farms may also be identified.

38 World Bank database: <http://data.worldbank.org/indicator/FP.CPI.TOTL.ZG>

Figure 20. Combined productivity ratio



■ 6 Survey Results

This section addresses the survey results. First a general characterisation of smallholders is presented in sub-section 6.1. This is followed by the evaluation farm household economic performance and viability in 6.2 where income level, reproduction threshold and poverty line per farm types (based on their cropping orientation) are discussed. Data concerning input factor productivity of smallholders is commented in 6.3, while sub-section 6.4 contains the assessment of smallholders regarding the relevance of the received STABEX support.

6.1 Characterisation of smallholders

In order to understand the current situation of agricultural smallholders in Sierra Leone, and to be able to draw conclusions in supporting the formulation of adequate policies, data on farm-household characteristics were collected, and the results of this data collection are presented in this sub-section. More specifically, first, a description

of the family household is made focusing on demographic traits (6.1.1), main activities and income sources (6.2), farming practices (6.1.3) and resources (6.1.4). Next, infrastructure and communication are described (6.1.5) along with issues related to community leadership and social participation (6.1.6).

6.1.1 Household demography

According to Ellis (1993) the family is a social unit defined by the kinship relations between people and the household is a social unit where members share the same abode or hearth, which is usually a subset of the family (the composition of which differs across different societies). Household is a useful unit of analysis, given the assumptions that within the household resources are pooled, income is shared, and decisions are made jointly by adult household members. It is also convenient to associate the household (rather than the larger family) with the farm as a production unit. In the framework of the present

■ *Figure 21. Average gender composition of farming households in the Northern and Eastern regions of Sierra Leone*

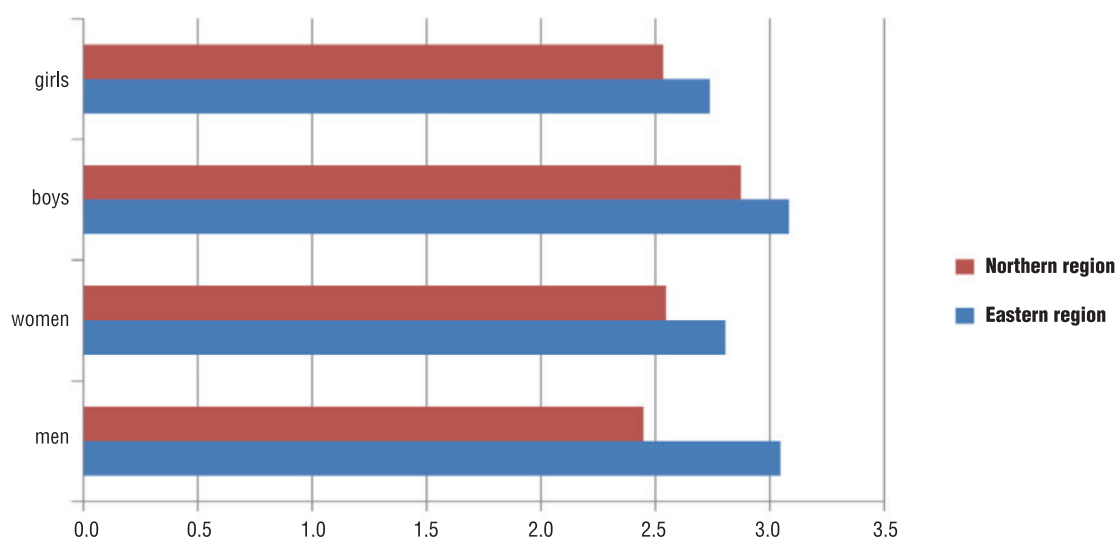


Table 21. Average age composition of farming households in the Northern and Eastern regions of Sierra Leone.

	Northern region	Eastern region
Age of household head	47	51
Age of spouse	37	37
% of the number of children under 10 yrs	35 %	30 %
% of the number of children between 10-18 yrs	27 %	34 %
% of the number of dependants above 18 yrs	38 %	37 %

Table 22. Educational composition of farming households in the Eastern and Northern regions of Sierra Leone

	Eastern region	Northern region
Education of head (average over heads with education)	8.3 yrs.	9.2 yrs.
(% without any education)	67%	72%
Education of spouse (average over spouses with education)	7.8 yrs.	7.0 yrs.
(% without any education)	86%	89%
% of children in school	62%	60%
% of children not in school	38%	40%

study this definition of the household is adopted in order to provide a base for the analysis, which represents a social and production unit.

To understand the composition of the farm households, key demographic aspects are described by focusing on gender, age and education of the household members.

The gender composition and number of household members for the sample average in the East and North are summarised in Figure 21. The graph shows that the average household is composed of roughly similar numbers of girls, boys, women and men (with slightly higher averages in the East relative to the North) adding up to a total household size of 11.7 members in the East and 10.4 members in the North.

The average age of the household head and spouse and the average age composition of children by age category in the proportion of all children in the household are described in Table

21. On average, the age of the household head is 47 years old in the sample households of the North and 51 in the sample households of the East. Their spouses are 37 years old on average in both samples. The proportion of the children across different age categories is quite similar in both regions; however, the proportion of children under 10 years is slightly higher in the Northern region compared to the Eastern one.

The average years of schooling of the household head and the number of children enrolled in both regions are presented in Table 22. A large majority of household heads in the sample have not received any formal education, while those who have received can account for 8-9 years of schooling. Absence of any schooling of the household heads is slightly more pronounced in the North than in the East, and more pronounced in women than in men. Concerning the education of the children, in both regions around 2/3rd of the children attend school and 1/3rd do not receive any education.

6.1.2 Main activities and income sources

The main activity of the working household members and whether they were involved on full or part-time work basis is summarised in Table 23. The primary activity of all household heads and spouses in the sample is agriculture. In the Eastern region only 1%, of the household heads and spouses engage in secondary activities, whereas in the

Northern region, the proportion is higher at 7-8%. In the Northern region, the secondary activity of spouses is predominantly petty trading, whereas that of the household heads is a mix of petty trading, paid employment and self employed craftsmanship. The higher prevalence of secondary activities in the North in comparison to the East can explain the higher proportion of part-time household farm labour in the Northern region.

Table 23. Professional status of smallholders

	Eastern region	Northern region
Primary activity of head	Agriculture	
(% households)	100%	
Secondary activity of head	petty trading, paid employment, self employed craftsman	
(% households)	1%	7%
Primary activity of spouse	Agriculture	
(% households)	100%	
Secondary activity of spouse	petty trading, paid employment, self employed craftsman	
(% households)	1%	8%
No. of hh members in farming	5.7	
(% part-time)	15%	25%

Figure 22. Sources of income for smallholders in the Eastern and the Northern regions of Sierra Leone (% of farms).

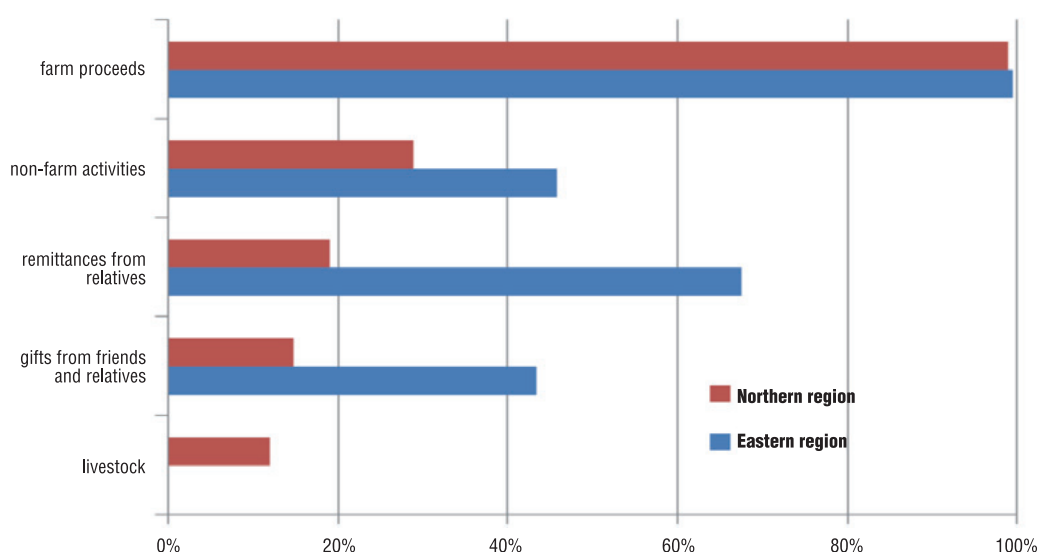
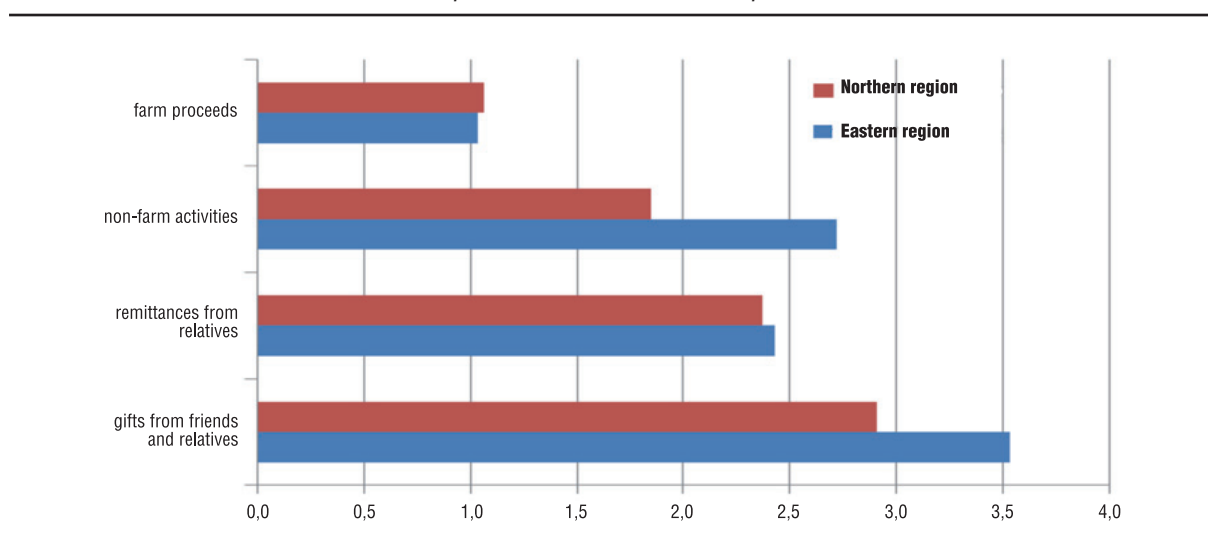


Figure 23. Sources of income for smallholders in the Eastern and the Northern regions of Sierra Leone ranked from the most important (1) to the least important (4)



In the Eastern region, 5.7 members of households, on average, take part in farming activities, 15% of which are part-time. In the Northern region, 5.1 household members are involved in farming, 25% of which are part-time. Households dedicate more labour to farming in the East, than in the North. This appears to be in relation with farm size, since also the farms (determining the demand for labour) beyond the households (providing supply of labour) are larger in the East than in the North (described in section 6.1.1.).

The sources of income of the household are illustrated in Figure 22. As expected, all farming households earn income from farm activities. In the Eastern region however, there are significantly more households claiming to receive income from non-farm activities, and from friends and relatives than in the Northern region. This may seem contradictory at first sight because it is in the Northern region, and not in the Eastern region, that household heads and spouses claim to have more secondary activities, and that other household members work less intensively on the farm presumably in order to undertake additional secondary activities. One plausible interpretation is that off-farm activities in the East may be better remunerated or more easily found. In this respect, respondents were

asked to identify all sources of income for the household without regard to the importance of the income generated, which is presented in Figure 23. Smallholders were asked to rank the different sources of income on a scale from 'most important' (rank 1) to 'least important' (rank 4). In both the Eastern and the Northern region, 'farm proceeds' are the most important source of income, and 'gifts from friends' and relatives the least important. Once ranked, 'non-farm activities' are close to second in the Northern and close to third in the Eastern region. Additionally, in the Northern region, about 10% of the households earn some income from 'livestock', whereas in the Eastern region, this is not the case for any of the households.

6.1.3 Crop Allocation and Farm Production of smallholders

The average acreage under cultivation per crop for the observed farm households in the Northern and Eastern samples is presented in Figure 24. Results indicate that in the East farms are double the size of those in the North; potentially allowing for additional cash crop cultivation in the Eastern region which is also adapted to hold these cash crops given its agro-ecological conditions (Jalloh, 2006; Sierra Leone Household Survey 2003/04, 2007).

Figure 24. Average acreage under cultivation per crop for the sample of smallholders in the Eastern and Northern regions of Sierra Leone

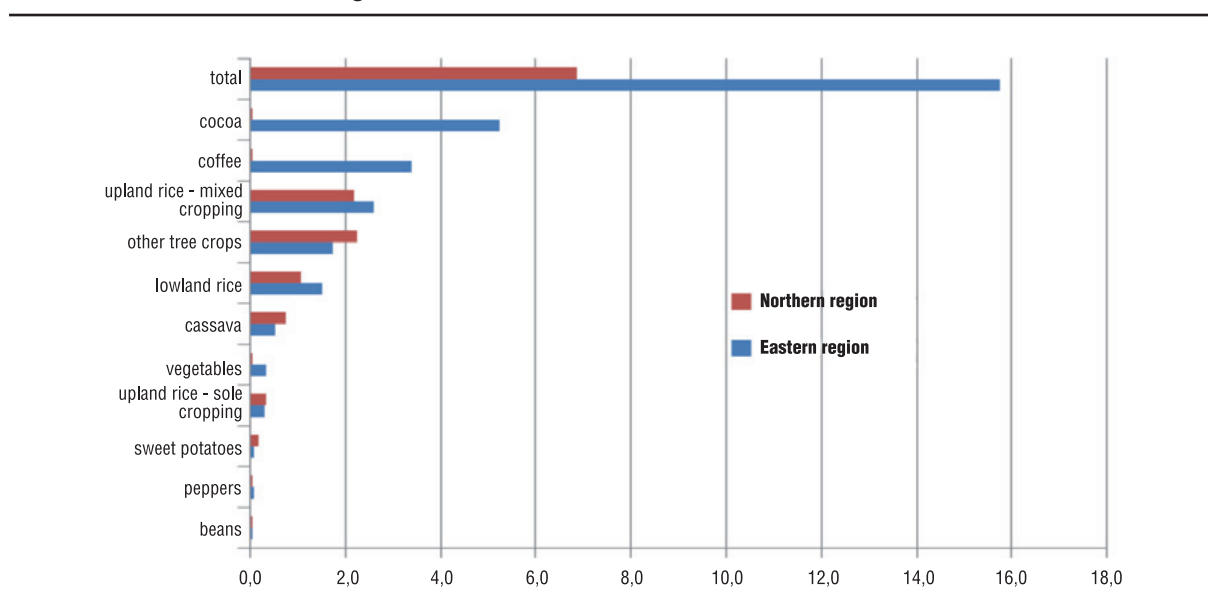
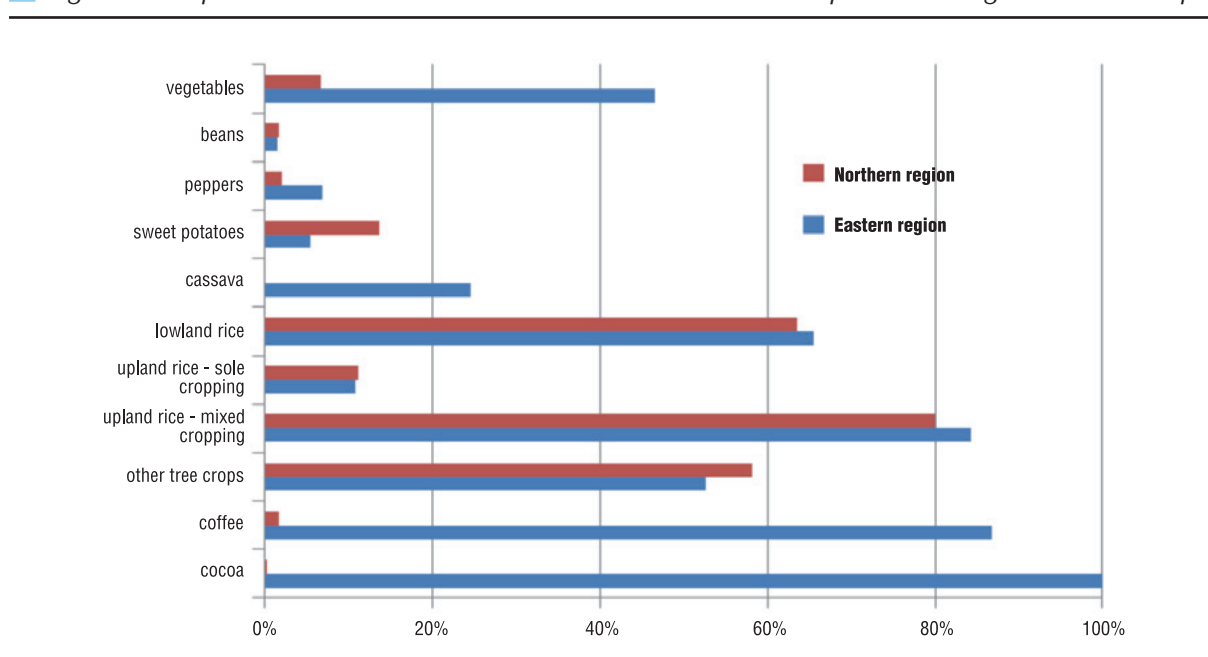


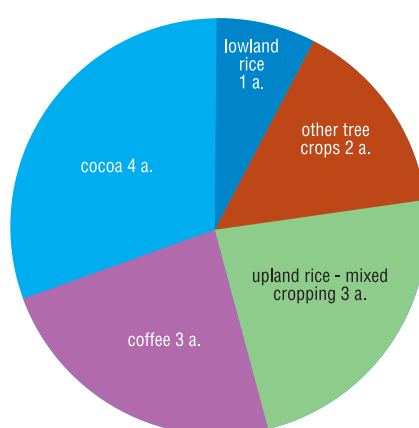
Figure 25. Proportions of smallholders in the Northern and Eastern samples cultivating the different crops



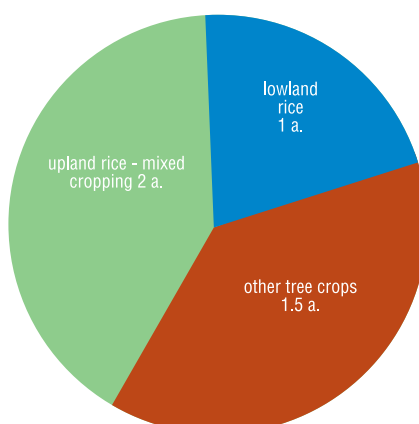
Furthermore, on average in the Eastern districts, a farm household disposes of 13 acres, and of 4.5 acres in the Northern districts (Figure 26 and Figure 27). This translates into an approximate availability of 1.1 acre per farm household member in the Eastern region and 0.4 acre per farm household member in the Northern region. The lower disposable acreage in the latter

compared to the previous region contributes to partly explain the highest propensity to search for off farming sources of livelihood in the North with respect to the East; as observed in the survey where highest importance was given to secondary activities and part time off-farm jobs in the North in comparison to the East. However, the importance of the cash crop may be in fact

■ Figure 26. Allocation of acreage to different crops for the median farm in the Eastern region of Sierra Leone



■ Figure 27. Allocation of acreage to different crops for the median farm in the Northern region of Sierra Leone



a more relevant determinant to the decision of seeking alternative secondary (off-farm) activities rather than the actual size of the cultivated plot. In any case, it is the agro-ecological setting which puts limitations to the choice of crops and thus access to higher cash income via the engagement in market sales versus self-consumption.

The proportion of smallholders cultivating different crops is presented in Figure 25. This figure shows that 90-100% of the growers produce coffee or/and cocoa in the East. Additionally, cassava and vegetables are more present in the East. In the North, (lowland and upland) rice is the dominant crop although inter-cropped with other staples such as sweet potato

or tree crops such as oil which is usually devoted to domestic consumption.

Figure 26 and Figure 27 compare land allocation in the Northern and Eastern region for the median farmer, confirming the above findings.

6.1.4 Resources of smallholders

Resources in terms labour, land and capital available to smallholders are described in this sub-section. In the case of capital there is hardly any machinery, agricultural buildings or monetary savings that could be used for production. However, livestock and agricultural stocks do compose an important part of the wealth of

Table 24. Resources of smallholders in the Eastern and Northern regions of Sierra Leone

Resources	Northern region		Eastern region		
	Bombali	Tonkolili	Kono	Kenema	Kailahun
1. Land (acres cultivated)	6.2	7.4	15.0	18.7	12.4
(acres/household unit)	0.9	1.0	2.4	2.1	1.2
2. Labour (nos.)	8.7	9.4	7.8	11.1	13.1
(adult equivalent)	6.7	7.3	6.2	8.7	10.4
men	1.9	2.0	2.0	2.8	3.5
women	1.9	2.1	1.9	2.7	3.0
children	4.8	5.3	3.9	5.7	6.7
Extended family (nos.)	11.9	13.1	9.7	20.7	19.0
(adult equivalent)	9.7	10.6	8.0	16.8	15.9
3. Livestock (Leones)	191028	284373	217222	238689	208530
(% households owning livestock)	62%	67%	75%	82%	61%
sheep (nos.)	3	2	1	2	4
	13%	18%	17%	27%	7%
goats (nos.)	2	3	2	2	3
	13%	21%	31%	28%	25%
chickens (nos.)	7	9	7	5	7
	59%	61%	65%	78%	51%
other poultry (nos.)	3	5	10	0	0
	4%	9%	26%	0%	0%
4. Agricultural stocks (Leones)	380891	275830	640184	951121	2248502
(% households having stock)	97%	95%	88%	94%	96%
Upland rice (bushels)	5	4	13	13	5
	60%	89%	82%	93%	79%
IVS rice (bushels)	4	3	9	10	4
	65%	47%	26%	63%	75%
Boli rice (bushels)	10	40	0	0	0
	28%	0%	0%	0%	0%

the smallholders. Next, each key resource is described in detail (See Table 24 for a summary overview at district level)

Land

Land is the main production factor for the smallholders. Regarding the size of cultivated area, as pointed in the previous sub-section, farms are roughly twice as big in the districts of the Eastern than those in the Northern region (see Table 24).

The amount of land used for food and tree crop cultivation on average per district is shown in Figure 28. These results show that all household dedicate on average a similar amount of land to food crop production to secure self consumption. On the remaining disposable acreage tree crops are cultivated with Eastern districts devoting a higher proportion to this activity.

The smallholders were asked about the number of years during which they keep land under bush or forest fallow (idle). (Figure 29). The length of the fallow period is crucial for the productivity of the systems, since it influences the weed vegetation, pests and diseases, consequently the yields of cultivated crops, evidences show that reduced fallow duration were associated with yield reduction (Beker & Johnson 2001, De Row, A 1995, Nyoka 1982). Surveyed households have reported fallow periods which are below the expected regeneration periods established for bush and forest areas (see section 3.2). Only in Kono the average number of years of land under forest fallow is close to the said regeneration period of 20 years. In the long run, the land rotation system can be expected to have a negative impact in terms of soil fertility management practices and the necessary efforts to reduce land degradation (Bernard Tinker *et al.*, 1999).

Figure 28. Total cultivated acreage per farm for food and tree crops per district

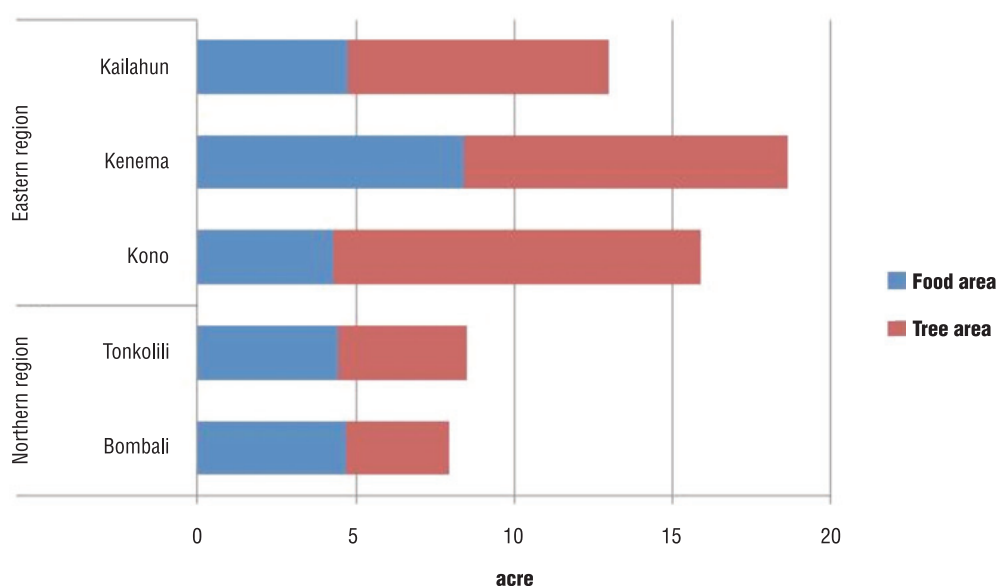
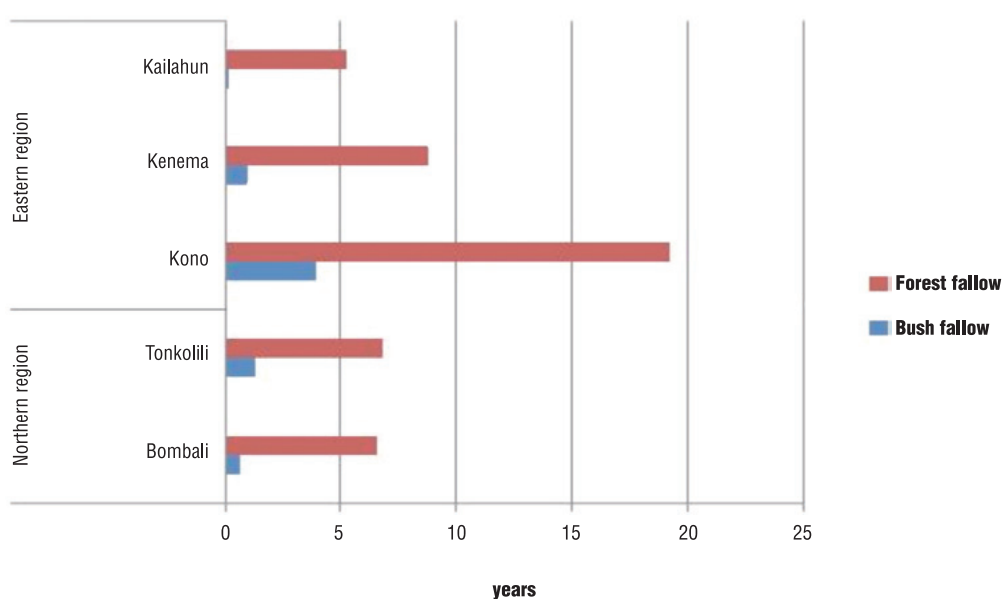


Figure 29. Average number of years of land under forest and bush fallow per district



When calculating cultivated farm acreage per household unit, both districts of the Northern region result in around 1 acre per household unit (Figure 30). In the Eastern region, Kailahun report on average a bit more than 1 acre and Kenema

and Kono a slightly higher average than 2 acres per household unit. Figure 31 shows that on average around 0.5-0.7 acre per household unit are dedicated to food production in all districts, except Kenema where slightly more area is used.

Figure 30. Total acre per household member per district

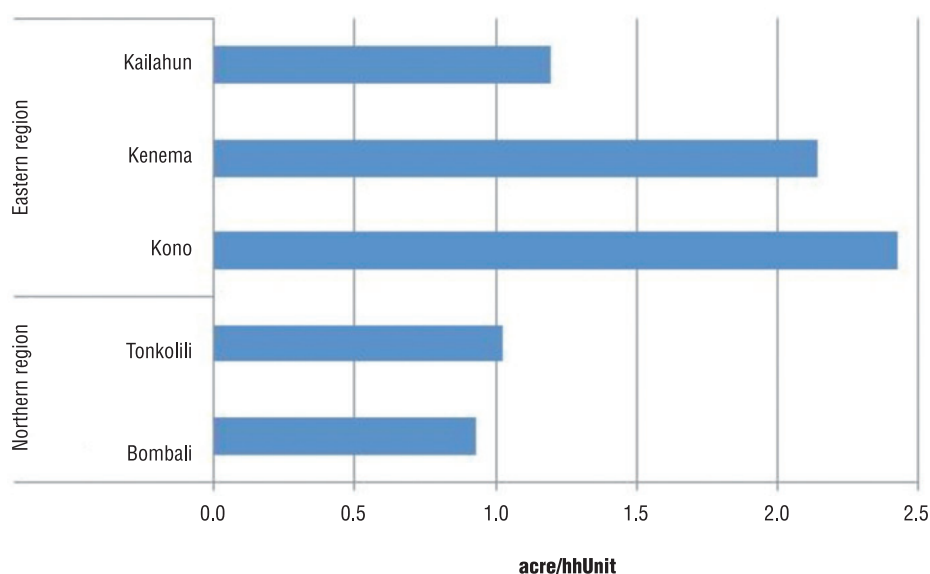
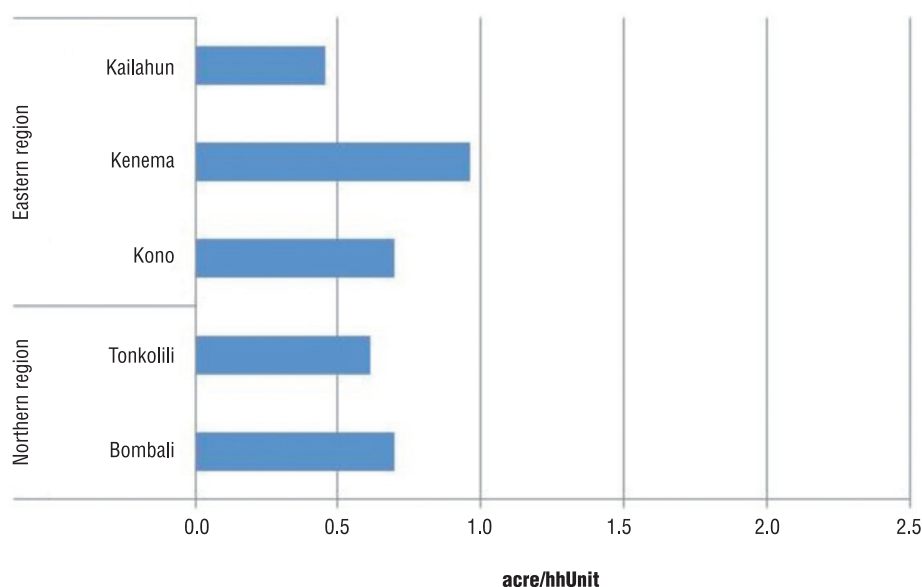


Figure 31. Food production area for one household member per district



Labour

As a measure for household labour supply, we use the information provided on household size and composition. This information is presented by district in the second section of Table 24. The households are larger on average in the districts of the Eastern region than they are in the Northern region (with the exception of Kono). The total available working days per

household are 260 days³⁹ (1950 hours per year per full time working man power). The labour use for production can be seen in Figure 32⁴⁰, which

39 ILO 1996, Wage Workers in Agriculture: Conditions of Employment and Work, Geneva, International Labour Office

40 In Sierra Leone on average the total hours worked in agriculture is around 900 hours per year for women and 1450 hours for men (Lee R. Martin 1991. A Survey of Agricultural Economics Literature: Agriculture in economic development 1940s to 1990s, University of Minnesota Press, 1072p)

Figure 32. Total household and hired labour use for production in days per year per district (men, women and children hours worked included)

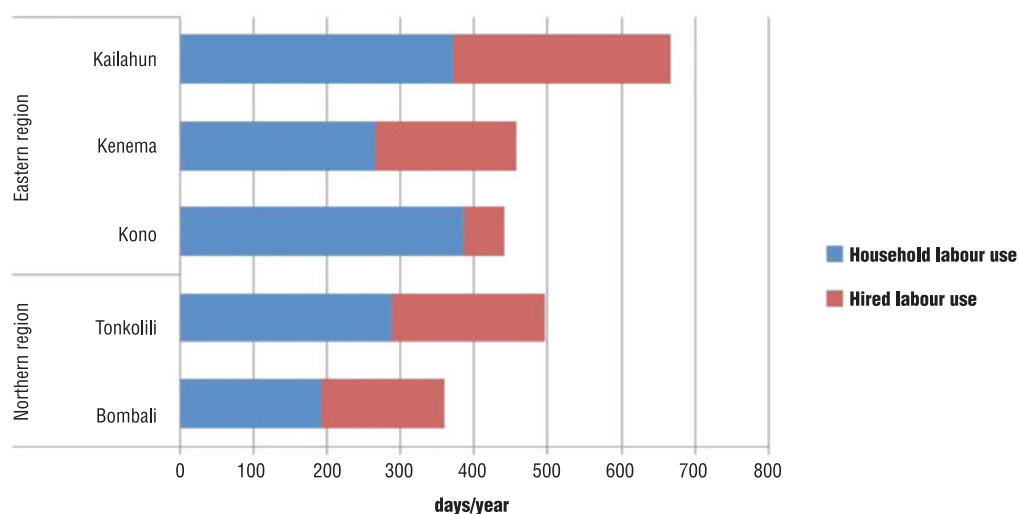
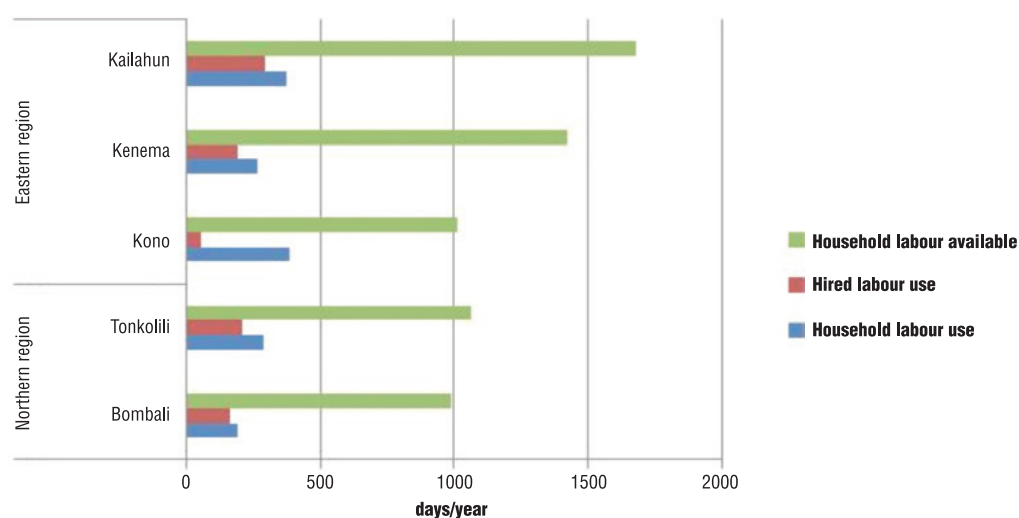


Figure 33. Total household labour availability and use and hired labour use in days per year per district



shows the proportion of the labour used from household and hired labour separately.

Figure 33 shows the availability of household labour and the use of household and hired labour on an average farm household. In the labour use all the labour force (man, women and children) are included (sum of the hours worked by each category). The Eastern district of Kono is the one with the highest use of household labour, which represents half of its yearly availability, and the

lowest use of hired labour. In the rest of the districts the proportion of the use of household and hired labour are roughly the same, showing a slightly lower number for hired labour use than for own family labour. It can be seen that each district has a lot of available working hours left without its use for own farm production, which could be exploited further. However, there are peak periods when available household labour is not sufficient to cover labour needs, and it is necessary to hire labour, for example during the

harvesting period (Sesay *et al.*, 2004). According to the survey results, the average wage for hired labour per district ranges from 5000 to 8000 Leones/day, however the wage also depends on the activity undertaken.

Livestock

Information on livestock was collected in the survey. The average monetary value (based on market price) of household's livestock is presented in the third part of the Table 24 along with the average numbers of the most common animals. Note that not all households own livestock, and that the averages are calculated only for those households that own it.

Animals other than sheep, goats, chicken and other poultry are rare. More specifically, no household declared to own work oxen or cattle. The highest and lowest concentrations of livestock are found in the Northern region, with a value of under 200 000 Leones in Bombali and a value close to 300 000 Leones in Tonkolili. In all districts of the Eastern region, the values are fairly similar, not exceeding more than 200 000 Leones in 2009.

Agricultural stocks

Information on agricultural stocks is represented through the average monetary value of a household's agricultural stocks, along with the average volume of the most common stocks of crops (upland rice, IVS rice and boli rice) at household level (see Table 24). The monetary value of the agricultural food stocks was based on regional market prices. Not all households produce or stock all crops listed.

Stocks of crops other than rice are not widespread. The most common and the most abundant crop stock is Upland rice, followed by IVS rice. Boli rice is only produced and therefore only stocked in the Bombali district. Other crops are not typically stocked (except for cocoa and coffee). The monetary value of agricultural stocks

is at least double in the East than in the North, with households in Kailahun leading the Eastern region with a value that is more than double the value of agricultural stocks in the following district: Kono: 640 184 Leones, Kenema: 951 121 Leones, Kailahun: 2 248 502 Leones; North: Bombali 275 830 Leones, Tonkolili: 380 891 Leones. The higher values of agricultural stocks in the East result from including cocoa. Given the nature of cash crop production (which is almost immediately delivered to the cooperatives that store and sell to the market) stocks of coffee and cocoa were not accounted as part of household wealth. Moreover, for the storage of these particular export crops, a higher quality in terms of facilities would be necessary in order to prevent damage from humidity exposure. The latter implies that with the absence of such storage infrastructure, it is highly infrequent for farm households to keep coffee or cocoa as agricultural stocks.

6.1.5 Infrastructure and communication

Agricultural production and marketing require market access. Data was consequently collected on the issue of accessibility; measured by distances, frequency and perceived difficulty of access (Table 25).

The different situations (in terms of distance between plots, distance from village to feeder roads, distance to usual markets and project offices (in the case of aid programme beneficiaries)) in the Eastern and the Northern regions lead, nonetheless, to a similar assessment of market infrastructure since half of all households find it difficult to access local markets. In the Eastern region, 81% of farmland is fragmented into multiple plots, whereas in the Northern region, only 62% of farms have their farmland fragmented. In both regions, the average distance between the plots of fragmented farms is just under a mile (approx. 1.6 km). A higher proportion of the households interviewed live in villages with a road in the Northern region than in the Eastern region (82% and 61%), but a

Table 25. Market accessibility in the Eastern and Northern regions of Sierra Leone

	Eastern region	Northern region
Distance between plots (average over positive distances)	0.8 mi.	0.9 mi.
(% of hh with no distance)	9%	38%
Distance from village to road (average over positive distances)	2.8 mi.	5.0 mi.
(% of hh with no distance)	61%	82%
Distance to usual market (average over positive distances)	10.4 mi.	6,8 mi.
(% of hh with no distance)	32%	1%
Distance to project officers (average over positive distances)	33.0 mi.	13,8 mi.
(% of hh with no distance)	5%	6%
% of hh with seasonally roads	29%	6%
Frequency of commercial vehicles		
% of hh with difficult market access	49%	51%

Table 26. Communication in the Eastern and Northern regions of Sierra Leone

	Eastern region	Northern region
Post office facilities	0%	0%
Land line infrastructure	0%	0%
Mobile phone coverage	37%	91%
Mobile phone ownership	15%	26%

higher proportion of the households interviewed in the Eastern region report to live in villages with a market (32% and 1% in the Northern region). Roads and markets are consequently underdeveloped in both regions for different reasons. Within this context of restricted mobility it is noted that project officers of the different aid programmes were also located far from the smallholders surveyed in both regions, with the distance much higher in the Eastern region than in the Northern region (33 miles vs. 13.8 miles).

Concerning communication infrastructure, the results (Table 26) show no existence of post or land line facilities but some presence of mobile phone in the East (15%), and around a quarter (26%) in the North. Coverage in the Northern region is much better compared to the East with mobile phones having apparently leapfrogged landline technology.

6.1.6 Community leadership and social participation

In order to attain a deeper understanding of social structures, data was collected concerning the role of farmers in their communities and the perceived benefits from holding certain positions and memberships (Figure 34).

Figure 35 presents membership to farmer associations and groups to which the respondents belong to. In the Northern region almost 90% of the farmers belong to some kind of farmers groups or NGO formations, while in the Eastern region 90% of the farmers belong to Cocoa and/or Coffee Farmers Cooperative.

Concerning the position held in a farmer organisation, 60% of the respondents are ordinary members, while some 30% have

Figure 34. Local participation in the community by the respondent in the Eastern and Northern regions of Sierra Leone

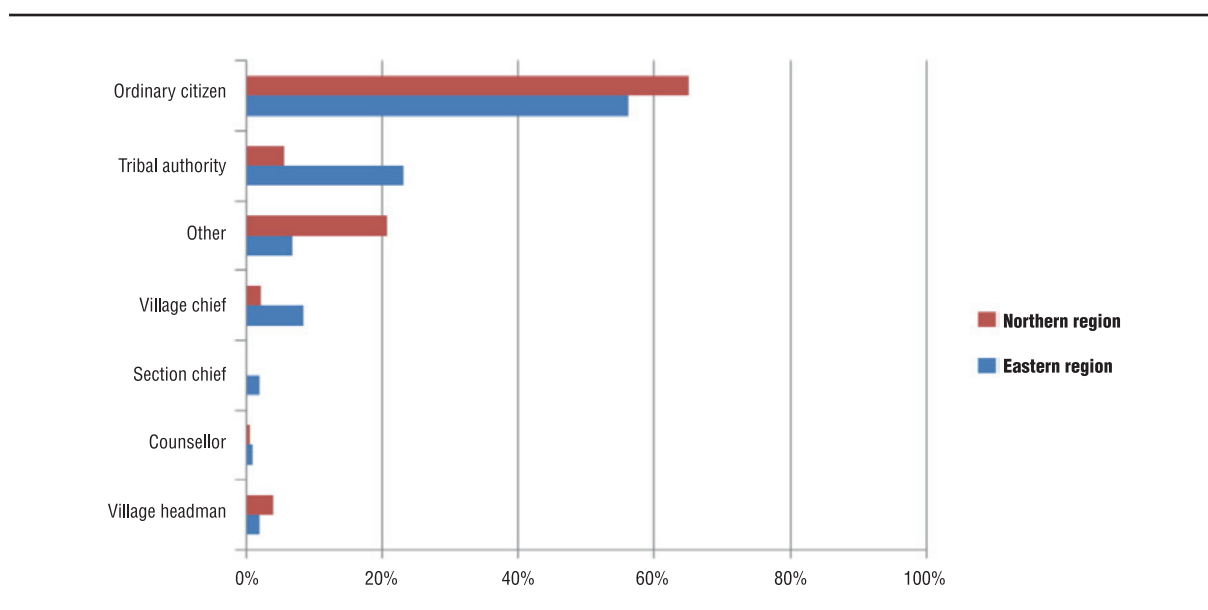
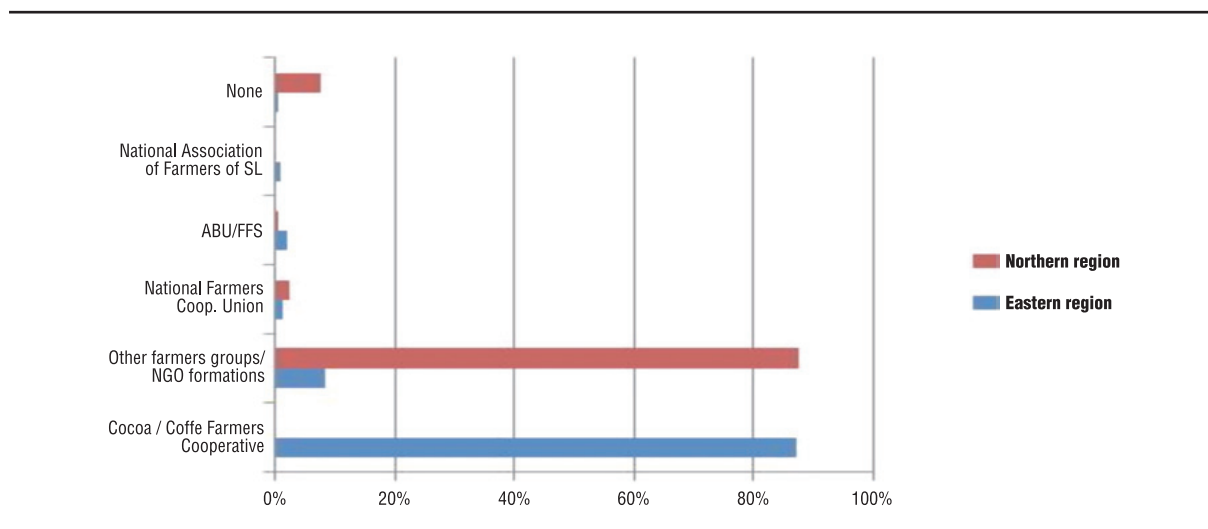


Figure 35. Membership of farmer associations or groups in the Eastern and Northern regions of Sierra Leone



executive positions, including president (Figure 36). The perceived benefits from this membership are ranked for the Eastern and Northern regions separately (Figure 37 and Figure 38).

In the Eastern region, access to specialised knowledge (for both marketing and processing) as well as access to markets is perceived as the key benefits from joining a farmer organisation. This is congruent to the needs of cocoa and coffee producers. In the Northern region access to seeds

and tools are the most perceived benefits, thus reflecting the particular production challenges of staple producers. These results could partially be explained in terms of particular production process necessities which are different between rice and coffee or cocoa growers. In the Northern districts, farmers aim at securing input access and increasing their productivity and overall output while in the East, farmers are highly concerned with guaranteeing cash crop output is marketed and sold at sufficiently high prices for which

Figure 36. Position held in any farmer organisation by the interviewee in the Eastern and Northern regions of Sierra Leone

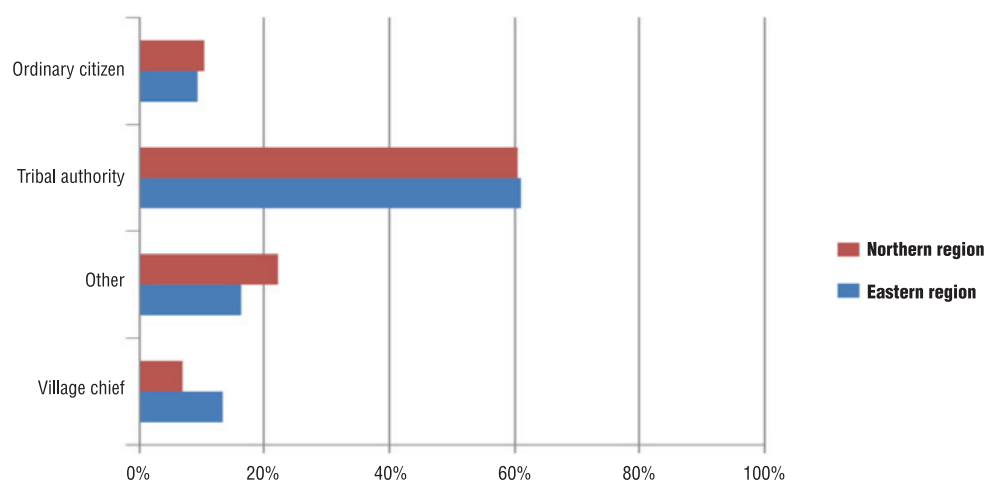


Figure 37. Evaluation of benefits from membership in farmer organisations, Eastern region

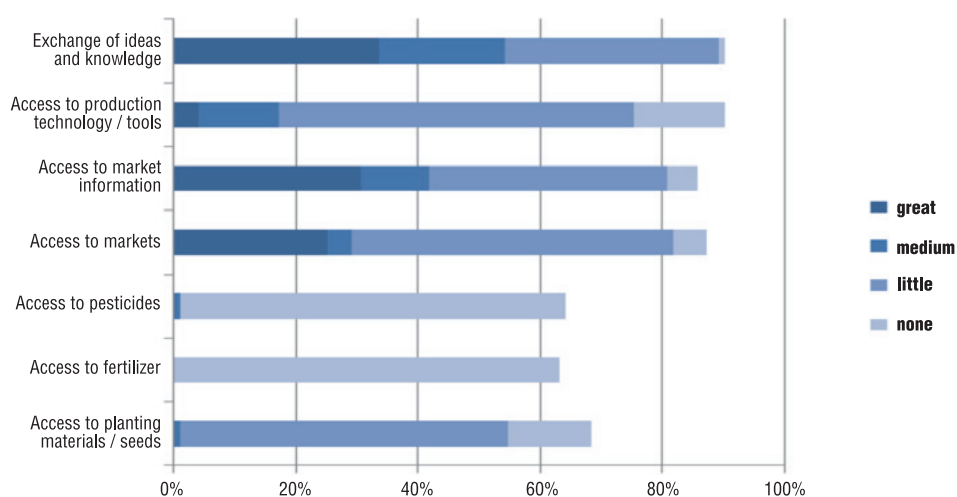
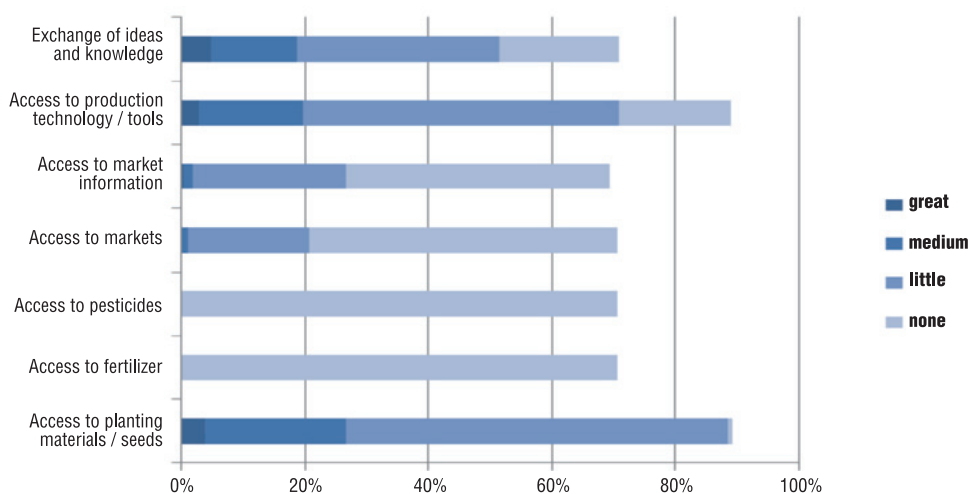


Figure 38. Evaluation of benefits from membership in farmer organisations, Northern region



improved management strategies at pre and post-harvest stages are crucial.

6.2 Evaluation of the economic performance and viability of smallholders

In order to evaluate the economic performance and the viability of farm households at farm level, first the smallholders were grouped into different farm types depending on their crop orientation. This farm typology is important in order to understand to which extent the farm production system affects the performance of the farm households given the resource availability they have (6.2.1). Once a detailed typology is in place, the results of the farm household income calculation are presented (6.2.2): i.e. the Farm Net Income (and Cash Income) calculations at farm level and Gross Margin (output value and input costs) calculations at crop production level, focusing especially on rice as the main staple food and coffee and cocoa tree cropping as the main cash crops. Then, economic results are analysed in relation to the reproduction threshold (in order to assess *farm* viability) and the poverty line (for evaluating *household* viability) (6.2.3).

6.2.1 Farm typology

The typology of smallholders is based on clustering them according to their similarity/difference in terms of socio-economic and agro-environmental characteristics. In order to characterise the farms within the regions – first step of the typology – the main criteria often used are biophysical conditions, resource endowments, land use, specialisation, intensification, farm managements and socio-economic conditions as well as orientation of production activities (market, self-consumption), position of the household in the ‘farm developmental cycle’ (Forbes, 1949; cited by Crowley, 1997) and main sources of the income for the household (Tittonell *et al.*, 2010).

The description of farm households in section 6.1 shows that within regions very similar socio-economic and agro-environmental characteristics are shared among smallholders. Differences between farm households are mainly found in terms of crop specialisation and crop mix. The differences in crop orientation also mark a difference concerning production activities for marketing or self-consumption. Thus, the smallholders were typified according to these two main criteria. The steps followed to set up the farm typology for the Sierra Leone survey consisted of first classifying the main production activities (in terms of crop mixes) across all surveyed farms for the Northern and Eastern districts. Secondly, farms were split into farm types according to their dominant production orientation for either market or self-consumption.

In the studied areas the main crop production activities are: rice production (upland and lowland rice), tree cropping (including cash crops: cocoa, coffee and self-consumption tree crops: oil palm), and other food production (including all other food crops produced e.g. vegetables, cassava). Consequently, farm typology was initially defined based on the mix of these three main crop production activities. Accordingly, farms may as a first step fit into one of the following options:

- rice only,
- rice & other food crops
- rice & tree
- rice & other food crops & tree, and
- tree only.

The number of farms and the proportion of the total area devoted under each of the categories described above for all surveyed farms are illustrated in Figure 39 and Figure 40.

It can be seen that the majority of the households base their farm production on mixed cropping system. The most dominant ones are i)

Figure 39. Crop mix categories present in Sierra Leone Survey (% of total cultivated acreage and all surveyed farms)

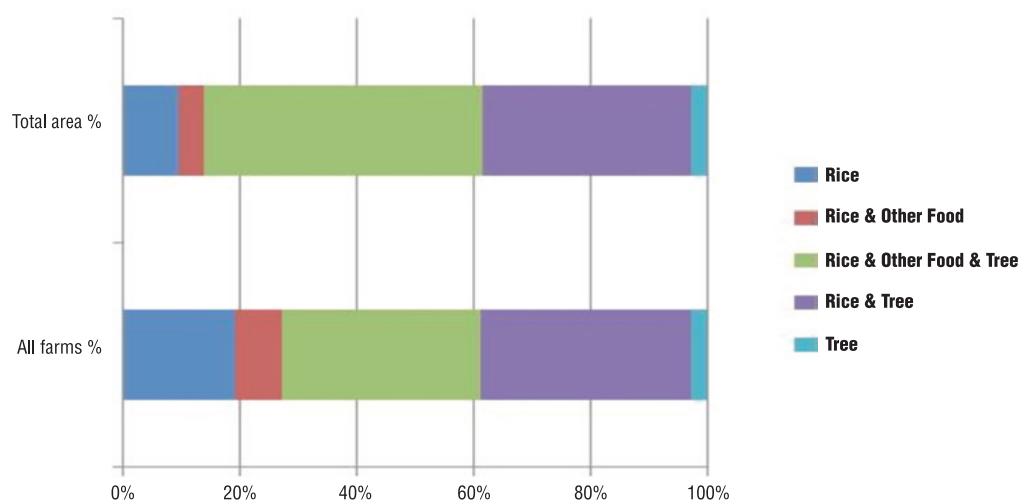
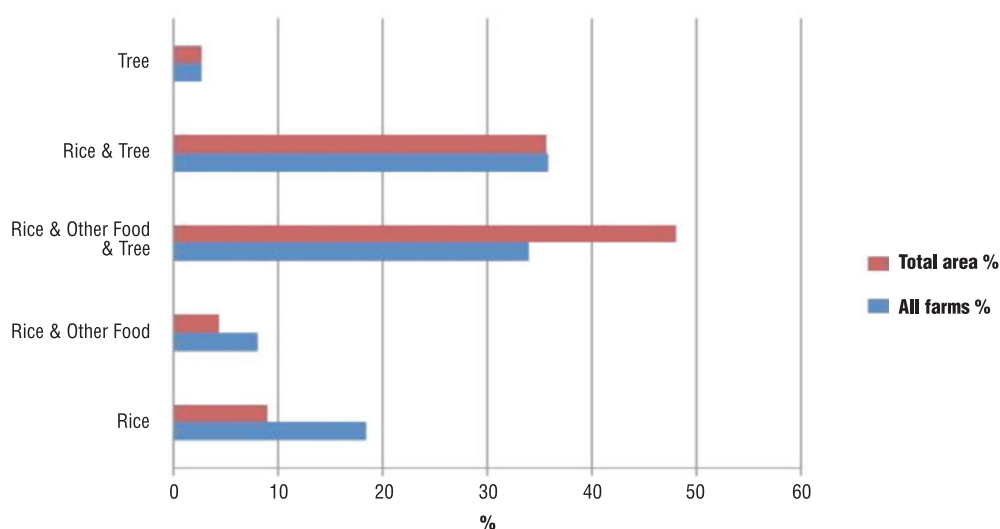


Figure 40. Crop mix categories present in Sierra Leone Survey (% of total cultivated acreage and all surveyed farms)



rice & tree cropping systems and ii) rice & tree & other food cropping systems. These two categories represent around 70% of surveyed farms. There is almost 20% of farms specialised only on rice production and 8% on rice and other food, however, these together represent only around 10% of the total surveyed area. At district level, it can be seen from Figure 41 that the rice & tree crop mix is typical for all the districts. The rice & other food & tree category is widespread in all the districts, except Kailahun. Rice only and rice & other

food can be found only in the Northern districts representing together 20% and 40% of the surveyed smallholders in Tonkolili and Bombali, respectively.

Figure 42 and Figure 43 further illustrate the distribution in the sample of farm households growing rice (upland, lowland or mixed) and tree crops (cash crops coffee and cocoa; and subsistence crop oil palm) at the district level. Concerning rice production it can be seen that the majority of the farms in all districts have a mix of

Figure 41. Crop mix categories in the Sierra Leone Survey, at district level (% of total cultivated acreage)

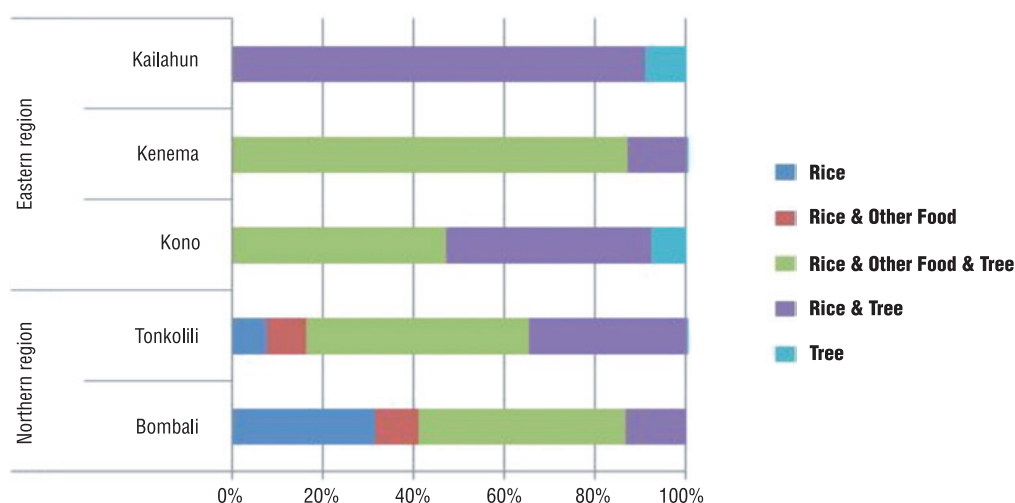
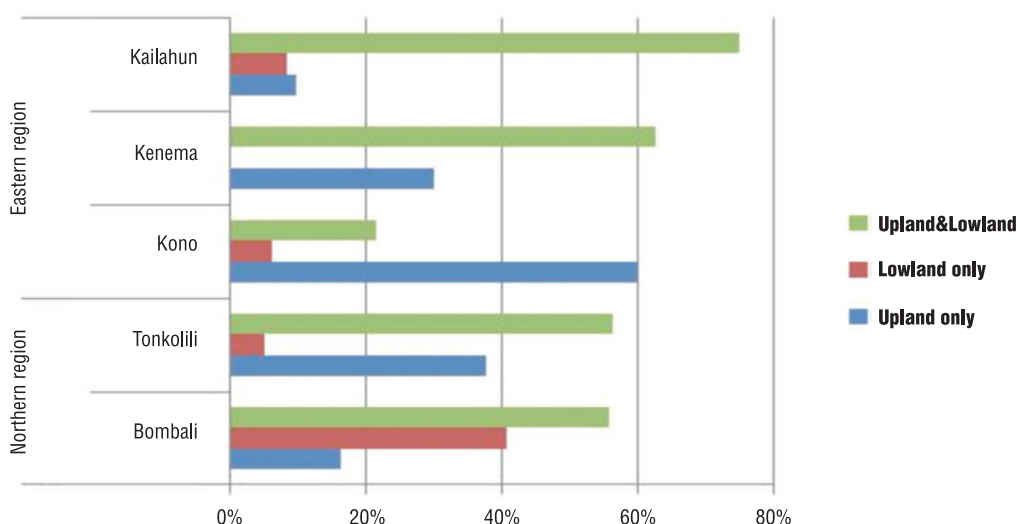


Figure 42. Percentage of farms cropping rice at district level



upland and lowland rice cropping system. In the Northern region, the pure lowland rice production is more dominant in Bombali, while in Tonkolili the upland rice production is widespread. In the Eastern region, in Kenema and Kono mainly upland rice is present, however, in Kailahun the mixed upland-lowland rice cultivation is the most widespread. Concerning tree crops, in the Northern region basically only oil palm is grown, while in the Eastern region farms mainly specialise in cocoa and coffee production.

In order to further understand the most typical cropping activities of surveyed farms, further distinction was made between crop types according to the production target (for subsistence/self consumption, or for the market/cash) as follows:

- upland rice
- lowland rice
- other food crops
- oil palm and other tree crops for self-sufficiency
- coffee, cocoa and other tree crops for cash income.

Figure 43. Percentage of farms cropping trees at district level

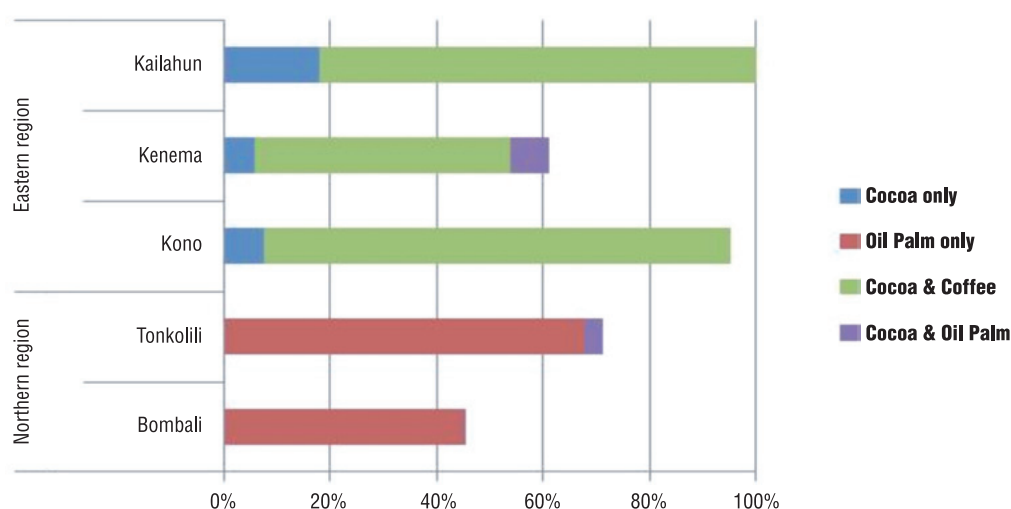
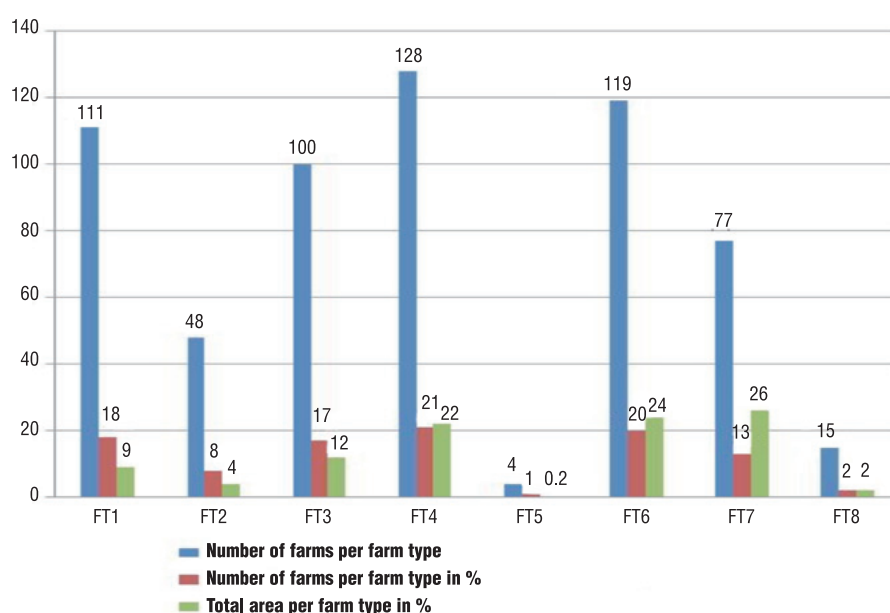


Figure 44. Farm Types (Number, Percentage and Percentage of total surveyed area)



According to this categorisation 8 farm types are distinguished (rice can be either upland or lowland) (Appendix III):

- rice only (FT1)
- rice & other food (FT2)
- rice & other food & tree for subsistence (FT3)
- rice & tree for subsistence (FT4)
- other tree for subsistence farms (FT5)
- rice & tree for cash (FT6)

- rice & other food & tree for cash (FT7)
- only cash tree farms (FT8).

Figure 44 shows the number and the proportion of farms and farm area belonging to each farm type. Overall, the introduced farm typology highlights the differences between the subsistence (mainly rice) oriented Northern and the cash (coffee and cocoa) oriented Eastern district. This typology becomes particularly useful

when analysing the smallholder viability at farm and household level. Farm types also provide relevant synthetic information concerning crop production systems and production orientations.

Agricultural income of smallholders

In this section, average annual Farm Net Income (FNI) levels per region and district are described followed by a detailed examination of output values and variable costs.

The smallholders in the Sierra Leone survey are only partially integrated into the cash economy of the country, and rely heavily on barter for their economic transactions. Consequently, a market only approach to evaluate the allocation process of smallholders' resources in crop production might not be the most appropriate. Therefore it is necessary to address the specific constraints faced by smallholders in order to better assess farm household behaviour and strategic decisions. Accordingly, a more context-specific approach has been applied to calculate output value and input costs of the farm production data obtained from the survey.

It has been already argued (in section 5) that FNI for the Sierra Leone survey could be

calculated in two different ways: FNI relying on Neoclassical theory principles of complete markets (FNI-NA), and FNI based on the assumption that peasants are only partially integrated to a market economy and thus face incomplete markets (FNI-PF). The main differences between the two FNI calculations are based in the calculation of consumption and stocks values and in the way selected input costs are accounted for. This means that FNI-NA market values are assigned to inputs used regardless of whether an actual competitive market exists or not (i.e. seeds, hired labour and household labour are valued at market price). In the FNI-PF calculations are based on real costs which farm households faced given the underlying productive and input supply schemes in place at the village level. The results of these two FNI calculations (illustrated in Figure 45) are here commented and compared.

For the overall analysis of smallholder performance in terms of farm viability, factor (labour/land) productivity and food security achieved through farming, average FNI and the main economic indicators of smallholder income measurement have been calculated at the following levels for all five surveyed districts: FNI per average farm household, per cultivated acre, per household working unit and total household

Figure 45. Farm Net Income of Neoclassical and Peasant Farming Approach for an average smallholder per district (Leones/year)

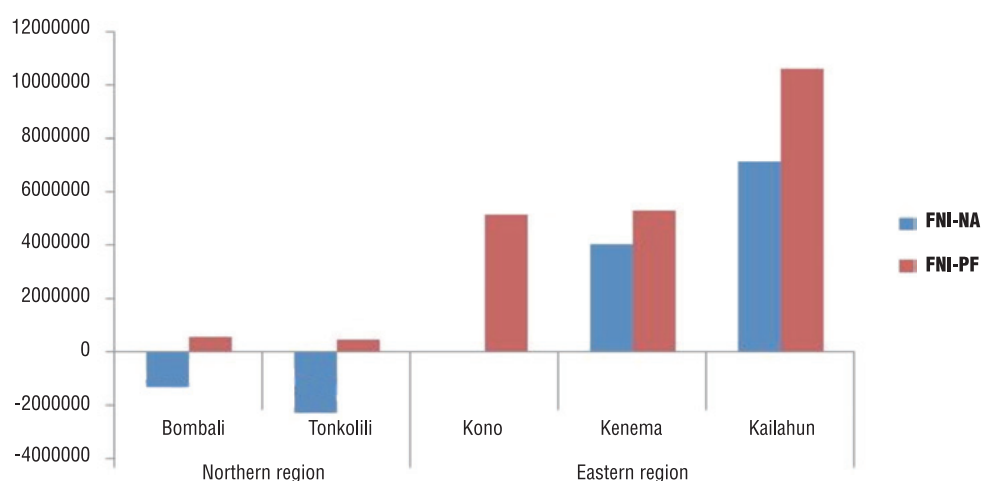
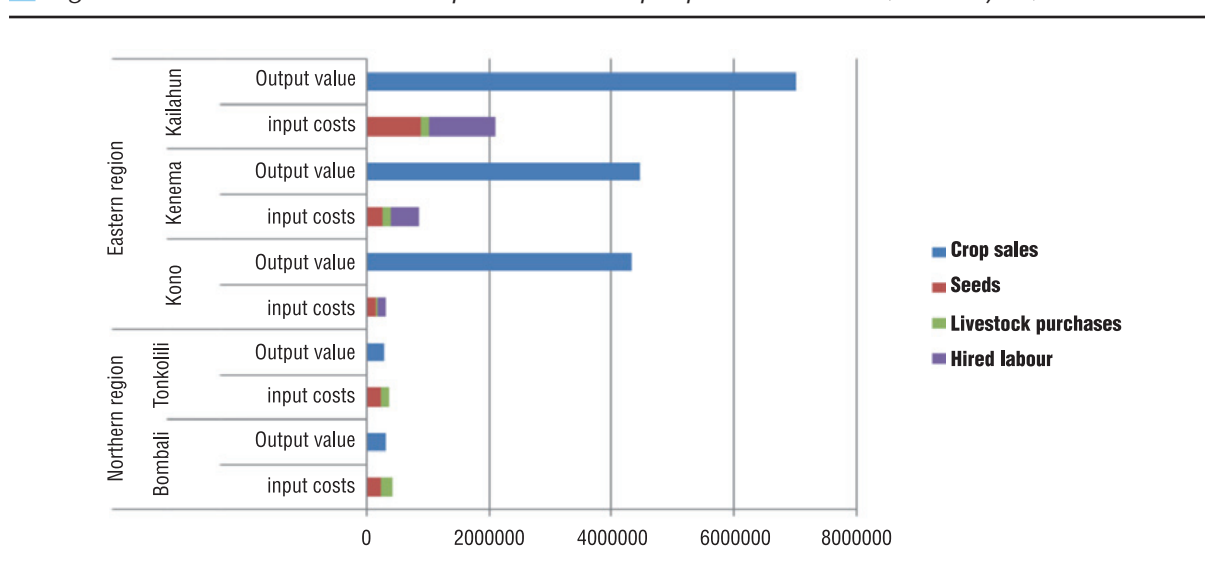


Figure 46. Annual Cash flow of output value and input production costs (Leones/year)



unit. Results aggregated per district are presented in Table 27 up to Table 30, respectively.

As illustrated in Figure 45 more income is generated from household production in Eastern region than in the Northern region, however the magnitude of it does also vary across the different districts and the method of FNI calculation. It can be seen that based on FNI-NA calculations the overall performance of the farms in the Eastern regions is positive (with Kono being around zero), thus profitable, compared to the farms in the Northern regions, where farm net income and farm gross margin both show a negative value. Alternative calculation of FNI-PF shows positive results for FNI for all the districts, with best performing values in Kailahun district. The choice of crop appears as a determinant factor given the higher output value of cash crops (i.e. cocoa and coffee) mainly produced in the Easter region. From this viewpoint, it may be argued that higher benefits are obtained per acre in the East than the North. Nevertheless, costs in Eastern district of Kailahun were observed to fairly similar to costs in both districts of the Northern region on a per acre basis. The key difference lies in the output value which in both districts of the Northern region is roughly one-fourth the output value in Kailahun. Consequently, the balance is positive in Kailahun district and negative in the Northern

region. Concerning Kenema and Kono, production is significantly lower (less than half) than in Kailahun, but so are costs, so the difference stays positive. Although, if only food crop output value is compared, the Northern districts on average appear in a similar position to the Eastern districts.

For cash flow calculation (Figure 46) all expenditures that are not calculated in cash terms were excluded, and thus only those components remain where cash was actually either spent were included: seeds⁴¹, livestock purchase, hired labour for cash crops (i.e. during collection periods), or earnings associated to sold production. As a result, the balance is slightly negative in the North and it may only be compensated through complementary coping strategies such as loans, family gifts, non-cash economic transactions at the village level and aid between families or other institutional bodies (NGO's, Government or International assistance). However, considering the very low monetary value of the negative cash-balance the socio-economic impact is in fact quite marginal (10000 Leones are roughly 1,78 EUR) and the households in Northern districts can be considered balanced around zero in real terms.

⁴¹ In the case of seeds, the 2003/2004 Sierra Leone survey indicates that usually 1/4th of seeds are acquired without entering into a monetary exchange.

Table 27. Economic results of the smallholders per average farm by districts based on Neoclassical Approach and Peasant Farming Approach (Leones/year)

Economic variables	Northern region			Eastern region	
per farm	Bombali	Tonkolili	Kono	Kenema	Kailahun
Output Value (OV-NA)	1019770	867946	5396101	6250815	12634378
Output Value (OV-PF)	1090328	924596	5502554	6430769	13196694
Value of Sales	314192	301437	4331568	4451269	7011220
Food crop	255524	186287	286962	502090	225852
Tree crop	48272	82674	4025776	3918507	6677532
Livestock	10396	32476	18831	30672	107836
Value of Consumption (VoC-NA)	269113	265362	497995	759551	2902599
Food crop	236819	217242	456936	559030	718663
Tree crop	19520	27059	23169	190519	2173746
Livestock	12775	21060	17890	10002	10191
Value of Stocks (VoS-NA)	436466	301147	566538	1039995	2720559
Food crop	420049	283462	566538	756343	276309
Tree crop	16416	17685	0	283651	2444250
Value of Consumption (VoC-PF)	296024	291898	547794	835506	3192859
Food crop	260500	238967	502629	614933	790529
Tree crop	21472	29765	25486	209571	2391121
Livestock	14052	23166	19679	11003	11210
Value of Stocks (VoS-PF)	480112	331261	623192	1143994	2992615
Food crop	462054	311808	623192	831978	303940
Tree crop	18058	19454	0	312016	2688675
Input Costs (IC-NA)	2445768	3191148	3579882	2408330	6079732
Input Costs (IC-PF)	509354	489495	352106	1119384	2591318
Variable Costs (VC-NA)	2187446	2928820	3521259	2002933	5855915
Seeds food	244220	224841	129107	253174	156485
Seeds tree	6811	2327	24962	0	1102893
Hired labour food	851499	1041596	192907	465392	999551
Hired labour tree	158143	340297	139415	460813	1108124
Household labour	926773	1319759	3034869	823554	2488863
Variable Costs (VC-PF)	251031	227167	293483	713987	2367501
Seeds tree	6811	2327	24962	0	1102893
Seeds food	244220	224841	129107	253174	156485
Hired labour tree	0	0	139415	460813	1108124
Fixed Costs	258323	262327	58623	405398	223817
Tools	82952	101976	32950	250935	103956
Livestock purchases	175064	159897	25673	154463	118861
Land rent	306	454	0	0	1000
Neoclassical Approach:					
Farm Gross Margin (FGM-NA)	-1167675	-2060875	1874842	4247882	6778463
(in Euro)	-216	-382	347	787	1255
Farm Net Income (FNI-NA)	-1425998	-2323202	1816219	3842484	6554646
(in Euro)	-264	-430	336	712	1214
Peasant Farming Approach:					
Farm Gross Margin (FGM-PF)	839297	697429	5209071	5716783	10829193
(in Euro)	155	129	965	1059	2005
Farm Net Income (FNI-PF)	580974	435102	5150448	5311385	10605376
(in Euro)	108	81	954	984	1964
Farm Net Cash Income	71261	83003	4248657	4233513	5750345
(in Euro)	13	15	787	784	1065

Table 28. Economic results of the smallholders per average acre by district based on Neoclassical Approach and Peasant Farming Approach (Leones/acre)

Economic variables per acre	Northern region		Eastern region		
	Bombali	Tonkolili	Kono	Kenema	Kailahun
Output Value (OV-NA)	164302	116776	360541	333730	1020077
Output Value (OV-PF)	175670	124398	367654	343338	1065477
Value of Sales	50622	40556	289414	237652	566073
Food crop	41169	25064	19173	26806	18235
Tree crop	7777	11123	268983	209208	539132
Livestock	1675	4369	1258	1638	8707
Value of Consumption (VoC-NA)	43359	35703	33274	40552	234351
Food crop	38155	29228	30530	29847	58024
Tree crop	3145	3641	1548	10172	175504
Livestock	2058	2834	1195	534	823
Value of Stocks (VoS-NA)	70322	40517	37853	55525	219653
Food crop	67677	38138	37853	40381	22309
Tree crop	2645	2379	0	15144	197344
Value of Consumption (VoC-PF)	47694	39273	36601	44608	257786
Food crop	41971	32151	33583	32831	63826
Tree crop	3459	4005	1703	11189	193055
Livestock	2264	3117	1315	587	905
Value of Stocks (VoS-PF)	77354	44569	41639	61078	241618
Food crop	74445	41952	41639	44419	24540
Tree crop	2909	2617	0	16659	217079
Input Costs (IC-NA)	394054	429347	239190	128580	490866
Input Costs (IC-PF)	82065	65858	23526	59764	209218
Variable Costs (VC-NT)	352434	394053	235273	106936	472796
Seeds food	39348	30251	8626	13517	12634
Seeds tree	1097	313	1668	0	89046
Hired labour food	137191	140140	12889	24847	80702
Hired labour tree	25479	45785	9315	24603	89468
Household labour	149319	177565	202775	43969	200946
Variable Costs (VC-PF)	40445	30564	19609	38120	191148
Seeds tree	1097	313	1668	0	89046
Seeds food	39348	30251	8626	13517	12634
Hired labour tree	0	0	9315	24603	89468
Fixed Costs	41620	35294	3917	21644	18071
Tools	13365	13720	2202	13397	8393
Livestock purchases	28206	21513	1715	8247	9597
Land rent	49	61	0	0	81
Neoclassical Approach:					
Farm Gross Margin (FGM-NA)	-188132	-277277	125268	226794	547281
(in Euro/acre)	-35	-51	23	42	101
Farm Net Income (FNI-NA)	-229752	-312571	121351	205150	529210
(in Euro/acre)	-43	-58	22	38	98
Peasant Farming Approach:					
Farm Gross Margin (FGM-PF)	135225	93834	348045	305218	874329
(in Euro/acre)	25	17	64	57	162
Farm Net Income (FNI-PF)	93605	58540	344128	283574	856259
(in Euro/acre)	17	11	64	53	159
Farm Net Cash Income	11481	11168	283875	226027	464272
(in Euro/acre)	2	2	53	42	86

Table 29. Economic results of the smallholders per working unit by district based on Neoclassical Approach and Peasant Farming Approach (Leones/hhWU)

Economic variables per hhWU	Northern region		Eastern region		
	Bombali	Tonkolili	Kono	Kenema	Kailahun
Output Value (OV-NA)	222942	105714	242532	327684	712683
Output Value (OV-PF)	238367	112614	247317	337118	744402
Value of Sales	68688	36714	194686	233347	395491
Food crop	55862	22689	12898	26321	12740
Tree crop	10553	10070	180942	205419	376668
Livestock	2273	3955	846	1608	6083
Value of Consumption (VoC-NA)	58833	32321	22383	39818	163731
Food crop	51773	26460	20537	29306	40538
Tree crop	4267	3296	1041	9988	122617
Livestock	2793	2565	804	524	575
Value of Stocks (VoS-NA)	95420	36679	25464	54519	153462
Food crop	91831	34525	25464	39650	15586
Tree crop	3589	2154	0	14870	137876
Value of Consumption (VoC-PF)	64717	35553	24621	43799	180104
Food crop	56950	29106	22591	32236	44592
Tree crop	4694	3625	1145	10986	134879
Livestock	3072	2822	884	577	632
Value of Stocks (VoS-PF)	104962	40347	28010	59971	168808
Food crop	101014	37978	28010	43614	17145
Tree crop	3948	2369	0	16357	151663
Input Costs (IC-NA)	534693	388675	160901	126251	342947
Input Costs (IC-PF)	111355	59619	15826	58681	146172
Variable Costs (VC-NT)	478218	356724	158266	104999	330322
Seeds food	53391	27385	5803	13272	8827
Seeds tree	1489	283	1122	0	62212
Hired labour food	186154	126864	8670	24397	56383
Hired labour tree	34573	41447	6266	24157	62507
Household labour	202611	160744	136405	43173	140392
Variable Costs (VC-PF)	54880	27669	13191	37429	133547
Seeds tree	1489	283	1122	0	62212
Seeds food	53391	27385	5803	13272	8827
Hired labour tree	0	0	6266	24157	62507
Fixed Costs	56474	31951	2635	21252	12625
Tools	18135	12421	1481	13155	5864
Livestock purchases	38272	19475	1154	8097	6705
Land rent	67	55	0	0	56
Neoclassical Approach:					
Farm Gross Margin (FGM-NA)	-255277	-251010	84266	222685	382361
(in Euro/WUhh)	-47	-46	16	41	71
Farm Net Income (FNI-NA)	-311751	-282961	81632	201433	369736
(in Euro/WUhh)	-58	-52	15	37	68
Peasant Farming Approach:					
Farm Gross Margin (FGM-PF)	183487	84945	234126	299689	610856
(in Euro/WUhh)	34	16	43	55	113
Farm Net Income (FNI-PF)	127012	52994	231491	278437	598231
(in Euro/WUhh)	24	10	43	52	111
Farm Net Cash Income	15579	10110	190960	221932	324367
(in Euro/WUhh)	3	2	35	41	60

Table 30. Economic results of the smallholders per household unit by district based on Neoclassical Approach and Peasant Farming Approach (Leones/hhUnit)

Economic variables per hhUnit	Northern region		Eastern region		
	Bombali	Tonkolili	Kono	Kenema	Kailahun
Output Value (OV-NA)	152500	119395	876078	715905	1220680
Output Value (OV-PF)	163052	127188	893361	736515	1275009
Value of Sales	46985	41466	703247	509803	677394
Food crop	38212	25626	46589	57504	21821
Tree crop	7219	11373	653600	448786	645155
Livestock	1555	4467	3057	3513	10419
Value of Consumption (VoC-NA)	40244	36503	80851	86991	280437
Food crop	35415	29884	74185	64026	69434
Tree crop	2919	3722	3762	21820	210018
Livestock	1910	2897	2904	1146	985
Value of Stocks (VoS-NA)	65271	41426	91980	119110	262849
Food crop	62816	38993	91980	86624	26696
Tree crop	2455	2433	0	32487	236153
Value of Consumption (VoC-PF)	44269	40154	88937	95690	308481
Food crop	38956	32872	81604	70428	76378
Tree crop	3211	4094	4138	24002	231020
Livestock	2101	3187	3195	1260	1083
Value of Stocks (VoS-PF)	71798	45569	101178	131022	289134
Food crop	69097	42893	101178	95286	29365
Tree crop	2700	2676	0	35735	259768
Input Costs (IC-NA)	365749	438977	581208	275826	587398
Input Costs (IC-PF)	76171	67335	57166	128203	250362
Variable Costs (VC-NT)	327119	402891	571690	229396	565774
Seeds food	36522	30929	20961	28996	15119
Seeds tree	1019	320	4053	0	106557
Hired labour food	127336	143283	31319	53301	96572
Hired labour tree	23649	46812	22635	52777	107062
Household labour	138593	181547	492723	94322	240463
Variable Costs (VC-PF)	37540	31249	47648	81773	228738
Seeds tree	1019	320	4053	0	106557
Seeds food	36522	30929	20961	28996	15119
Hired labour tree	0	0	22635	52777	107062
Fixed Costs	38631	36086	9518	46430	21624
Tools	12405	14028	5350	28740	10044
Livestock purchases	26180	21996	4168	17691	11484
Land rent	46	62	0	0	97
Neoclassical Approach:					
Farm Gross Margin (FGM-NA)	-174619	-283496	304388	486510	654906
(in Euro/hhUnit)	-32	-52	56	90	121
Farm Net Income (FNI-NA)	-213249	-319582	294870	440079	633282
(in Euro/hhUnit)	-39	-59	55	81	117
Peasant Farming Approach:					
Farm Gross Margin (FGM-PF)	125512	95939	845713	654743	1046271
(in Euro/hhUnit)	23	18	157	121	194
Farm Net Income (FNI-PF)	86881	59853	836195	608312	1024647
(in Euro/hhUnit)	16	11	155	113	190
Farm Net Cash Income	10657	11418	689786	484864	555574
(in Euro/hhUnit)	2	2	128	90	103

Figure 47. Farm Net Income for an average smallholder per district based on Neoclassical Approach (Leones/year)

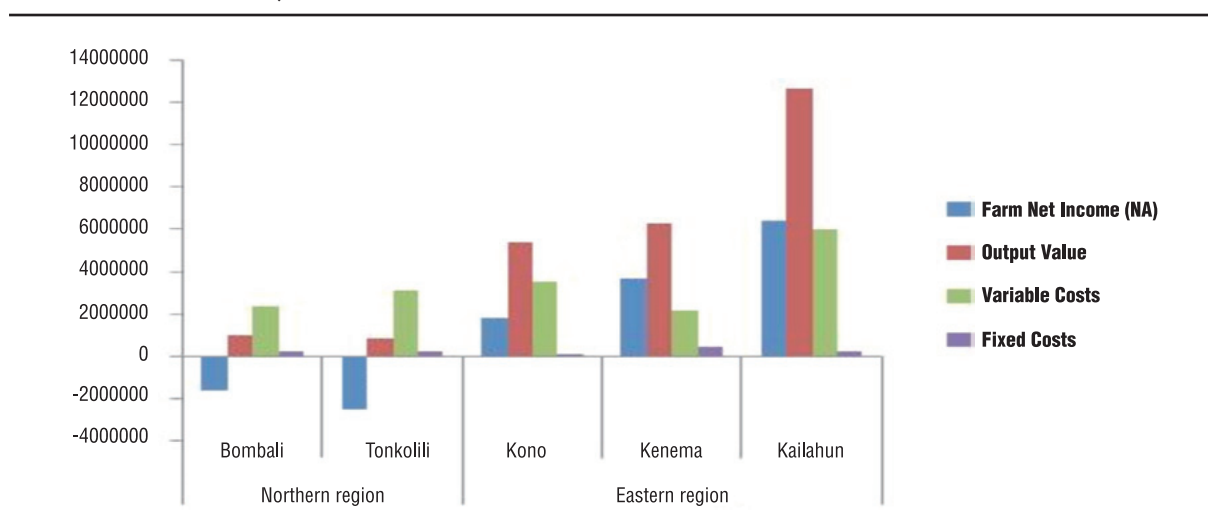
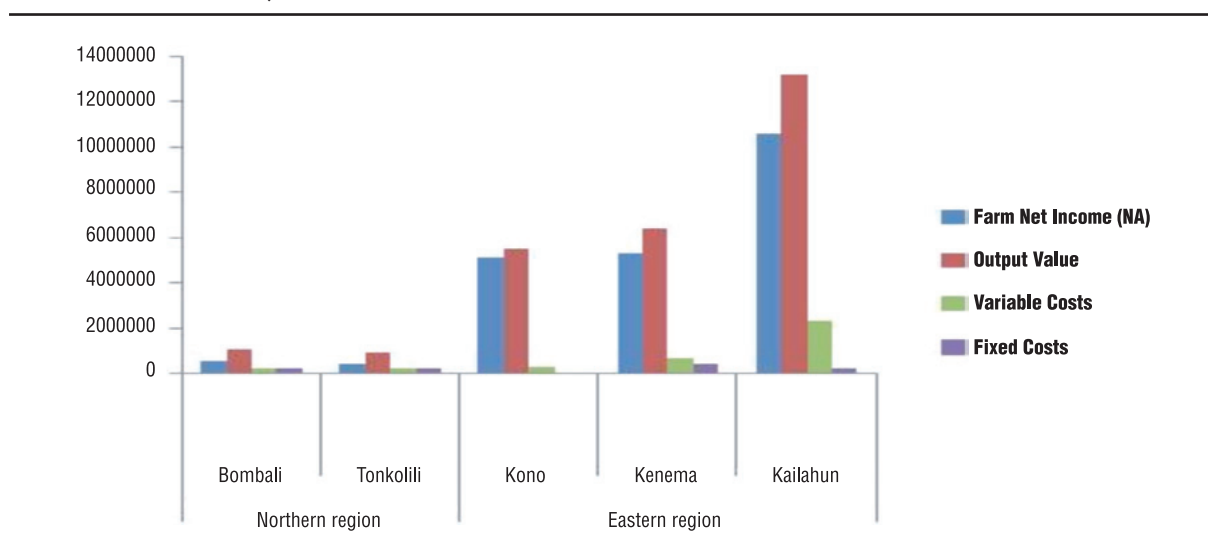


Figure 48. Farm Net Income for an average smallholder per district based on Peasant Farming Approach (Leones/year)



To visualize the difference between the two approaches used in the analysis and evaluation of FNI, Figure 47 shows a graphical representation of output value, variable costs and fixed costs of the FNI calculations following neoclassical principles while Figure 48 presents the same information for the Peasant Farming approach of measuring FNI. In the first case, the output value of production is much higher in the Eastern than in the Northern region, with Kailahun district particularly prominent in the Eastern region. Concerning Kenema and Kono, production value is significantly lower (less than half) than

in Kailahun, but so are costs, thus the difference stays positive (in Kono, however, a break-even situation is portrayed). In turn these latter two produce four times as much as the average households in the Northern Tonkolili and Bombali districts. The value of production outweighs costs in the Eastern region, with the opposite being true in the Northern region. Consequently, the balance according to the Neoclassical calculation is positive in Eastern region and negative in the Northern region. On the other hand, with the Peasant Farming approach, lower variable costs are introduced due to unvalued household and

Table 31. Different output values and input costs as proportion of the total for an average smallholder per district based on Neoclassical Approach and Peasant Farming Approach (%)

Economic variables per acre	Northern region		Eastern region		
	Bombali	Tonkolili	Kono	Kenema	Kailahun
Output Value (OV-NA)	100	100	100	100	100
Output Value (OV-PF)	100	100	100	100	100
Value of Sales	31	35	80	71	55
Food crop	25	21	5	8	2
Tree crop	5	10	75	63	53
Livestock	1	4	0	0	1
Value of Consumption (VoC-NA)	26	31	9	12	23
Food crop	23	25	8	9	6
Tree crop	2	3	0	3	17
Livestock	1	2	0	0	0
Value of Stocks (VoS-NA)	43	35	10	17	22
Food crop	41	33	10	12	2
Tree crop	2	2	0	5	19
Value of Consumption (VoC-PF)	29	34	10	13	25
Food crop	26	28	9	10	6
Tree crop	2	3	0	3	19
Livestock	1	3	0	0	0
Value of Stocks (VoS-PF)	47	38	12	18	24
Food crop	45	36	12	13	2
Tree crop	2	2	0	5	21
Input Costs (IV-NA)	100	100	100	100	100
Variable Costs (VC-NA)	89	92	98	83	96
Seeds food	10	7	4	11	3
Seeds tree	0	0	1	0	18
Hired labour food	35	33	5	19	16
Hired labour tree	6	11	4	19	18
Household labour	38	41	85	34	41
Fixed Costs (FC-NA)	11	8	2	17	4
Tools	3	3	1	10	2
Livestock purchases	7	5	1	6	2
Land rent	0.01	0.01	0.00	0.00	0.02
Input Costs (IV-PF)	100	100	100	100	100
Variable Costs (VC-PF)	49	46	83	64	91
Seeds tree	1	0	7	0	43
Seeds food	48	46	37	23	6
Hired labour tree	0	0	40	41	43
Fixed Costs (FC-PF)	51	54	17	36	9
Tools	16	21	9	22	4
Livestock purchases	34	33	7	14	5
Land rent	0.06	0.09	0.00	0.00	0.04

hired labour costs for self-subsistence production, thus arriving to slightly positive outcome in the Northern districts.

Another way, to examine the differences between these two FNI measurement approaches is to compare and contrast the differences in terms of input cost structures. Table 31 shows the varying proportion in which input costs contribute to the total of an average farm within the five studied districts under both the Neoclassical and Peasant Farming approaches. While VC-NA provides market values to all inputs used, the VC-PF captures the perception of the incurred costs by the farmers. Under VC-PF, the main component in the cost structure in the North is allocated to seeds for food crop production but in the East, hired labour (particularly necessary for the harvest of cash crops) represents the highest proportion. Alternatively, household and hired labour constitutes the most important cost component under VC-NA calculations for all districts alike. Again, the relevance of hired labour in the East is accentuated.

Next, output and input components of the FNI calculation are analysed in more details.

Output Value

There is a difference across the districts concerning the amount of production value that goes into consumption, sales and stocks (Figure 49). In the Northern districts the amount of crop is more or less evenly distributed, around 30% of the production for sale, and the same for consumption, while close to 40% is stocked. In the Eastern districts more than twice of the production goes for sale, from around 50-80% of the value for sale, and the remaining 20-50% evenly distributed between consumption and stock.

Due to the very marginal livestock production in the studied smallholder farms the main focus is given on the analysis of food and tree crop production. As mentioned earlier, tree crop production is essentially concentrated in the Eastern region where higher overall output values are obtained given this concentration on cash crops (Figure 50).

Figure 49. Output value of crop production per production orientation for an average smallholder by district (Leones/year)

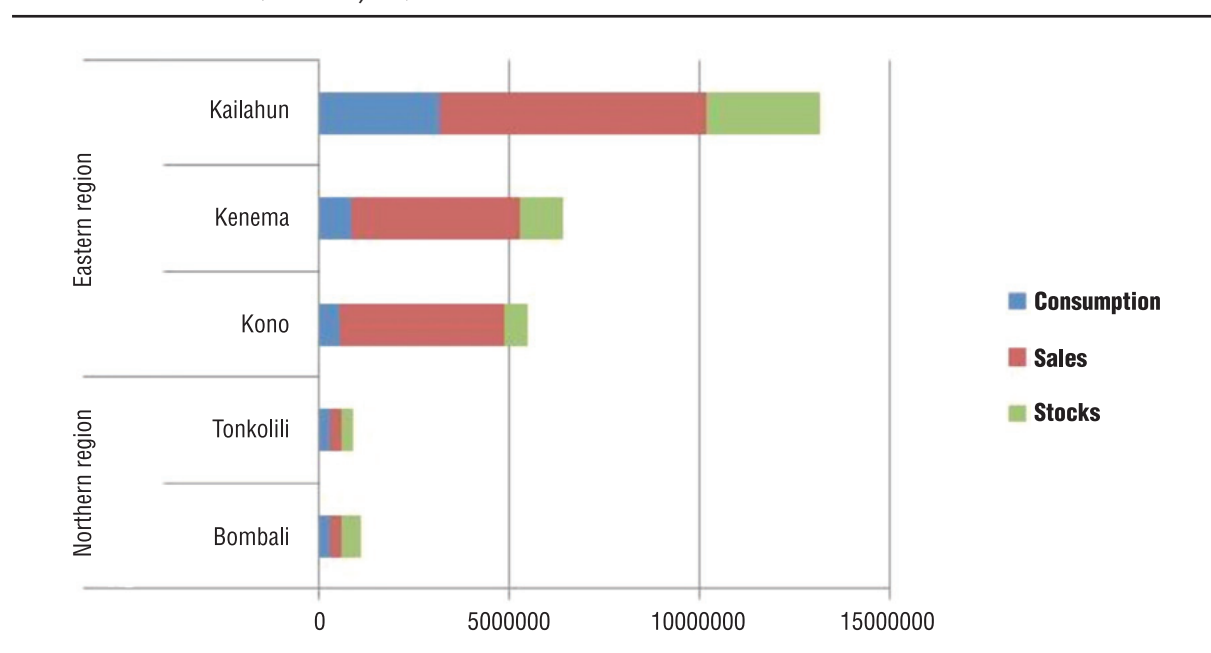
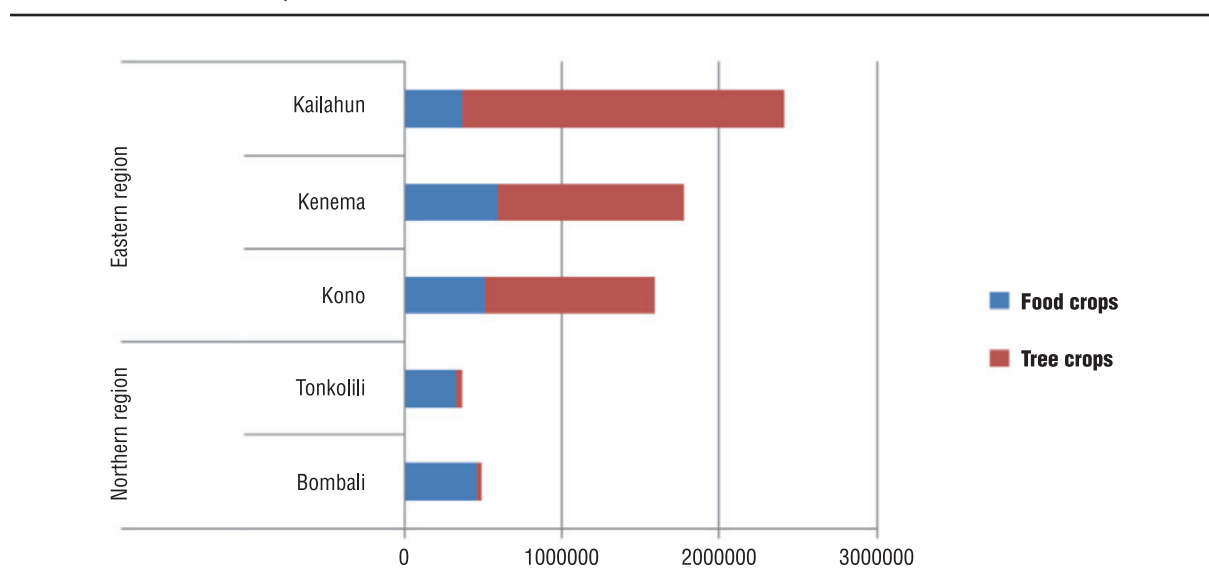


Figure 50. Output value of food and tree crop production for an average smallholder by district (Leones/year)



Food crops

Figure 51 identifies the most frequent food crops cultivated by the household in the different districts i.e. rice, cassava, groundnut, pepper, beans/vegetables, other food crops. Rice comprises the main bulk of food crop production across all districts with the Upland rice accounting for a bigger share than Lowland

rice, mainly IVS rice in all the districts, except in Bombali district where next to IVS rice, Boli rice is also cultivated (Figure 52).

Figure 53 and Figure 54 present the distribution of total food crop production in terms of overall household consumption, sales, stocks and yield losses. On average the households in all of the districts except for Kailahun present a broadly similar

Figure 51. Output value of food crop production per crop of an average smallholder by district (Leones/year)

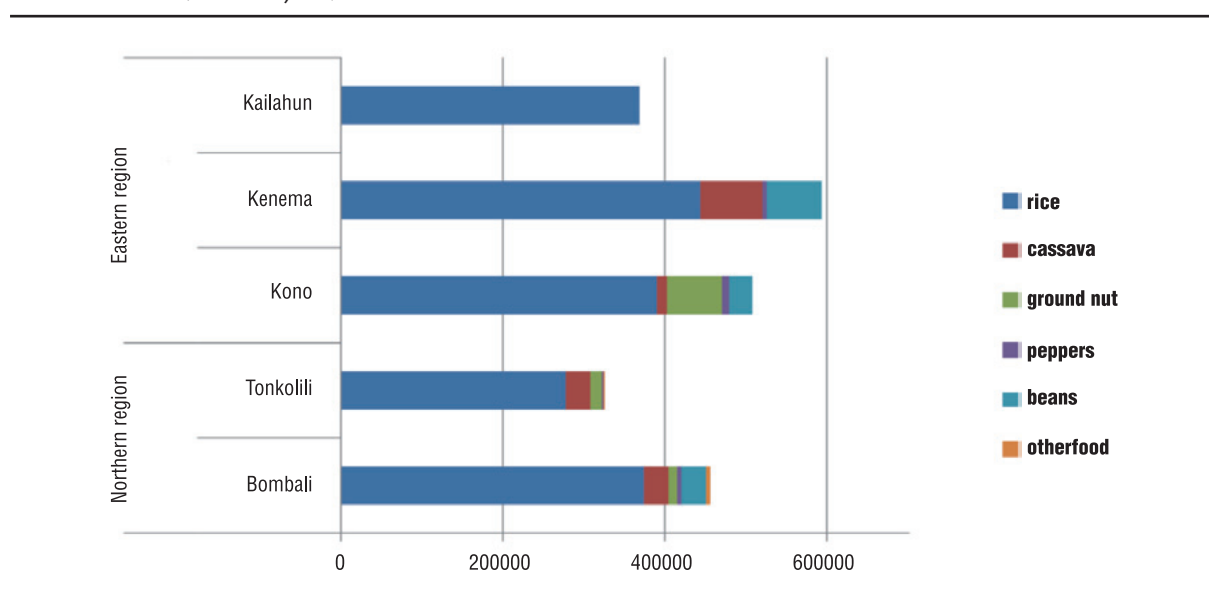


Figure 52. Output value of rice per rice type for an average smallholder by district (Leones/year)

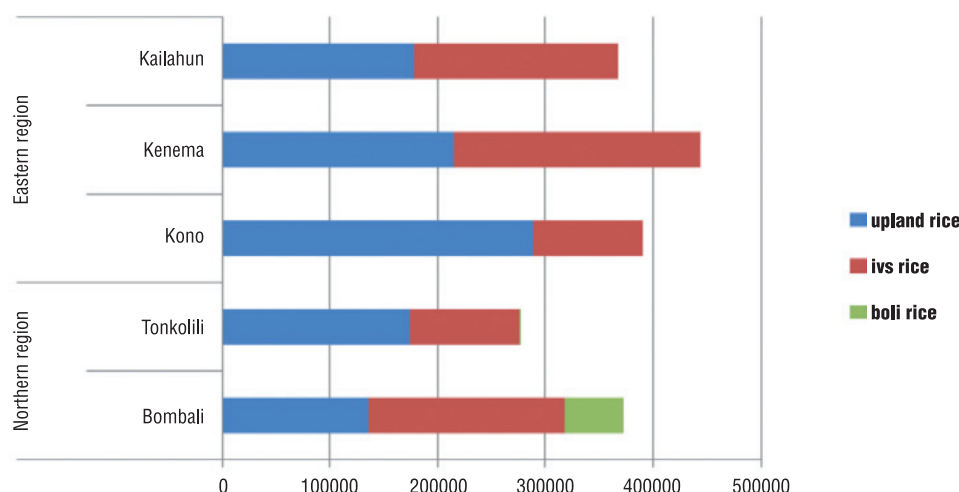


Figure 53. Distribution of food crop production of an average smallholder by district (Leones/year)

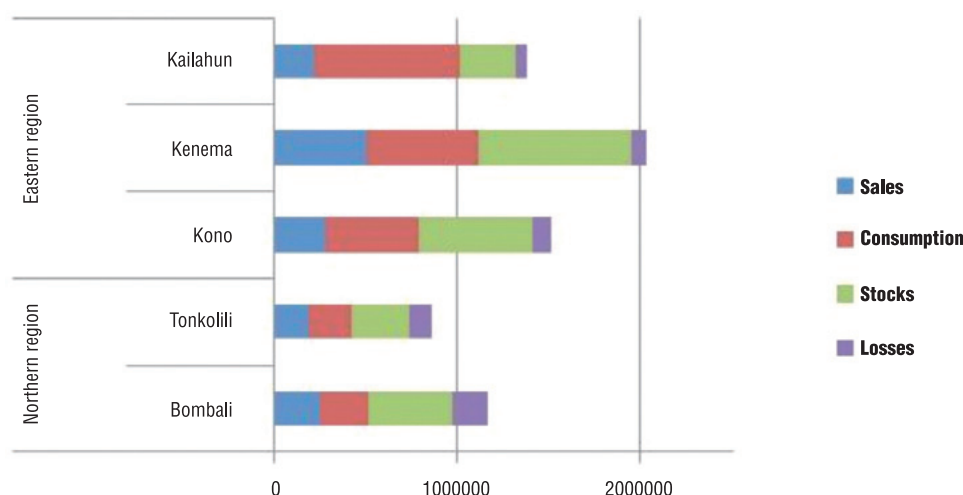
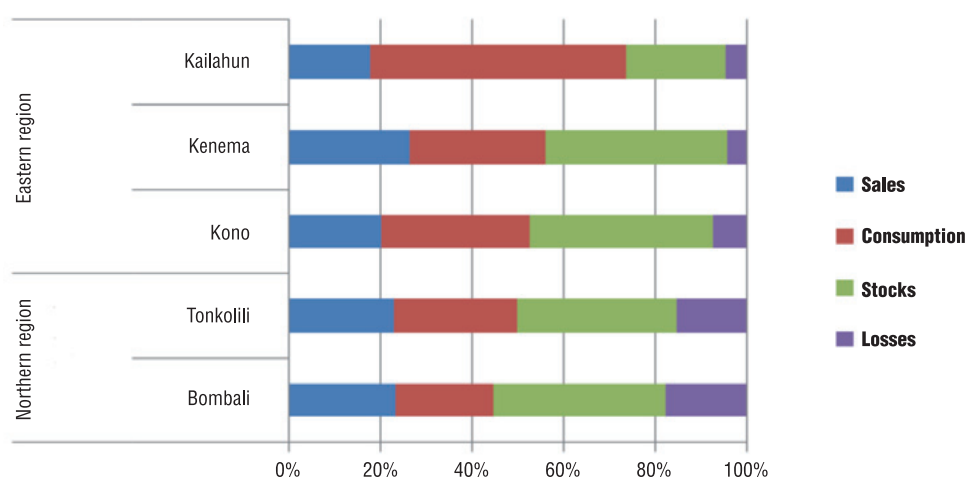


Figure 54. Distribution of food crop production of an average smallholder by district (%)



profile in terms of food crop production allocation as the four remaining districts sell and consume similar shares of their production. Households in the Northern region, however, suffer roughly twice as much yield loss as households in the Eastern region, which weighs down on their household consumption and the levels of their agricultural stocks. Finally, households in Kailahun consume about double the consumption in the other districts.

Tree crops

Very little tree crop production has been observed in the Northern region and when present it is largely oil palm. The tree crops that

are observed mainly in the surveyed Eastern districts are cocoa, coffee, oil palm, banana, orange, cola nut, other tree crops (Figure 55). Cocoa and coffee production make up the bulk of the tree crop production in the Eastern region.

Regarding the allocation of tree crop production, Figure 56 and Figure 57 clearly indicate that tree crop production is primarily produced for market sales, with Kenema district households consuming and stocking roughly 8%, and Kailahun households consuming and stocking roughly 38%. In Kono district, households do not consume or stock any of the tree crop production, all tree crops are produced for cash.

Figure 55. Output value of tree crop production per crop of and average smallholders by district (Leones/year)

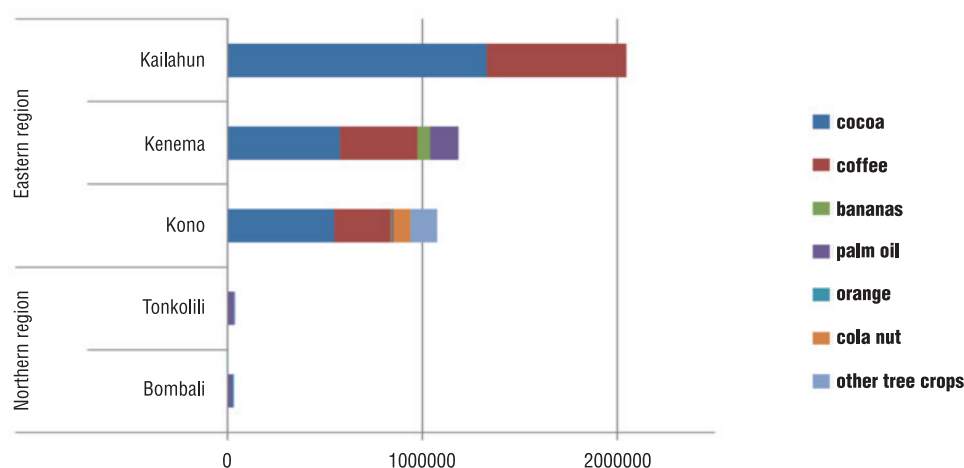


Figure 56. Distribution of tree crop production of an average smallholder by district (Leones/year)

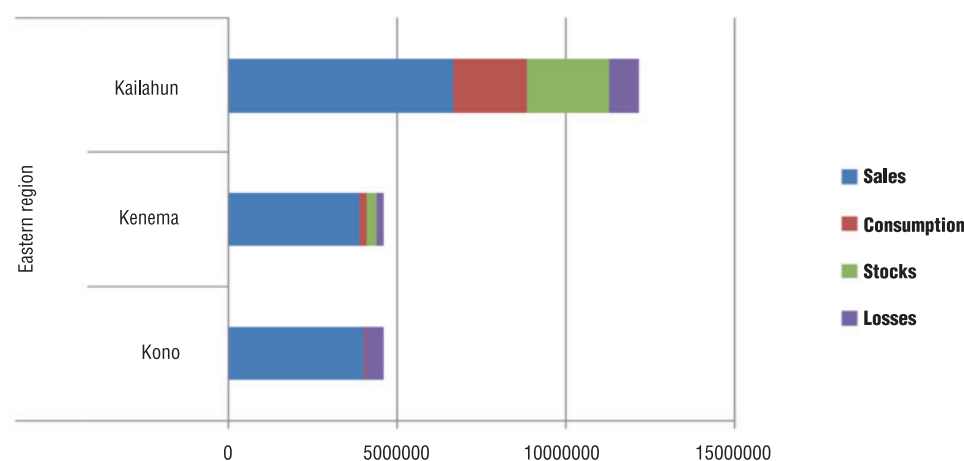
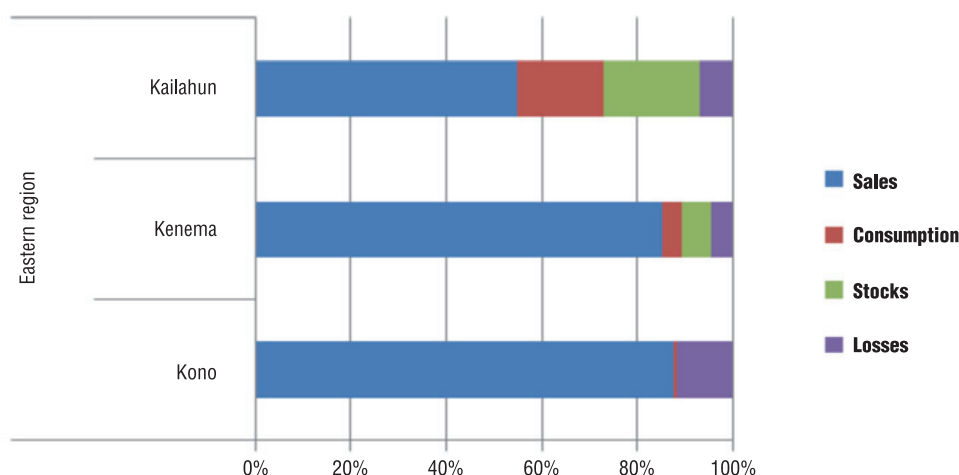


Figure 57. Distribution of tree crop production of an average smallholder by district (%)



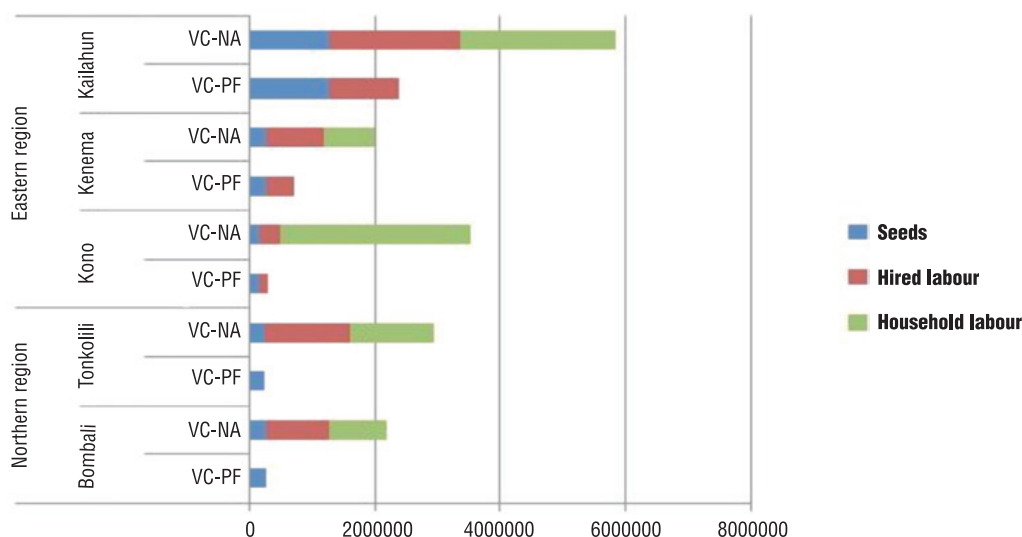
Input Costs

The cost side of crop production consists mainly of seeds, hired labour, tool and livestock purchase costs. The costs for renting the land constitute a very marginal part of the fixed costs on an average farm household, which is mainly paid in food or tree crop production instead of cash. In the Northern region, the survey results show that in Bombali 22% and in Tonkolili 13% of the smallholders are paying rent, and in the East

only one farm was found in Kailahun with renting obligations. In general this suggests that in the Northern region some land rent needs to be taken into account, which average annually around 8000 Le/acre in Bombali and 13000 Le/acre in Tonkolili, respectively (about 0.01% of total input costs under VC-NT and 0.06% under VC-PF), paid from the harvest (e.g. in bushels of rice).

As mentioned, there is a substantial difference in input cost calculation when using

Figure 58. Variable costs of an average smallholder per district of the Neoclassical and Peasant Farming Approach (Leones/year)



market values to assess the cost of all inputs in the case of Neoclassical Approach (VC-NA) and the perceived costs in the case of the Peasant Farming Approach (VC-PF). Under VC-NA calculation the labour costs account for about 50-90% of production cost in all districts, livestock purchases around 2-7%, seed representing around up to 20% and tools, the lowest, around 1-3%, except Kenema where tools constitute almost 10% of the production costs. While by PF calculation the real costs perceived by farmers are seed costs that account for 20-50% of the total costs, livestock costs from 7 to 34%, hired labour costs in cash crop farms representing around 40%, and tools rising to 10-20% of the input costs (Table 31).

The absolute size of the variable costs of the smallholders for the five districts are represented in Figure 58, which again highlights the difference between the two approaches regarding the exclusion of household labour and hired labour costs in the case of food cropping for both regions.

6.2.2 Economic viability of smallholders

Economic viability of smallholders is addressed in two different ways: farm viability and household viability. While farm viability is assessed using the concept of reproduction

threshold, household viability is contrasted by defining a Full Poverty and Extreme (Food) Poverty Lines. Before moving on to the analysis, it is important to highlight that in the present study the evaluation of economic viability is undertaken using only cross-section data. For a more in depth analysis that could reflect issues of sustainability in the long term panel data would be necessary. However disposing only of one year observation the latter is out of the scope of the present exercise.

Farm viability of smallholders

The economic viability of farms is assessed by focusing on the farm net income per household working unit (FNI/hhWU) in relation to the utilised agricultural land area per household working unit (area/hhWU). These economic analyses allow direct comparison of the income level across farm types.

Based on the Peasant Farming (PF) approach on income calculation, the farm viability for each smallholder, in the Northern and Eastern regions are illustrated in Figure 59 and Figure 60, respectively. These are immediately followed by the results of income measurements under the Neoclassical approach (NA) (See Figure 61 and Figure 62).

Figure 59. Farm viability of smallholders in Northern region based on Peasant Farming Approach

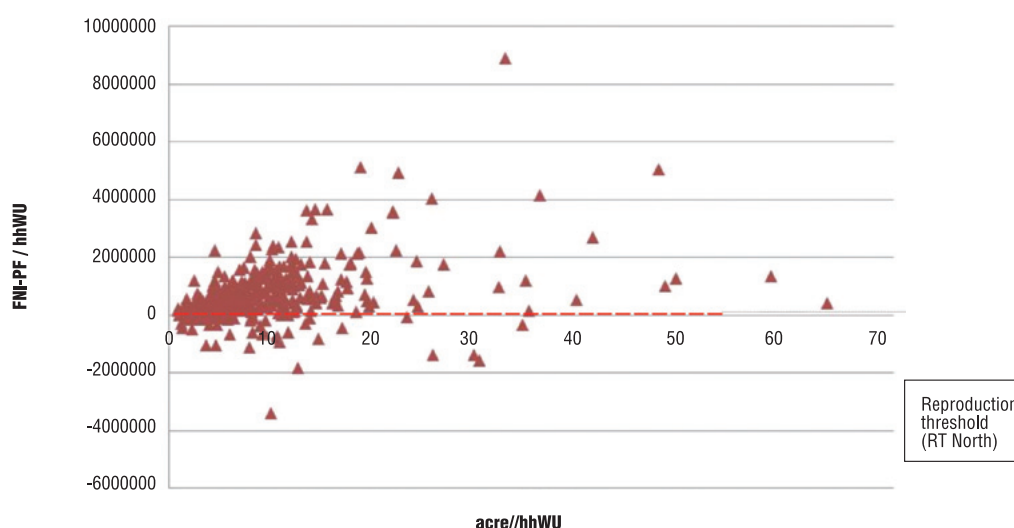


Figure 60. Farm viability of smallholders in Eastern region based on Peasant Farming Approach

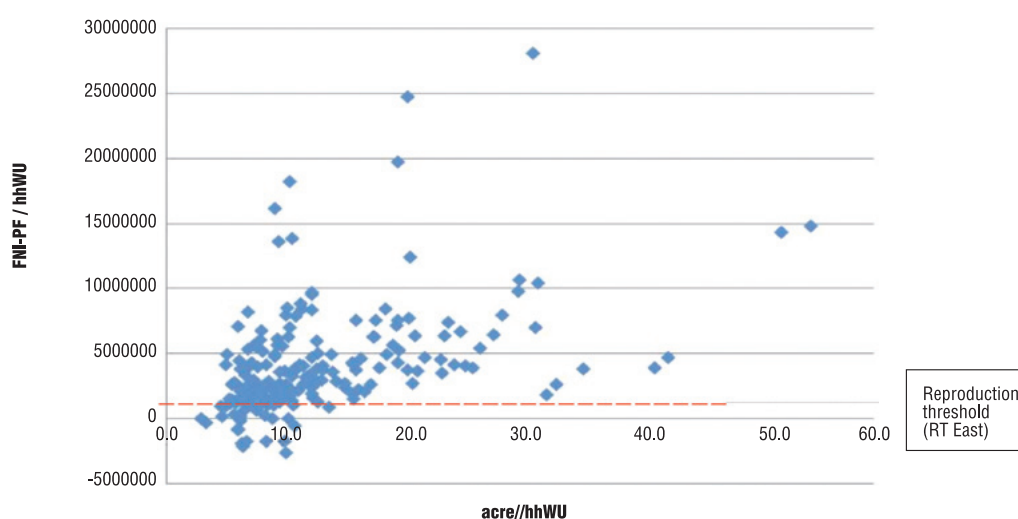
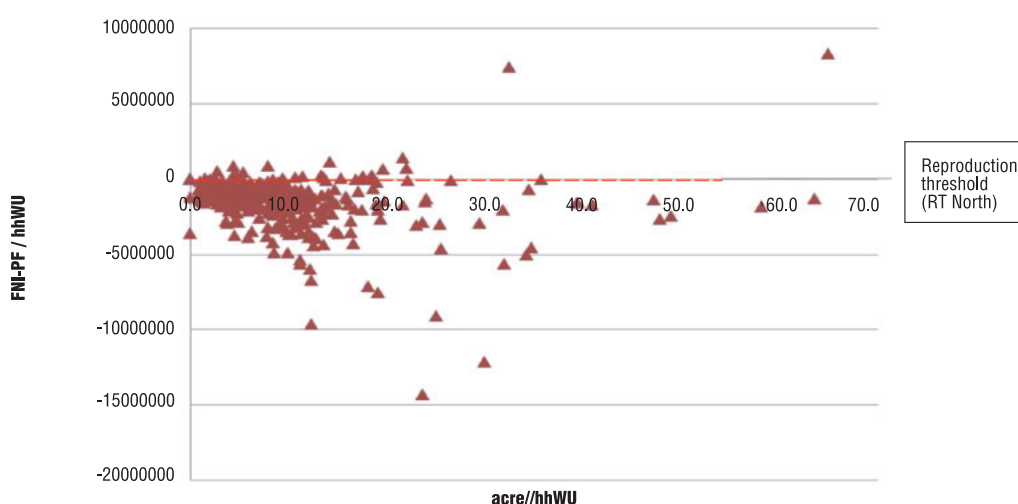


Figure 61. Farm viability of smallholders in Northern region based on Neoclassical Approach

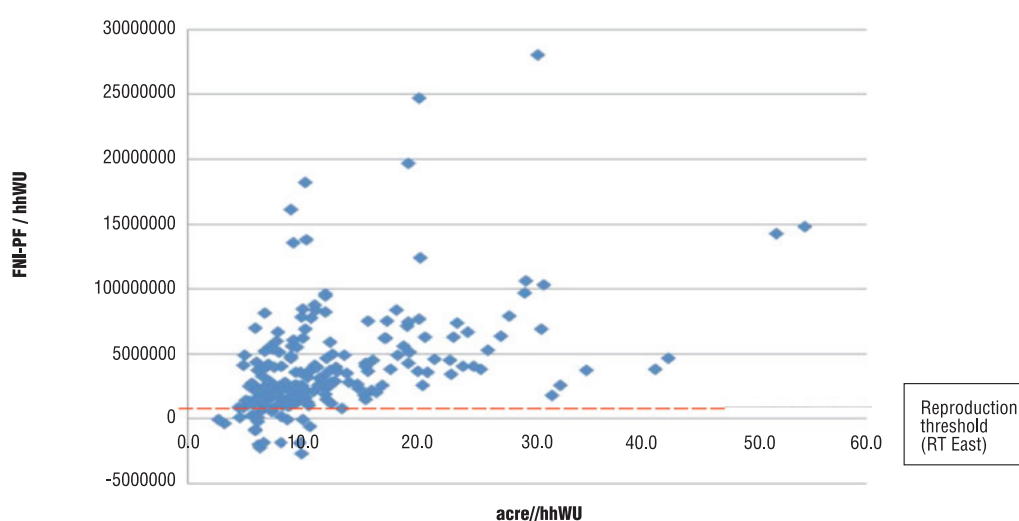


In Northern districts and under PF income measurement, 86% of the farms are above the reproduction threshold, meaning that they are viable, and only 14% fall below this threshold (RT North = 0)⁴². On the other hand, the NA income calculations show that only 5% of the farm households are above and 95% fall below the reproduction threshold for the same region.

⁴² The reproduction threshold for the Northern region (RT north) was set to be equal to zero level of Farm Net Income (see Chapter 5)

This in particular suggests that almost all surveyed farms in Tonkolili and Bombali are unviable. This result does not reflect the reality of surveyed areas as smallholders in fact have been producing at least since the end of the civil conflict period in the country. This implies that in order to survive the smallholders are highly dependent on their village/chiefdom values, culture and agricultural arrangements. In other words they are not fully integrated into the market economy and thus their behaviour is not adequately depicted by the neoclassical theory rationale.

Figure 62. Farm viability of smallholders in Eastern region based on Neoclassical Approach



In the Eastern districts and under PF income approach, 97% of the smallholders are above and 3% fall below the reproduction threshold (RT East = 700000 Leones)⁴³. With the NA income approach 93% are above and 7% fall below. In the Eastern region the difference between the two approaches is smaller since these smallholders are more integrated into the market economy.

Overall, these results imply that while in the Northern region most of the farms could not be viable if they would be taken out of their social/cultural/village environment with current farming practices and productivity level, on the Eastern region most of the farms are deemed viable as a separate or self-standing unit of production and less dependent on social aspects. Although, it must be stressed that cash tree crop farms are heavily dependent on village networks in order to secure additional labour during collection periods. With the intention of further analysing of farm viability, the analysis focuses on farm types.

The farm household were grouped into different farm types based on their crop mix and degree of market or self-consumption/(semi)

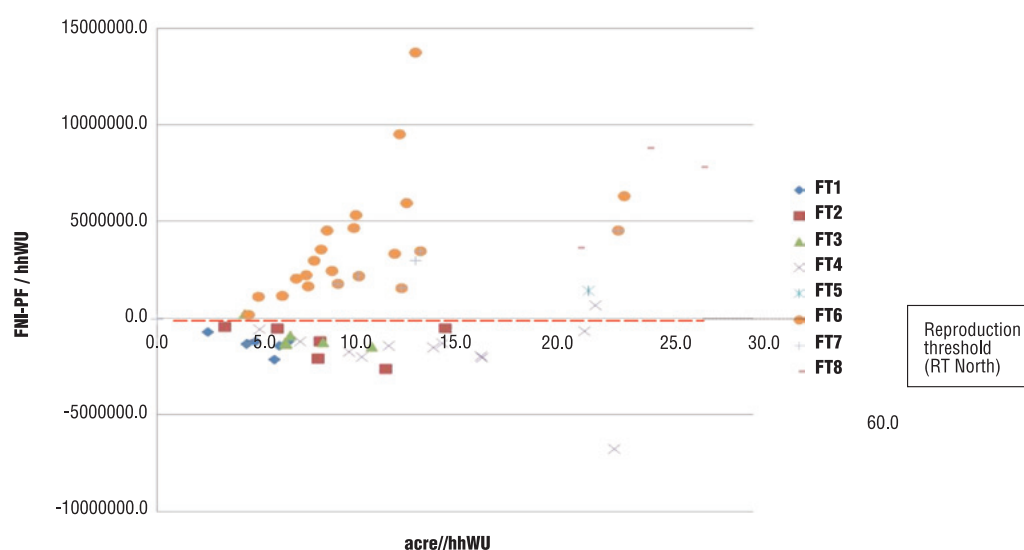
subsistence orientation. Figure 63 and Figure 64 present results under the NA and the PF approaches of the viability analysis per farm type. Under the NA income approach, most of the (semi)subsistence oriented farm types (F1-F5), located in the Northern region appear as non-viable, and only the market oriented ones of the Eastern region (F6-F8) are above the reproduction threshold. Under the PF income approach it is demonstrated that farm types F1-F5 may also be viable when their specific context and environment conditions are explicitly accounted for. In other words, under the PF income approach issues related to the village organisational schemes and institutional arrangements are considered. The latter, is therefore seen as a more realistic framework in which to evaluate farm viability in Sierra Leone.

Figure 65 and Figure 66 illustrate the economic viability per farm type in the Northern and Eastern regions separately, based on PF income approach.

In the Northern districts, there is a tendency to crop diversification as the land availability per household member increases. The smallest farms are mainly growing only rice and maybe other food crops for a very low income (FT1, FT2), however slightly bigger farms tend to have oil palm and other tree crops as well (FT3, FT4), which helps them to produce higher output value per household unit. Although output

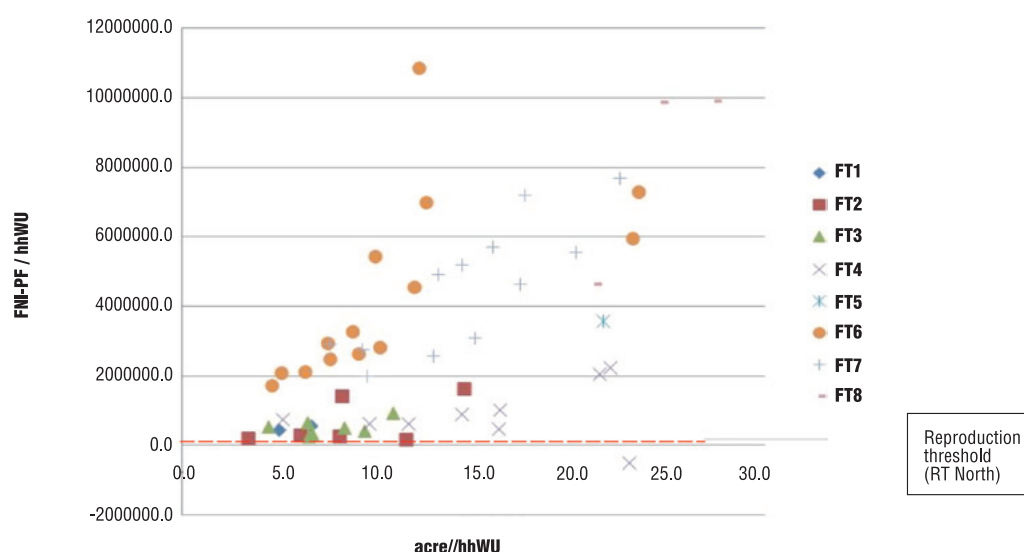
43 The reproduction threshold for the Eastern region (RT east) was set to be equal to 700000 Leones of Farm Net Income per household working unit (see Chapter 5)

Figure 63. Farm viability per farm type in Northern and Eastern regions based on Neoclassical Approach



NB: FT1 = rice only; FT2 = rice & other food; FT3 = rice & other food & tree for subsistence; FT4 = rice & tree for subsistence; FT5 = other tree for subsistence farms; FT6 = rice & tree for cash; FT7 = rice & other food & tree for cash and FT8 = only cash tree farms.

Figure 64. Farm viability per farm type in Northern and Eastern regions based on Peasant Farming Approach



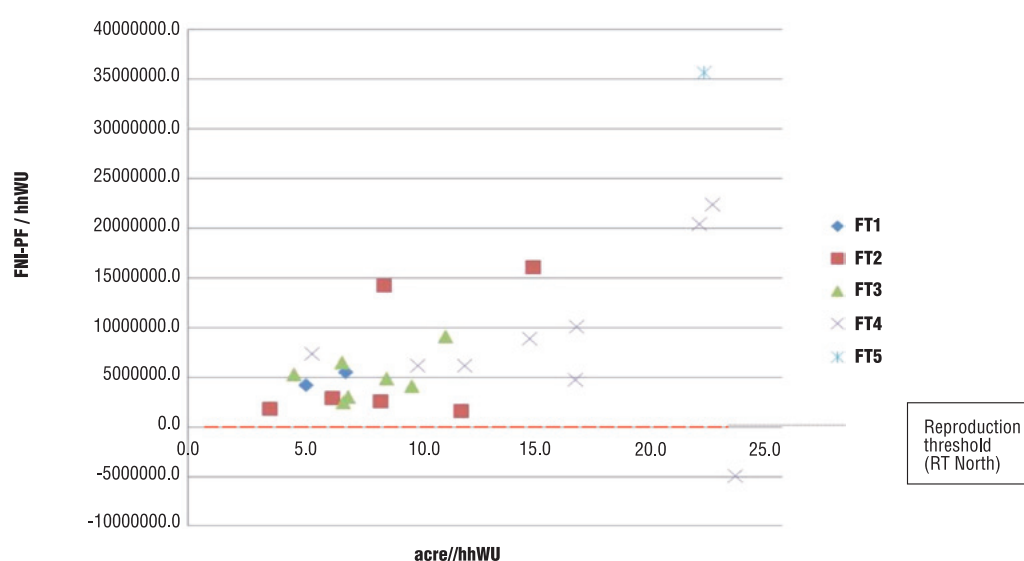
NB: FT1 = rice only; FT2 = rice & other food; FT3 = rice & other food & tree for subsistence; FT4 = rice & tree for subsistence; FT5 = other tree for subsistence farms; FT6 = rice & tree for cash; FT7 = rice & other food & tree for cash and FT8 = only cash tree farms.

diversification is not linearly related to the size of the farm, a tendency is observed.

In the Eastern districts (Figure 66) the average land area is larger (almost double: an average of 15 acres per farm) than in the North (an average of 7 acres per farm). Overall it is worthwhile to note

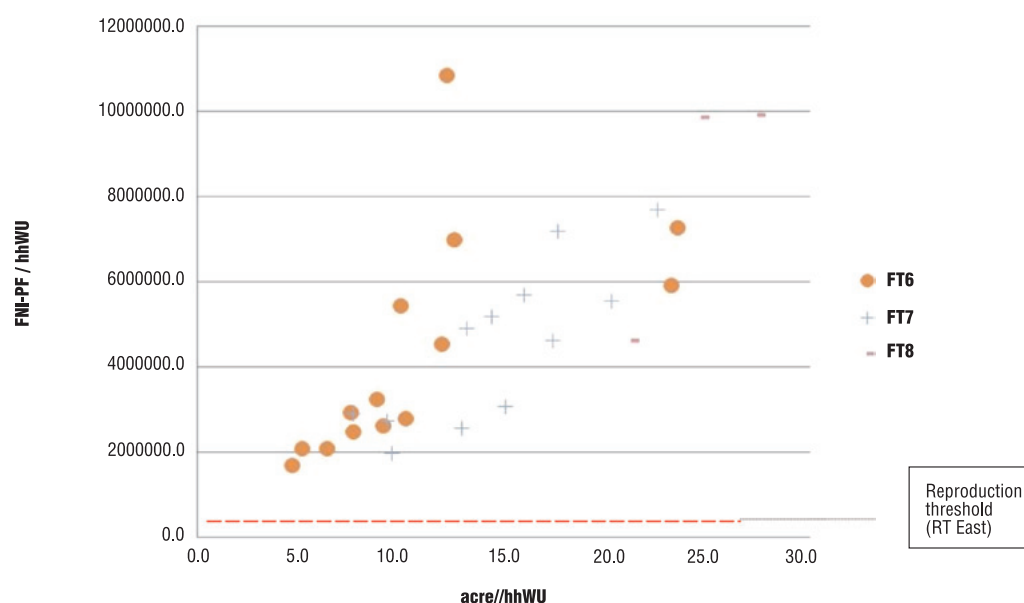
that in both regions larger farm types in terms of land available per household working unit tends also to reach higher levels of labour productivity (the latter varies across crops as it is shown in the following section). Likewise, the crop mix and production orientation are different. The rice & tree for cash production (FT6) tend to be smaller

Figure 65. Farm viability per farm type for Northern region based on Peasant Farming Approach



NB: FT1 = rice only; FT2 = rice & other food; FT3 = rice & other food & tree for subsistence; FT4 = rice & tree for subsistence; FT5 = other tree for subsistence farms.

Figure 66. Farm viability per farm type for Eastern region based on Peasant Farming Approach



NB: FT6 = rice & tree for cash; FT7 = rice & other food & tree for cash and FT8 = only cash tree farms

than those that are producing additionally other food crops (FT7). However, there is a group of farms that specialise only on tree cash crops, which produce higher revenues per acre per household working unit than the not only cash crop oriented farms (FT8).

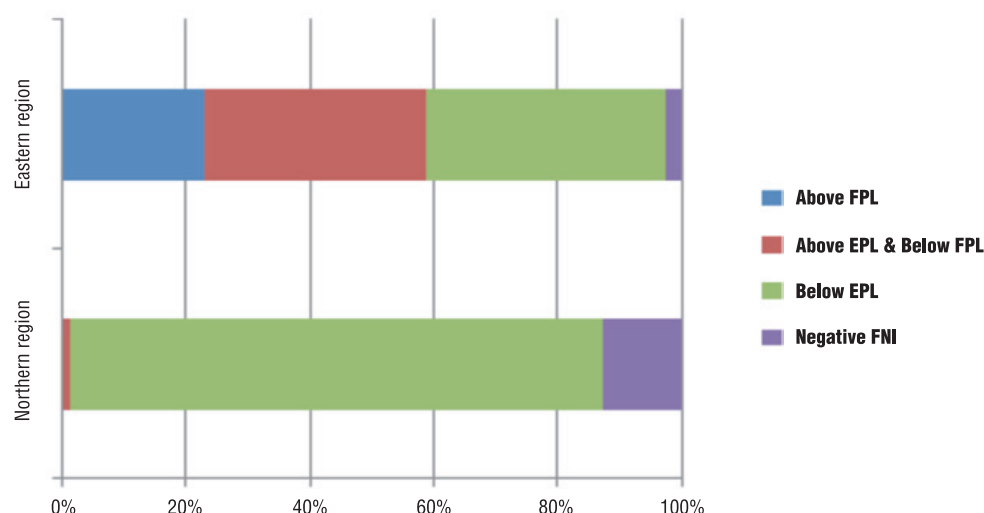
Poverty level of smallholders

In this sub-section, the proportion and type of farm households that fall below the Full and Extreme (Food) Poverty Lines (0.44 and 0.89 per day, respectively) are quantified and described.

Table 32. Percentage of farms per region above and below the poverty lines with Peasant Farming Approach (PF) – based on Farm Net Income (FNI) of smallholders

Poverty level	FNI-PF/hhUnit (% of farms)		
	Northern region	Eastern region	Total
Above Full Poverty Line	0.2	23.5	8.1
Above Extreme and Below Full Poverty Line	1.2	36.8	13.2
Below Extreme Poverty Line	98.5	39.7	78.7
Negative Farm Net Income	13.5	1.5	9.4

Figure 67. The proportion of the farms above and below the poverty lines with Peasant Farming Approach – based on Farm Net Income (FNI) of smallholders



NB: FPL: Full Poverty Line – EPL: Extreme (Food) Poverty Line.

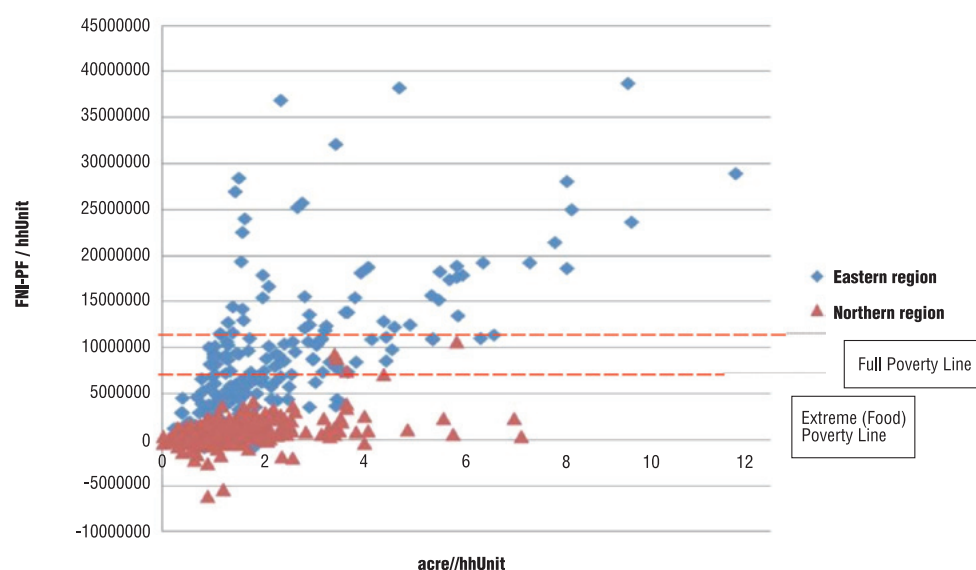
For this purpose, annual FNI per household unit is used to compare against the defined Full Poverty Line and Extreme (Food) Poverty Line (see Chapter 5.2.1).

Once again, it is crucial to underline that the analysis is conducted on the basis of farm households' observed agricultural income as off-farm activities were not entirely captured in the survey. In the present analysis, results are presented for the Peasant Farming income calculation approach since in the Neoclassical approach the estimated farm net income accounts for labour costs which did not really imply a deduction beyond time engagement. As previously stated, if a Neoclassical approach income measurement is used, the concrete situation of the farm household in the context of

the village is not adequately accounted for, while under Peasant Farming approach substantial part of input costs are actually covered by existing networks at the village/chiefdom level (i.e. labour). In other words, the comparison of poverty lines with respect to the NA income calculation would bring about biased results which overestimate the inability of farm households to fulfil their basic needs.

Table 32 presents the proportion of farms above and below the full poverty line (1324 670 Leones) and Extreme (Food) Poverty Line (648 079 Leones), Figure 67 illustrates the positioning of all sample observations for Northern and Eastern regions under the Peasant Farming income measurement procedures, respectively. Figure 68 summarises results for all observations.

Figure 68. Poverty level per household based on Peasant Farming Approach (only agricultural income is accounted for)



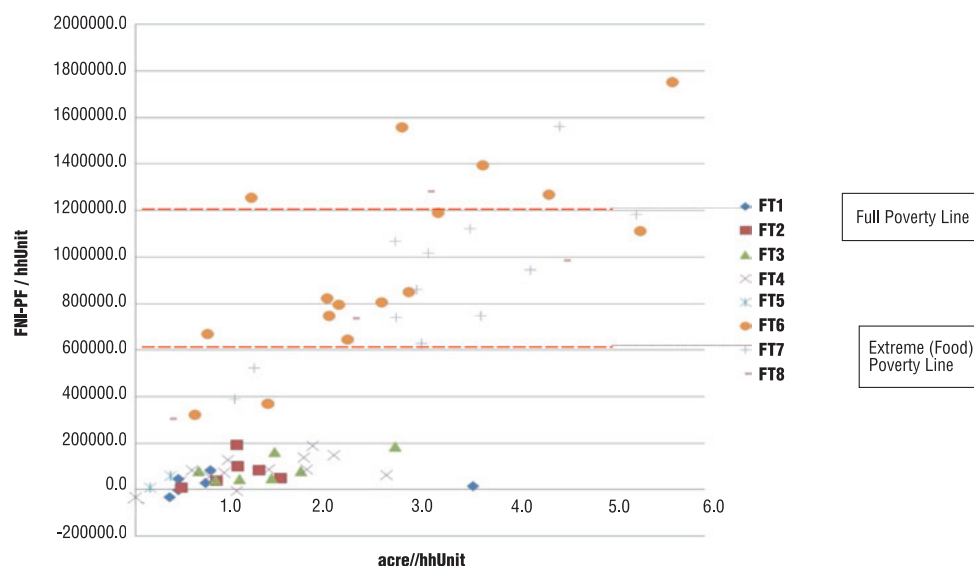
Under the PF approach, 79% of the farms fall below the Extreme (Food) Poverty Line, meaning that these farm households are “food poor”. However, it should be stressed that only income the household gets from the agricultural production is considered, and no other income sources were integrated into the computation. The latter implies that most of the household cannot sustain their consumption based on their agricultural production alone (even when relying on the village-level arrangements to secure labour and other inputs), and thus, these farm households depend on other income sources for their self subsistence.

The poverty level per farm type is illustrated in Figure 69 for the Peasant Farming approach. To recapitulate, farm type (FT) 1 to 5 are located in the Northern districts of Bombali and Tonkolili and their crop orientation extends from rice only to a combination of rice and other food crops and non-cash tree crops to only non-cash or subsistence tree crops. Farm types 6 to 8 are those located in the east and their crop orientation moves from highly diversified (with FT 6 and 7 cultivating cash and non-cash tree crops, upland and lowland rice, and other food crops) to farms of type FT8 largely under tree crop production (mainly cash crop).

Figure 69 shows that the farm types situated mainly in the Northern region with production orientation on self sufficiency and without cash crops are receiving income from agriculture that is not sufficient to fulfil their self subsistence needs. On the other hand, farms engaged in cash tree cropping are better positioned to cover the basic food needs. These results also suggest that farms with bigger area per household in the Eastern districts do cover more of their self-sufficient needs than farm households with smaller disposable area in the Northern districts. Figure 68 also shows that below 2 acres of available land per household unit the vast majority of the farm types are extremely poor. However, farm types with cash crop orientation disposing of more than 2 acres per household unit fall above the Extreme (Food) Poverty Line. This supports the idea that land availability and product orientation (diversification strategies) are relevant issues to be considered by the policy in the study area.

Thus, both the farm crop orientation and the size do play an important role in the food security of the households. However, the decision to alter the underlying crop mix is not directly in the hands of farms. Clearly, the agro-ecological setting does not allow for the extensive cultivation

Figure 69. Poverty level per farm type based on Peasant Farming Approach (only agricultural income is accounted for)



NB: FT1 = rice only; FT2 = rice & other food; FT3 = rice & other food & tree for subsistence; FT4 = rice & tree for subsistence; FT5 = other tree for subsistence farms; FT6 = rice & tree for cash; FT7 = rice & other food & tree for cash and FT8 = only cash tree farms.

of cash crops in the lowlands of the Northern districts of the country. In fact, not even in swamp valleys of the Southern districts of the country not covered in the sample. What could be a more feasible option is for smallholders in the Northern region to improve yields and decrease pre- and post-harvest losses at the acre level.

Another interesting issue arising from the results is that in the case of farm types devoted to subsistence cultivation (i.e. mainly located in the Northern districts), those with higher crop diversification appear to be in a slightly better position. The same may be argued in the Eastern districts. Those farms engaged only in cash crop production are slightly worse off than those with mixed crop orientation which involves not only highly valued cash crops but also upland and lowland rice and oil. In the case of the Eastern region, diversification strategies may be considered to reduce uncertainties due to weather failures, changes in market access or specific crop failures (due to unexpected disease). This implies that a mono-cash tree crop cultivation path is not precisely adequate to address poverty issues.

6.3 Input factor productivity of smallholders

The input factor productivity is assessed by analysing the two main important inputs of smallholders: land (6.3.1) and labour (6.3.2). Besides of the measurement of the productivity as a ratio of output per input use (which provides an apparent productivity measurement), a rough proxy of technical efficiency is introduced (in order to focus on output obtained per working unit given the underlying land used).

6.3.1 Land productivity

Land productivity is measured as a ration of the output per cultivated land area in monetary terms (Output Value per cultivated acre). Since in section 6.2.2 all economic indicator per cultivated acre were illustrated, in this subsection only the results of Output Value per cultivated acre are discussed in more detail.

The total farm productivity per cultivated acre can be seen in Figure 70. Figure 71 presents output value separately for tree and food production.

Figure 70. Land productivity per total cultivated land area–output value per acre by district (Leones)

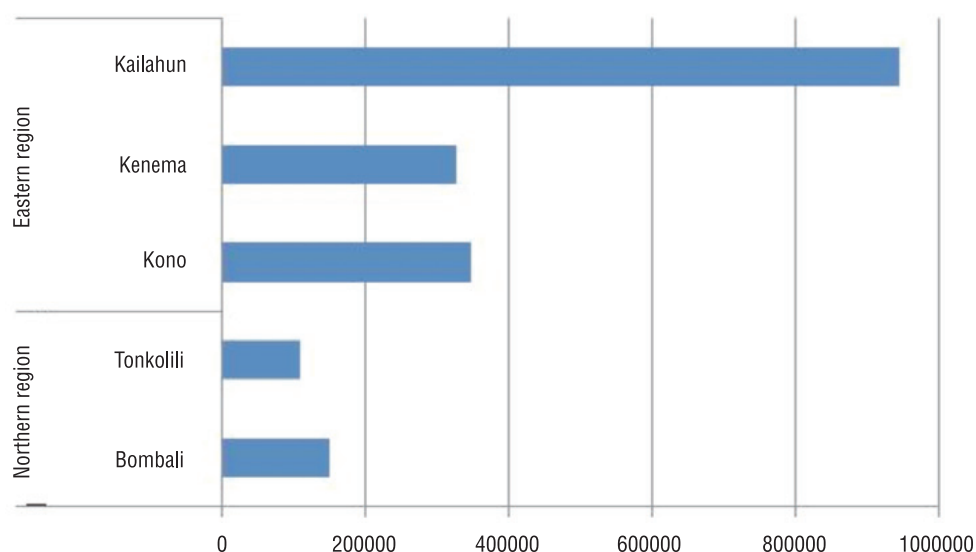
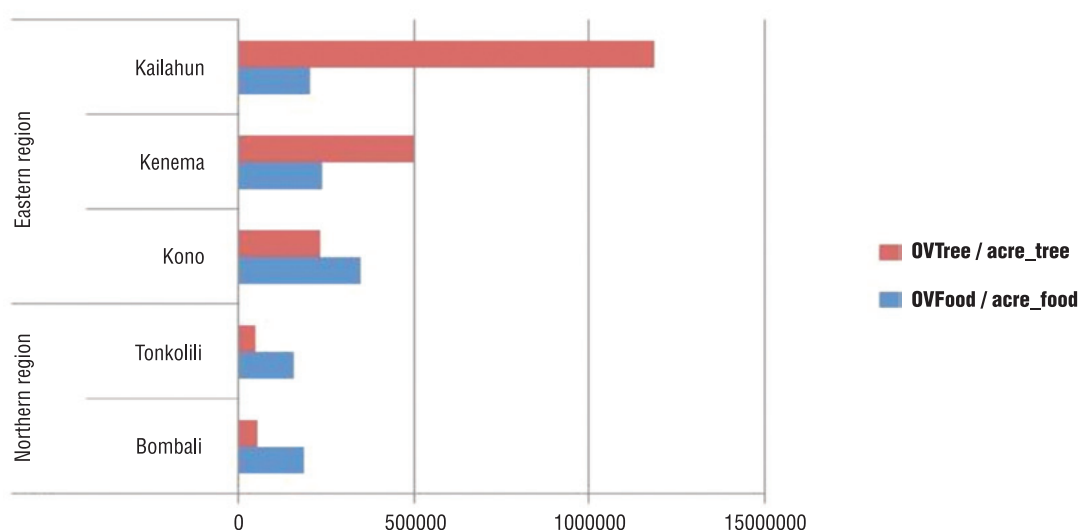


Figure 71. Output value of tree and food production per acre used by district (Leones)



Output value of food crop is higher in the North and in Kono district than that of tree production. Productivity of food production (i.e. output per acre) is about the same in the Northern districts and in Kailahun, but only half that of in Kenema and Kono districts. However in Kailahun this situation is compensated by the fact that much higher output value is generated

by tree cropping compared to all the other districts, which reflects great productivity in tree production system. On the other hand, tree crop production in Bombali and Tonkolili shows very low productivity of land use. This latter is mainly explained by the type of tree crop they produce, oil palm in the North and coffee/cocoa in the East. Next, land productivity analysis is expressed

Figure 72. Cocoa and coffee output value per acre by district in the Eastern region (Leones)

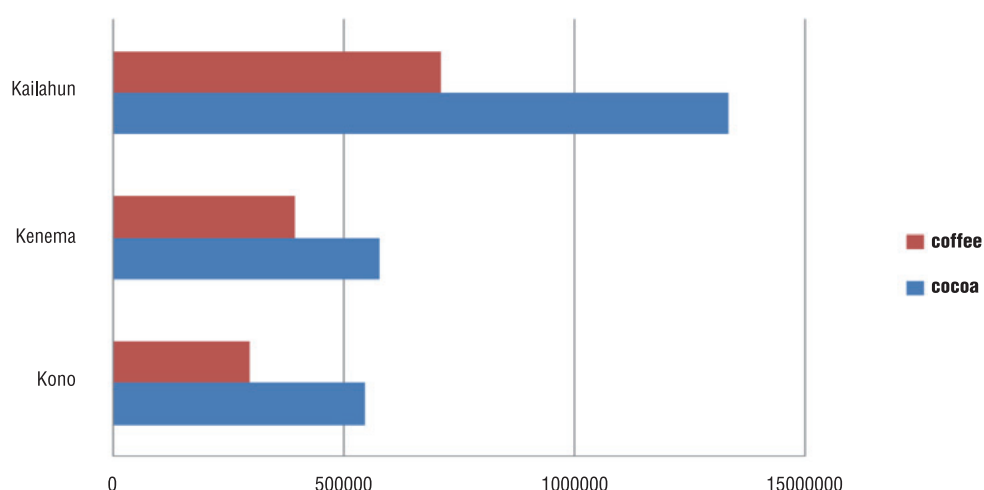
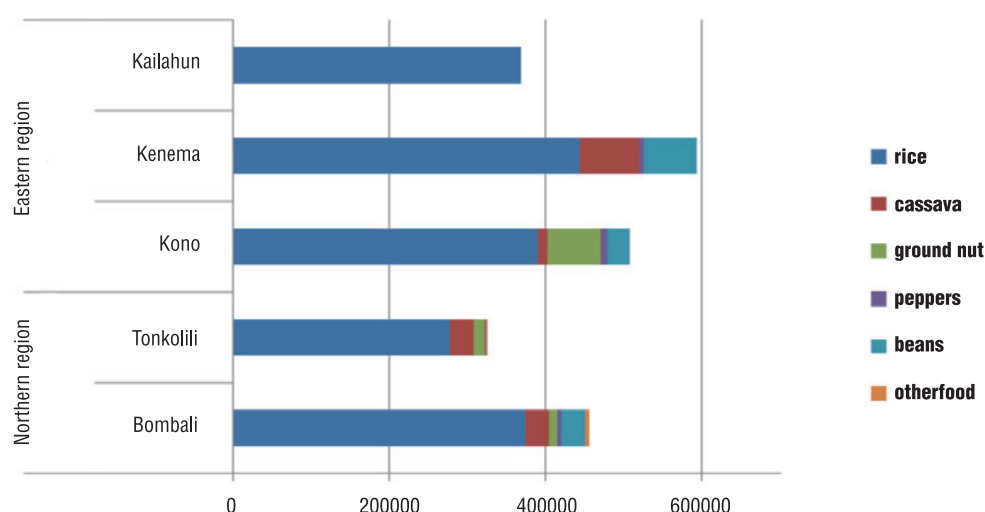


Figure 73. Food output value per acre by district (Leones)



in terms of key crop types (upland rice, IVS rice, Boli rice, other food crops⁴⁴, cocoa and coffee) by comparing output value per acre and input costs per acre across districts.

Figure 72 presents the output value of cocoa and coffee production in the Eastern region. Based on survey data, an acre of cocoa creates more value than an acre of coffee. As stated, output value is the highest in Kailahun district,

followed by Kono, and ultimately Kenema districts. The difference in output value between districts is large for both crops, but particularly for cocoa.

Concerning Food production, rice output value on average is quite similar across the regions, with the exception of Tonkolili, where the output value shows the lowest value (Figure 73).

In terms of rice varieties, Figure 74 indicates the output value per acre of the Upland, IVS, and Boli rice by district in both the Eastern and

44 Cassava, ground nuts, peppers, beans, etc.

Figure 74. Upland/IVS/Boli rice output value per acre by district (Leones)

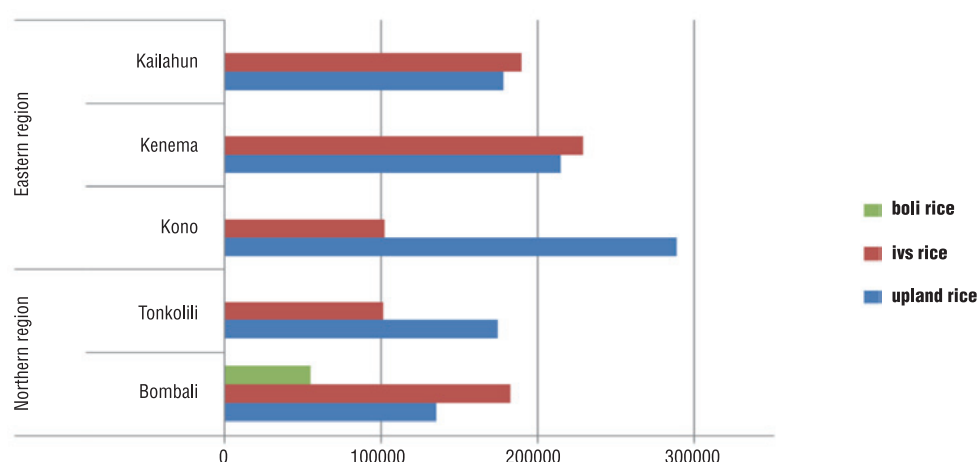
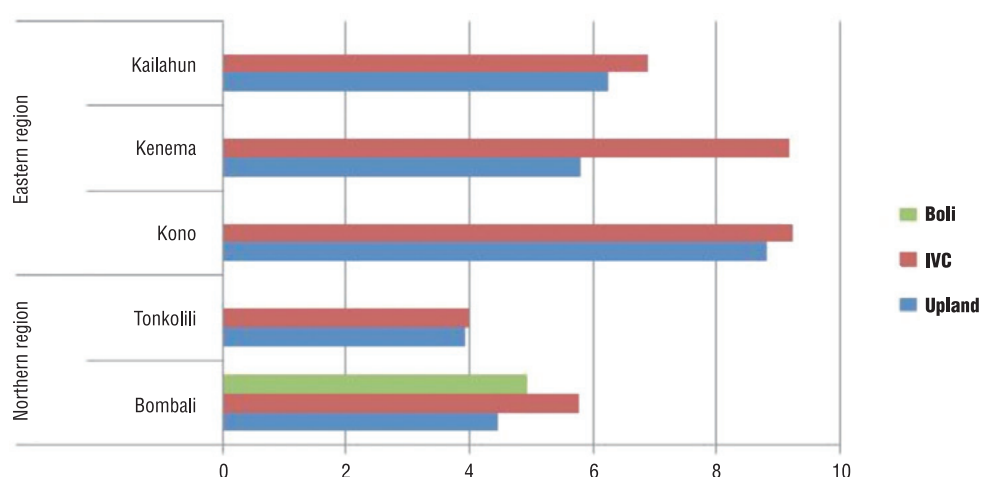


Figure 75. Average yield of rice per rice type by district (bushels/acre)



the Northern regions. IVS and Upland rice are cultivated in all 5 districts, whereas Boli rice is cultivated only in Bombali. IVS rice output value is quite similar in Kailahun, Kenema and Bombali districts and is slightly higher than the output value of the Upland rice. In the other two districts, Kono and Tonkolili the Upland rice generates higher output value, compared to the IVS rice.

From Figure 75 it can be seen that the rice yield per acre in the Northern districts are on average much lower, compared to the Eastern ones.

6.3.2 Labour productivity

Labour productivity is measured as an output per working unit, in monetary terms (output value per working unit). Working unit includes both household and hired labour as full time equivalent. In addition, output obtained per working unit given land availability is also introduced as a rough indication of technical efficiency between crop types.

The labour productivity on total output value per day for five districts can be seen in Figure 76. It should be noted that no information

Figure 76. Total labour productivity per days worked (output value per working day, in Leones/day)

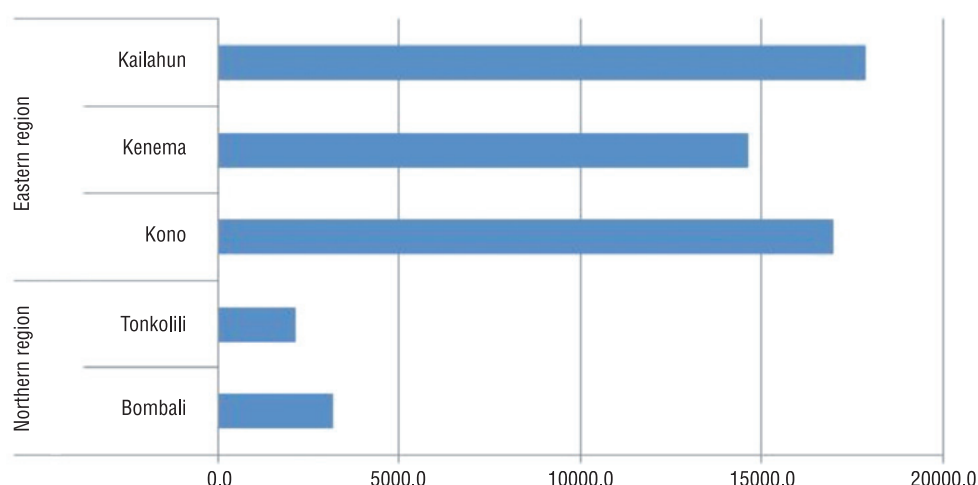
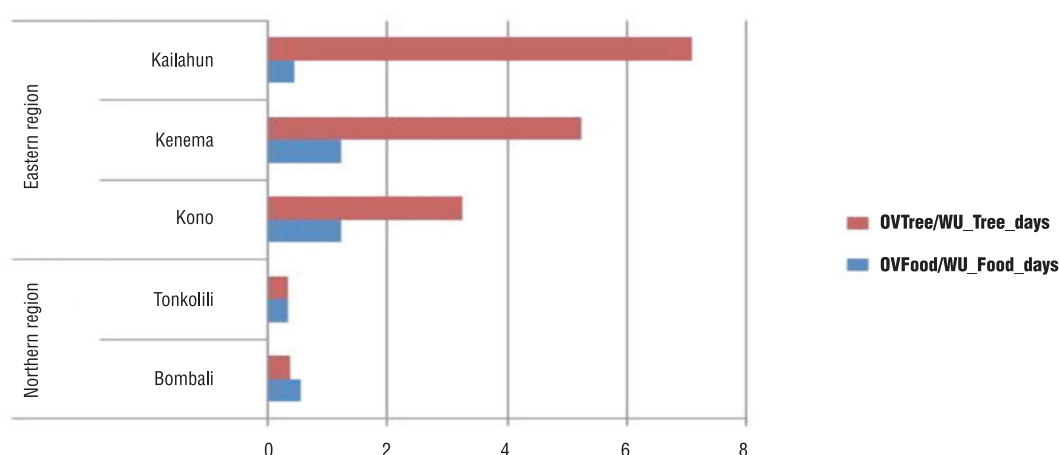


Figure 77. Total Labour productivity in food and tree crop production in the Northern and Eastern districts



was available at farm level concerning other constraints to labour productivity like sowing dates, water constraints, soil erosion or seed varieties which may explain the observed differences between the different farms and farm averages per district. In this sense, the analysis is limited to presenting a general picture when comparing labour productivity ratios at district level while the assessments at the crop level (for equivalent agro-ecologies) may be taken as a more accurate approximation. Nonetheless, the differences between the Northern and Eastern regions are substantial, particularly when making a distinction between labour productivity in food

and tree cropping. Figure 77 shows the total labour productivity of food and tree cropping (Output value for tree and food crops per total Working Unit in days worked on tree and food production, respectively). The results indicate that both food and tree cultivation are more labour productive in the Eastern region than in the Northern region. In fact, labour productivity levels of the Northern region are suggestive of under-performance when compared to the results of the Eastern region.

The difference in labour productivity ratios may be partly explained in terms of total labour

Figure 78. Total labour use per acre (days/year)

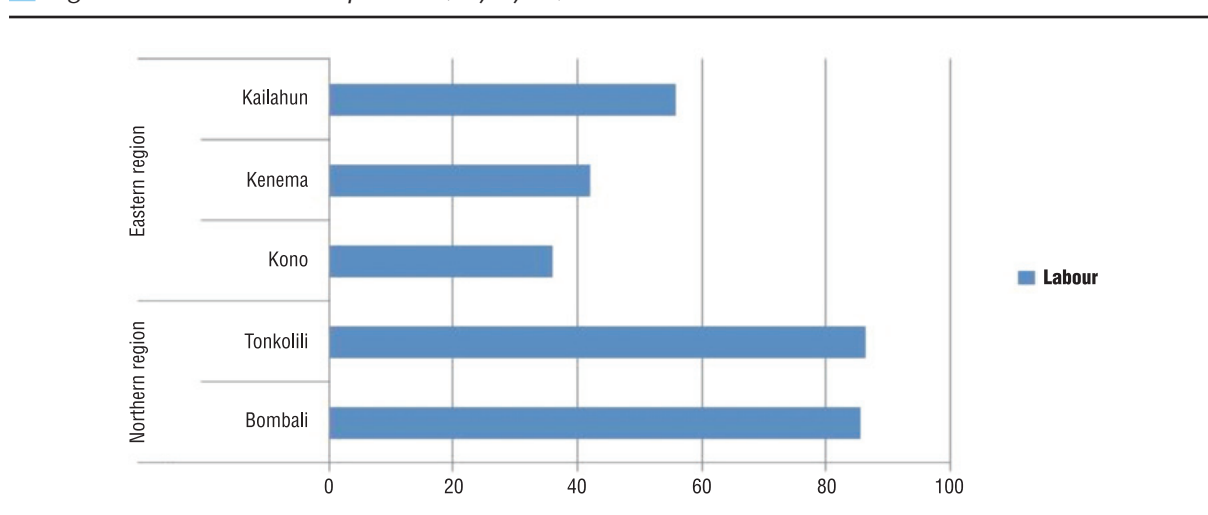
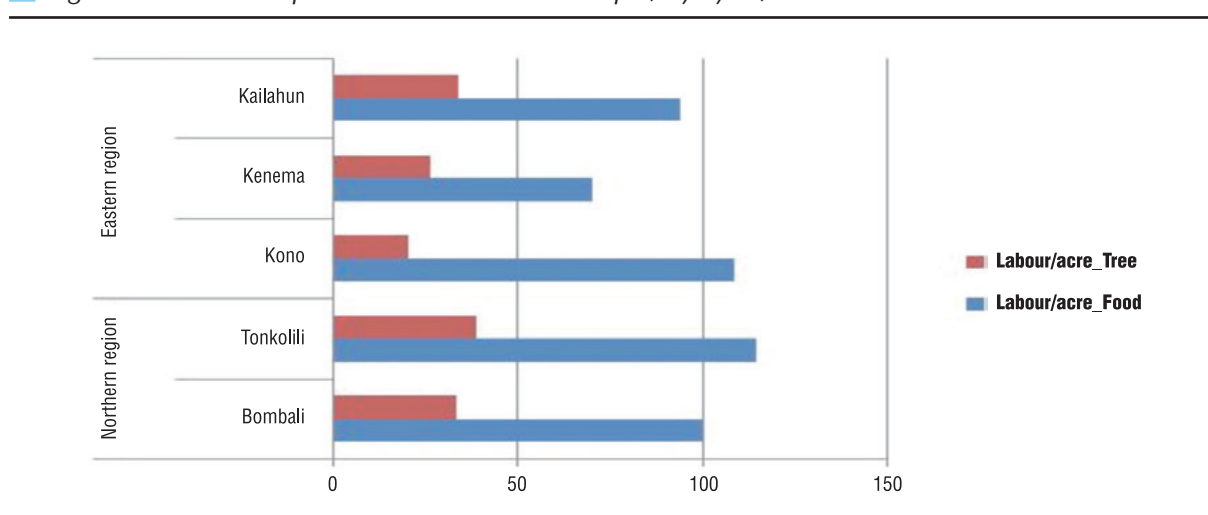


Figure 79. Labour use per acre for food and tree crops (days/year)



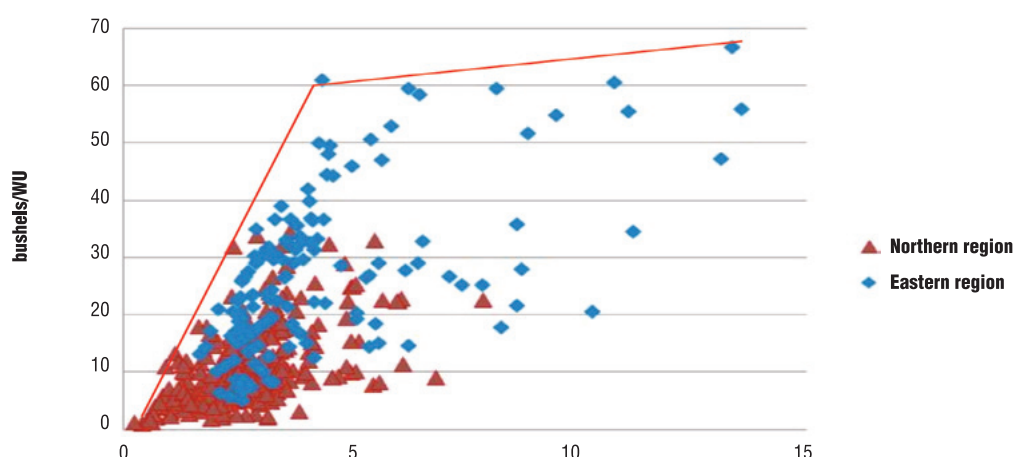
intensity per cultivated area which is substantially higher in the North than in the East (Figure 79). This would imply that the most efficient use of labour takes place in Kono, followed by Kenema, Tonkolili and Bombali qualify as the least efficient.

When distinguishing between food and tree crop production, the results show that food cropping is more labour intensive than the tree cropping, about 2-3 times on an acre base (Figure 79). Tree production seems to be the less labour intensive in Kono district, while in Tonkolili food cropping entails the highest labour intensity.

In the Figures 80 to 84, output obtained and surface used per working unit are calculated in physical terms for different crops, particularly for Upland rice, IVS rice, Boli rice, coffee and cocoa (See Appendix IV for the same results at district level).

In the case of upland rice, Figure 80 illustrates the distance existing between the best practice farms (through which an empirical best practice frontier is drawn) to all remaining farms in the sample. This allows to compare how farm household stand in relation to the best performing smallholders in upland rice production per

Figure 80. Labour productivity per working unit for Upland rice in the Northern and Eastern regions



working unit in both regions. Distance between farm households may be attributed to differences in labour use or effort, interaction with other inputs (i.e. tools, fertilizers) and the adequate use of such additional inputs. However, since within each region different constraints may arise, it is best to compare farms producing upland rice at district level. Accordingly, the regional level comparison shows (Figure 80) that farms in the Eastern region perform slightly better in terms of labour productivity per working unit in the case of upland rice production (productivity at district level is illustrated in Appendix IV).

From a general perspective, it can be seen that the most productive farms produce around 10 bushels/acre with one working unit cultivating up to 6 acres; after that the productivity per additional acre is diminishing considerably. This means that labour productivity can reach 60 bushels/year per working unit, which is equivalent to 1500kg of rice (at least 3 acres/person (30 bushels/year) would be needed under the current technology to fulfil the basic dietary requirement – based on rice only).⁴⁵ However,

most of the farms are less productive and dispose on average of 1-2 acres per household member, which means they would need to use their land more efficiently to reach higher yields, or sell their crop and buy more nutritious food or need to have to find other sources of income to survive. Currently on average around one acre/person is available, except Kono and Kenema with more than 2 acres (Figure 30), which implies that production technology requires substantial increase in improvement so that yields are increase sufficiently to sustain the present household population.

In the case of IVS rice, 50 bushels/year per person may be obtained with a working unit cultivating up to 3 acres per year (Figure 81). This translates into approximately 15 bushels per acre, which is 1.5 times higher than the production of upland rice. However, most of the farms here also fall below the observed best practice of some smallholders in the sample. In fact, the average is closer to 10 bushels/acre per year.

The Figure 82 on Boli rice production (which takes place only in the Bombali district located in the Northern region) shows increasing productivity of up to 5 acre per person and 10 bushels per acre, which leads to 50 bushels per person a year. However in some cases 60-70 bushels can be reached by one working unit. This shows that in Bombali district higher productivity can

⁴⁵ The minimum yearly caloric requirement of rice equivalent is 760kg rice per year or 985 kcal/year based on the minimum daily caloric requirement of 2700 calories; 1 kg rice = 1300 calories (PRSP, 2005)). At this level of output per working unit it is sufficient to cover the basic caloric needs; however only very few farms reach this degree of efficiency in their combination of labour and land use

Figure 81. Labour productivity per working unit for IVS rice in the Northern and Eastern regions

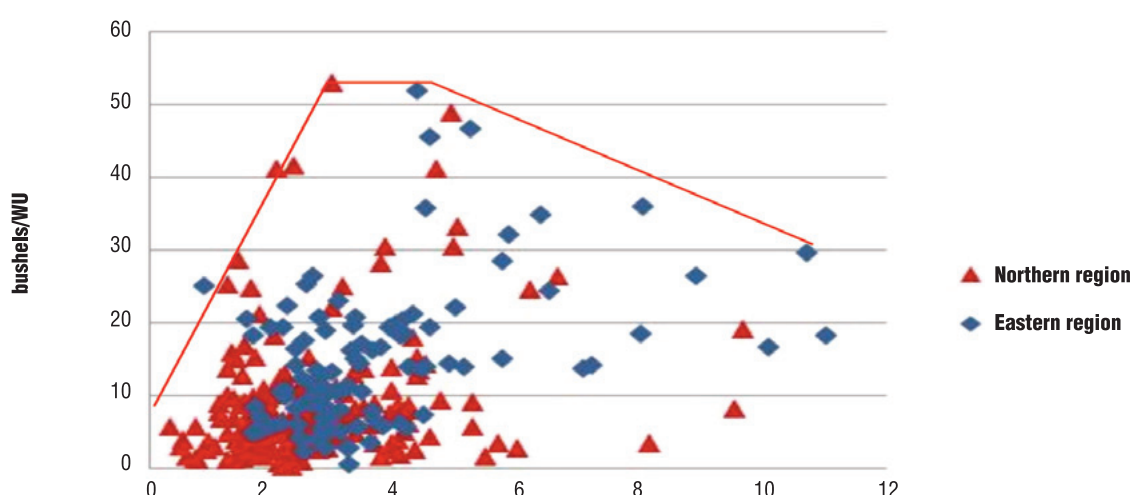
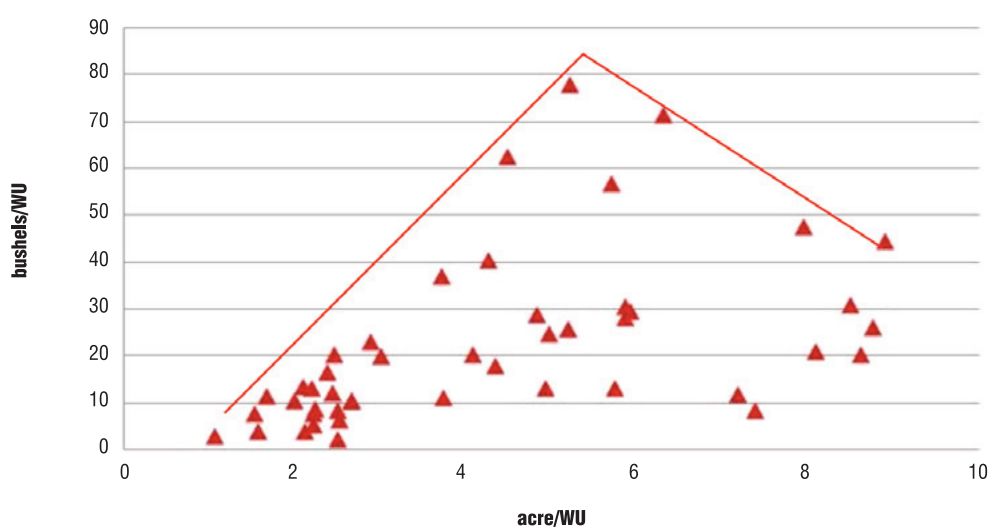


Figure 82. Labour productivity per working unit for Boli rice in the Northern region



be reached with Boli rice production than with upland or IVS rice (see Appendix IV).

Figure 83 and Figure 84 present the output per working unit vs. surface used per working unit for cocoa and coffee, respectively. The majority of cocoa growers (with around 10 acres per working unit) reach an average productivity level that is only one fourth of what top

performers achieve in this region of the cocoa production (i.e. a difference of 20 bags vs. 80 bags per working unit). A similar situation occurs in the case of coffee growers where the majority reaches only one third of the productivity level of observed best performers. Cocoa and coffee trees require initial maturity periods before they can be harvested. The latter may explain the situation of some growers reporting no output of these crops.

Figure 83. Labour productivity per working unit for cocoa in the Eastern region

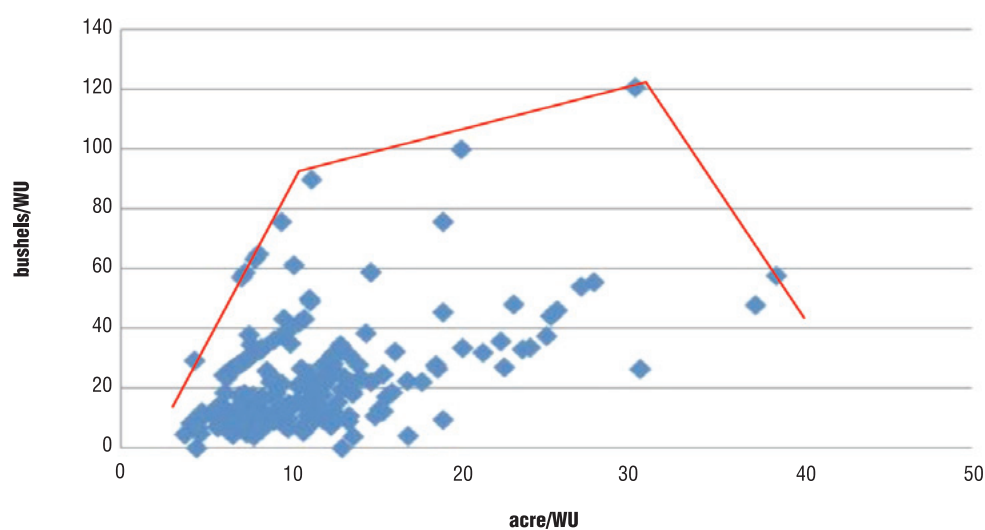
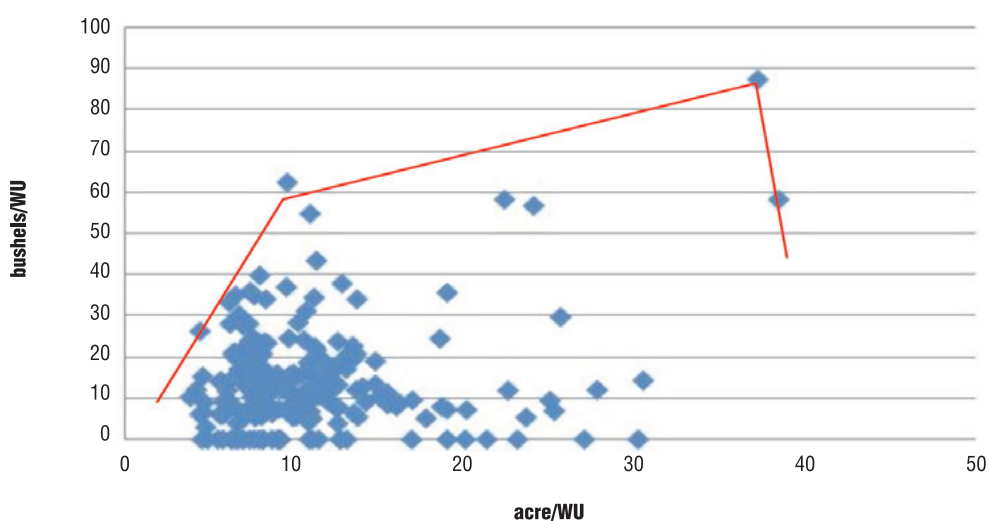


Figure 84. Labour productivity per working unit for coffee in the Eastern region



Overall, the results indicate that important productivity shortfalls are present in both regions. These are mainly due to the current production technology, pest management, pre and post-harvest losses (i.e. facilities, timely

access to inputs and output markets) (Box 3). The data collected also reflects that there is potential to reach production levels which allow farmers to cover a higher proportion of their basic needs.

Box 3: Crop production losses**Crop production losses by district, in percentage of total output**

	Northern region		Eastern region		
	Bombali	Tonkolili	Kono	Kenema	Kailahun
Cocoa		18%	6%	8%	
Coffee		24%	5%	6%	
Upland rice	30%	23%	8%	5%	7%
Lowland rice	28%	30%	14%	4%	5%
Boli rice	30%				

The Table above shows the proportion of self-reported crop production losses specific to each region and district in the survey. Smallholders in the Bombali and Tonkolili districts suffered the highest losses at around 30% of the total output, while smallholders in the Kenema and Kailahun districts faced the lowest percentage losses at around 6%. Kono falls in the middle with losses varying from 8% for upland rice to 24% for coffee.

The causes reported for these losses are specific to the crop regardless of the region under consideration:

- Cocoa: blackpod disease, monkeys and thieves
- Coffee: weeds, monkeys and thieves
- Rice: cutting grass procedure, rodents, birds and goats

These output losses percentages are relatively low in both regions (especially in the Eastern region) when compared to government reports which estimate losses of up to 40% simply regarding the post harvest losses. According to these sources, the losses are due to poor handling, poor transportation, and poor storage facilities (MAFFS, 2009).



Harvested, but uncollected rice, photographed close to Makeni, November 2009

Clearly, the situation of smallholders is also linked to the legacies of the civil conflict. In the particular case of coffee, during the war, plantations were not pruned and the awareness of the importance of pruning got lost, thus not only trees were mismanaged but the presence of over grown weed was accentuated. Additionally, pruning such tall trees represents a particularly arduous task for smallholders with rudimentary tools, and labour is already scarce. Re-training and awareness raising of these managerial practices which influence the magnitude of potential yields gains and minimize losses may be considered highly relevant for development cooperation measures. A same situation may be argued for rice, where the rudimentary tools, collection practices and deficient storage facilities reduce overall output.

6.4 Evaluation of the influence of the support provided

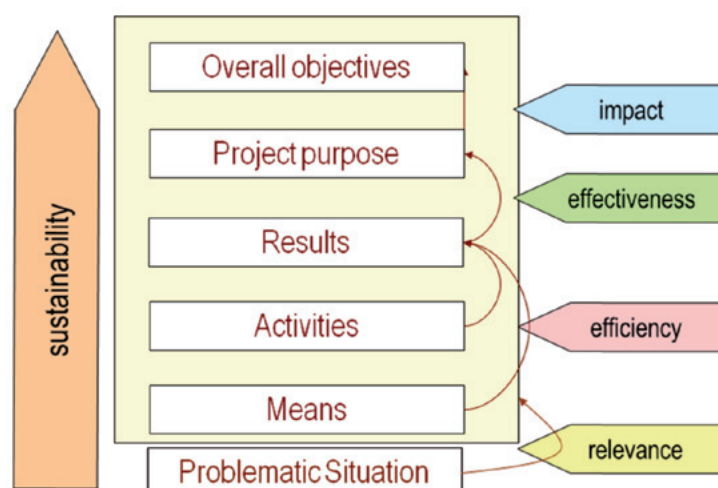
The evaluation of the support received by smallholders through STABEX-funded measures (implemented by Action Aid and Welthungerhilfe) and other aid programmes initiated by the government (MAFFS Projects and MAFFS Extension services) and NGO's in the sample districts was addressed from a qualitative point of view. It is important to highlight that all surveyed smallholders did not take part simultaneously in all of the above mentioned support programmes. However, absence of the support from a particular source is recorded in order to highlight the relative importance and presence of the different measures and source of technical assistance provided to smallholders. One differentiating factor between the STABEX-funded projects and the Government based programmes is related to the participatory approach which prevailed in the implementation processes of Action Aid and Welthungerhilfe. Besides this particular issue, the development initiatives concerned were connected as their general objective is to improve smallholders' productivity and food security.

Associated survey results are thus analysed in this sub-section applying the DAC (Development

Assistance Committee) Criteria used by OECD for evaluating development assistance (OECD and Europe Aid, 2010) as a general guideline. A visual representation of the Logical Framework Approach for this evaluation process is presented in Figure 85.

According to the above framework, the support provided is evaluated following five criteria: *relevance, efficiency, effectiveness, impact and sustainability*. In the current study the efficiency of the support provided could not be addressed, since it would require quantitative analysis of how economic resources/inputs (funds, expertise, time etc) are converted to results (i.e. benefits generated per euro of aid provided) and the survey results, do not contain quantitative information on the support received from aid programmes. The qualitative data available through the survey however does allow for assessing (*relevance, effectiveness, impact and sustainability* of the) aid programmes to which smallholders had access in terms of "how different measures are perceived by smallholders"; and so the analysis must be carried out taking into account that survey answers are most likely to be influenced by a (immeasurable) degree of subjectivity. In the paragraphs below precise definitions for the criteria set (OECD and

Figure 85. OECD-DAC Evaluation criteria and the Logical Framework Approach



Europe Aid, 2010) are discussed in the light of the Sierra Leone survey.

Relevance refers to the extent to which the objectives of the development intervention are consistent with beneficiaries 'requirements'. Therefore, in the Sierra Leone survey the relevance was assessed by asking smallholders about their perceived adequacy of the support received given their farm household needs. In other words, they were asked to analyze how adequate (sufficient/satisfactory) were the type of support received and to compare whether the amount of aid received with respect to the amount they believed they needed or required to operate their farm households. Given smallholders' often problematic situation, it is expected that the amount of resources provided will hardly be seen from their viewpoint as fully adequate. (Moreover, replying that it is so, would entail that no further aid is needed; a situation which would go against the interest of beneficiaries).

Effectiveness addresses the extent to which the development intervention's objectives were achieved (or are expected to be achieved). The aim of this criterion is to verify whether the results of the assistance projects translate into achievement of the initially stated project purpose. Consequently, smallholders were asked to comment on whether their project involvement allowed them to improve their situation in terms of total production and income. They were also asked to judge this improvement as: great, some or no improvement and to comment whether other aspects related to their rural livelihood were improved.

Impact is the criterion which deals with the primary and secondary long-term effects produced by the development intervention, directly or indirectly, intended or unintended. For the case of the present survey, *impact* was addressed by asking smallholders whether they experienced (or not), as a result of their involvement in project initiatives,

changes in key areas such as: production, cultivated area, yields, market and storage facility access. The latter is expected to reveal the extent to which the completion of project tasks contributed to the achievement of the overall objective of increasing farm households' food security and livelihoods supported by STABEX funded-measures.

Sustainability refers to the continuation of benefits from a development intervention after major development assistance has been completed; or the probability of continued long-term benefits. However, in the context of the Sierra Leone survey this criterion is evaluated in a more restricted manner as it is not possible to know with certainty which activities will continue to be performed by smallholders once the implementing agencies have left the area. In the Sierra Leone survey, *sustainability* is therefore analyzed by asking smallholders whether they believe that the processes initiated under the technical assistance programmes will continue to function beyond the implementation period. Consequently, the survey results reflect smallholders' perceptions regarding programme initiatives which in their opinion are likely to be followed up or simply discontinued once the implementing agency abandons their region.

Additionally to the above mentioned four criteria the perceived *General Improvement of the Community Area* was also assessed. This assessment was aiming at gathering information on smallholders' perceptions on changes occurred in different development areas in these regions. The households were asked whether they have experienced any improvement during the last two years (when the STABEX was operational) in the following development areas: general well-being in the area, education, health care, food security, opportunities to sell farm produce and buy fertiliser and also the provision of agricultural services by the government.

Table 33 presents the evaluation matrix specifying the indicators and data collected

Table 33. Evaluation Matrix for Support Provided

Evaluation of the influence of the support provided			
Criteria	Evaluation question	Indicator	Data collected
RELEVANCE	Does the support deal with target group priorities and fulfil their requirements?	Adequacy of kind of support: Did the aid received fulfil the household needs?	Opinion on the support provided
EFFECTIVENESS	To what extent, the interventions have contributed to reduce food insecurity of vulnerable groups	Extent of improvements: great, some or no improvement	Level of improvement in production Level of improvement in income
IMPACT	What is the impact of support on rural poverty alleviation and food security improvement?	Reduction of household poverty and food insecurity	Change in food production Change in cultivated area Change in yields of staple food Change in consumption of staples Change in prices for staple food Change in access to markets Change in on-farm food storage capacity
SUSTAINABILITY	How the support provided under selected development programmes influence the sustainable use of production resources?	Sustainability of interventions	Kind of support, which will continue after the intervention
GENERAL IMPROVEMENT IN THE COMMUNITY AREA	To what extent the living conditions of people living in rural areas have been improved	Extent of improvements: great, some or no improvement	Level of improvements in several development related areas

under each of the criterion described above. Despite lacking a quantitative dimension, the survey results allow to assess the STABEX-funded support provided in the Northern and Eastern regions of Sierra Leone. The latter along with the specific questions posed to smallholders are discussed in detail in the following sub-sections.

6.4.1 Relevance

As mentioned, *Relevance* refers to the perceived adequacy of support received by

smallholders given their farm household needs. Smallholders were specifically asked the following: “Considering your farming needs, do you think the various support you have received were adequate?” The assessment of this criterion is based on the reply given for each type of support: provision of market information, training in business management, training in processing, training in marketing, training in agronomic activities, processing equipment, tools, storage facilities, drying facilities, seeds, pesticides and insecticides, fertilizers, capital (micro-credit).

Figures 86 to 92 illustrate perceived adequacy for the specified list of development initiatives carried out by STABEX-funded implementing agencies, NGO's and other governmental services in the Northern and Eastern regions. The answer "not provided" reflects that the particular supporting agent did not address the development initiative stated above.

In the case of the STABEX support (Figure 86 and Figure 87), most of the smallholders have been reached by one or several initiatives. In the Eastern districts a higher proportion of smallholders has received some kind of support, compared to the Northern districts. It should be noted that in the Eastern region the aid spent per household was twice as high (514 Euro/ household) than that in the Northern region (263 Euro/ household). In the Eastern region the majority of the households received market information, training, tools and seeds/seedlings, almost half received storage and processing facilities, some received drying facilities and very limited (almost none) fertilisers, pesticides and microcredit. In the Northern region almost all farms received tools and seeds/seedlings, however only a limited number of households were reached by storage, drying facilities, training

(less than 40%), except the training in agronomic activities, which reached around 60% of the smallholders.

Overall, relevance/adequacy is deemed very low and only Action Aid (Bombali and Tonkolili districts in the Northern region) received slightly higher positive feedback in this respect, especially in training-related support. Although it is possible that these results are illustrating the possibility that beneficiaries are not willing to claim that the type of support and the associated amount of resources received are sufficient to fulfil their needs (even if they have had a positive impact from the interaction in the technical assistance program), it may also be the case that the amount of aid received per beneficiary was not high enough to imply a substantial improvement and was therefore deemed "not adequate". Most likely, the results illustrate a combination of these two aspects.

Concerning the case of MAFS projects and extension services (that were only operational in the Northern region), the provision of aid was limited to supporting drying and storage facilities and to providing some training, processing equipment and seeds, reaching only 1-5% of the

Figure 86. Adequacy of support provided by Welthungerhilfe STABEX in the Eastern districts of Sierra Leone

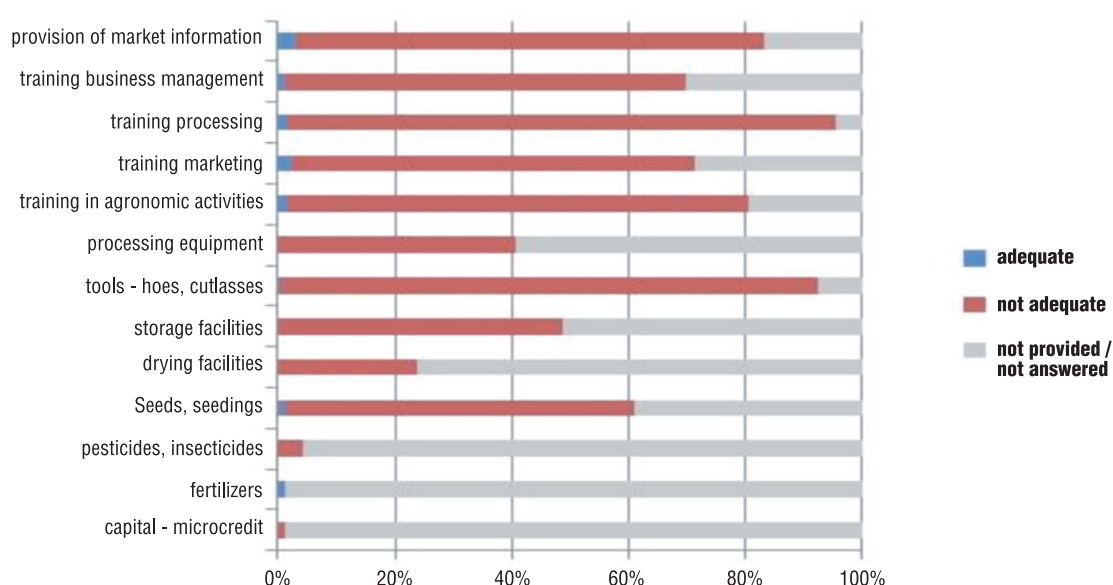


Figure 87. Adequacy of support provided by Action Aid STABEX in the Northern districts of Sierra Leone

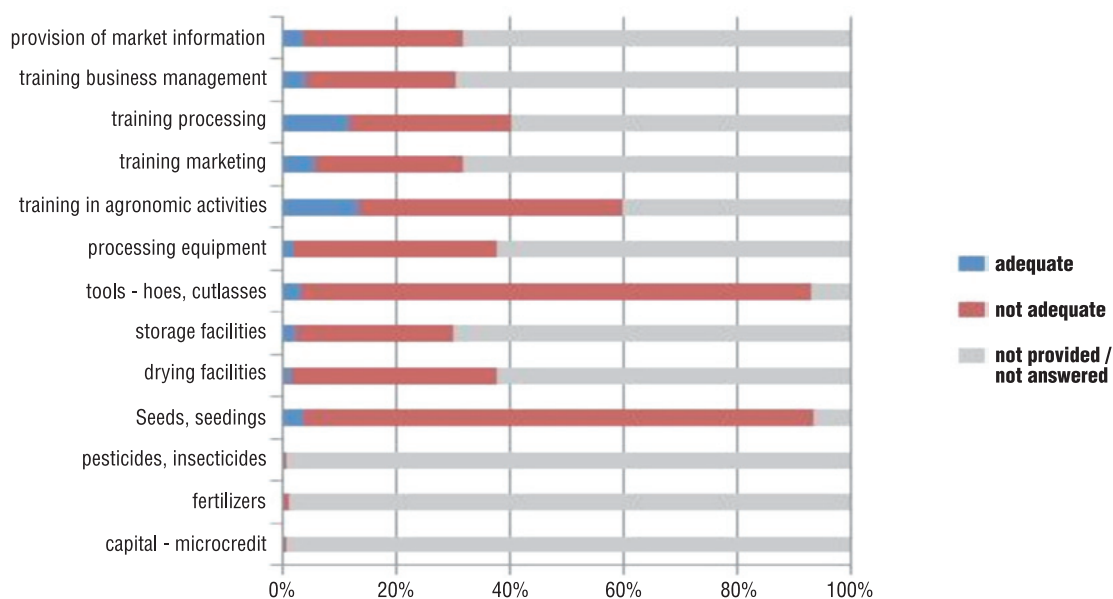
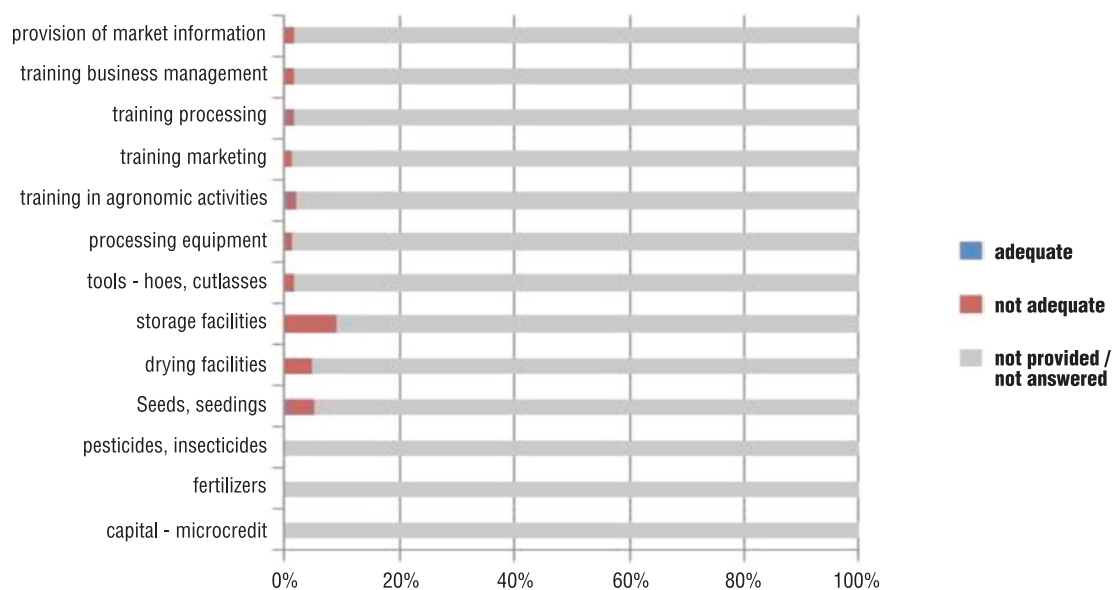


Figure 88. Adequacy of support provided by MAFFS projects and extension services in Northern region of Sierra Leone



sampled smallholders. The government-based measures were considered as “not adequate” by the few respondents who benefited from them and were included in the present survey.

NGOs were providing support to slightly higher number of smallholders than the government (on average 5-15% per each

initiative), especially training, drying and storage facilities and seeds/seedlings in both Northern and Eastern regions. Although, the adequacy was also perceived not being adequate for the majority of smallholders, only some households were claiming little satisfaction in the Northern region concerning the training and drying facilities.

Figure 89. Adequacy of support provided by Other NGOs in the Northern region of Sierra Leone

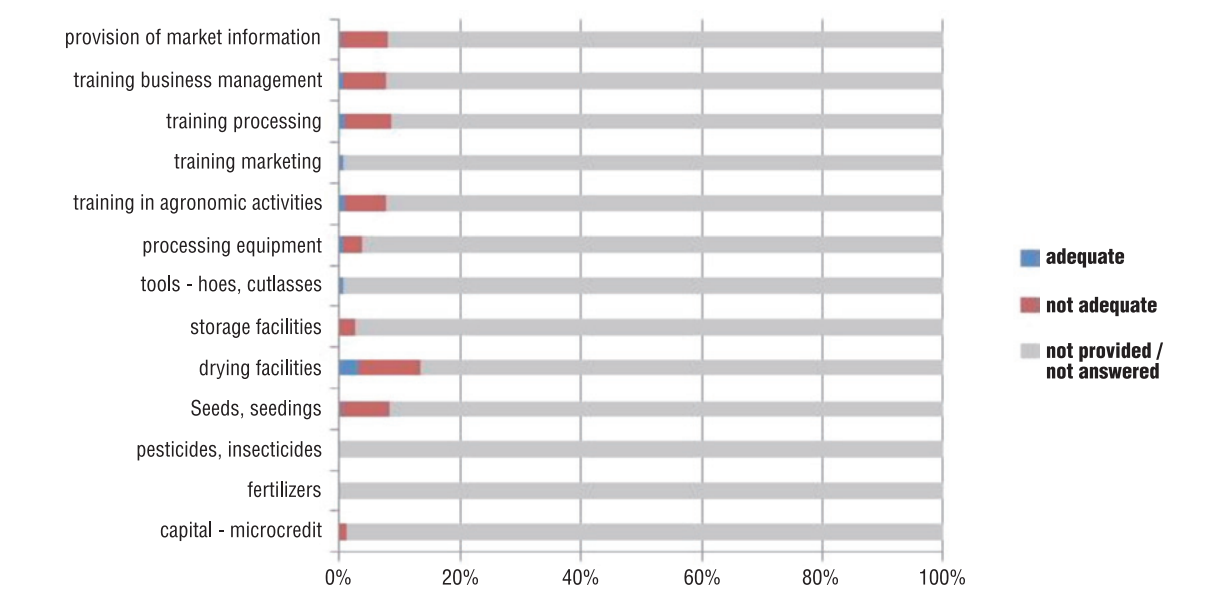


Figure 90. Adequacy of support provided by Other NGOs in the Eastern region of Sierra Leone

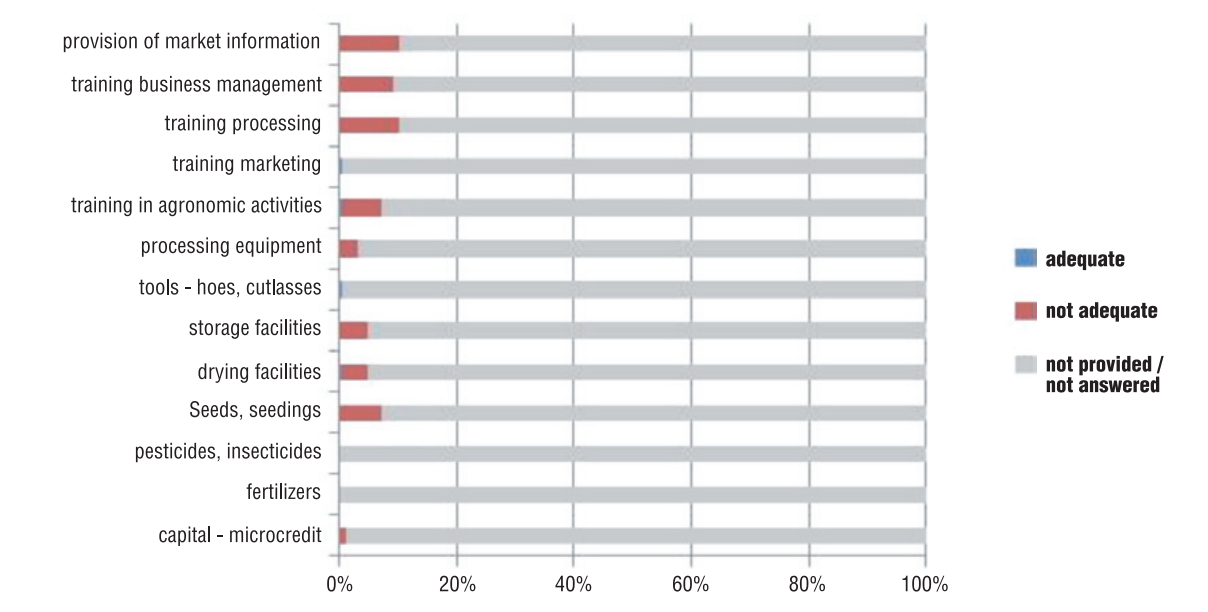


Figure 91 and Figure 92 summarise the perceptions of smallholders who participated in all development projects for the Eastern and Northern regions, respectively. By analysing the kind of support provided by all organisations and whether they matched the smallholders needs,

the survey results indicate that the most adequate support was the training in agronomic activities and in processing (i.e. the provision of intangible asset for the farm household). Almost 10% of the households found this type of support adequate. About 5% of the respondents found relevant the

Figure 91. Adequacy of support provided by all aid programmes in the Eastern region of Sierra Leone

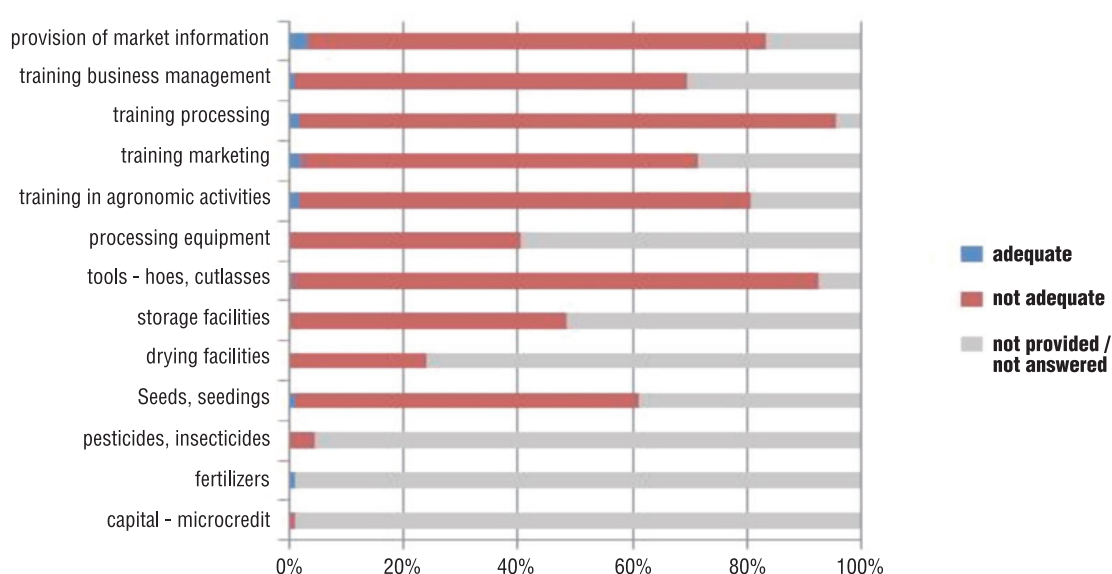
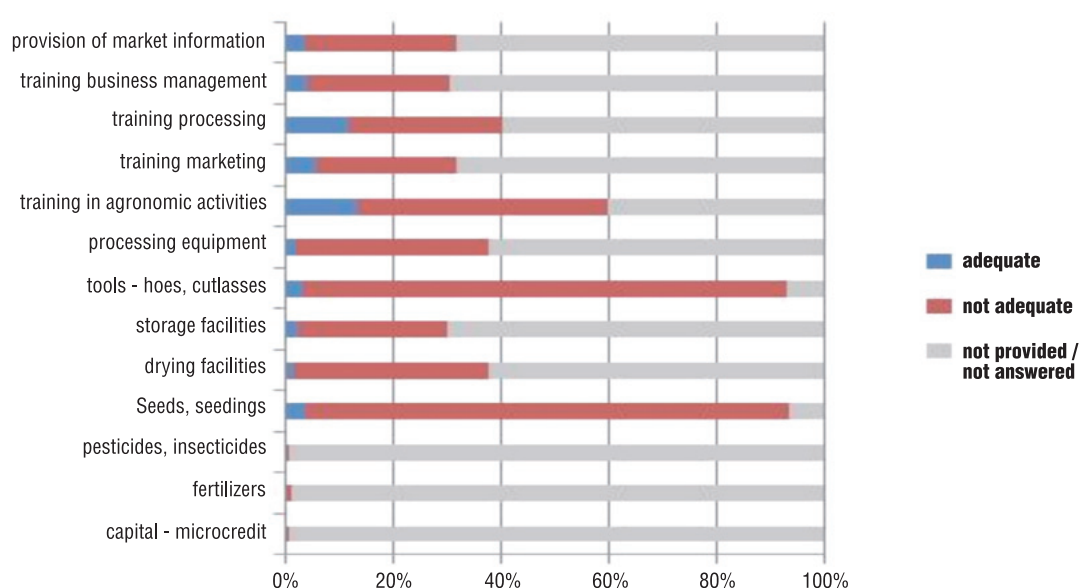


Figure 92. Adequacy of support provided by all aid programmes in the Northern region of Sierra Leone



training in marketing (mainly those located in the Northern districts, usually less exposed to market interaction) and a bit less the training in business management, provision of market information and drying facilities, seeds, seedlings. However these respondents only represent 3-4% of the farmers.

In the tasks which entail a more direct economic support (i.e. access to inputs such as seeds, tools etc or specific infrastructure), the large majority of farmers consider the support provided as not adequate. This is in line with the general perception of farmers who reported that the

amount of support received is not adequate, and that their need of future aid is substantial.

6.4.2 Effectiveness

The evaluation of *effectiveness* entails measuring how far the specific objectives of the projects implemented in the area have been met from the point of view of farm household beneficiaries. Since these objectives include enhancing the economic

viability of smallholders, reducing food insecurity of the surveyed farm households, and improving their rural living conditions, the question posed to beneficiaries directly addressed those components of the aid projects related to the improvement in production, income and food security.

Smallholders were asked to evaluate the “level of improvement in production” and “income” resulting from their interaction with

Figure 93. Change in production as a result of engaging in technical assistance projects in the Eastern region of Sierra Leone

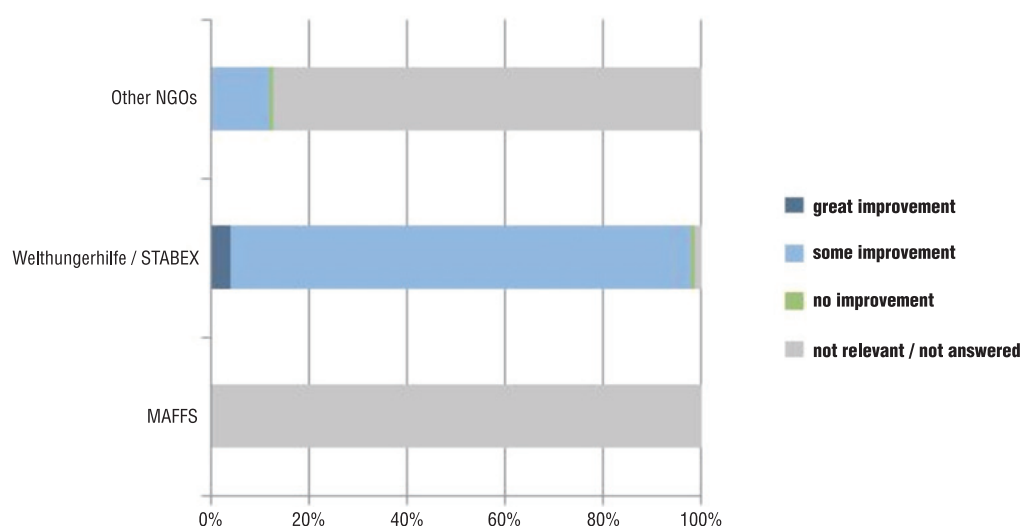


Figure 94. Change in production as a result of engaging in technical assistance projects in the Northern region of Sierra Leone

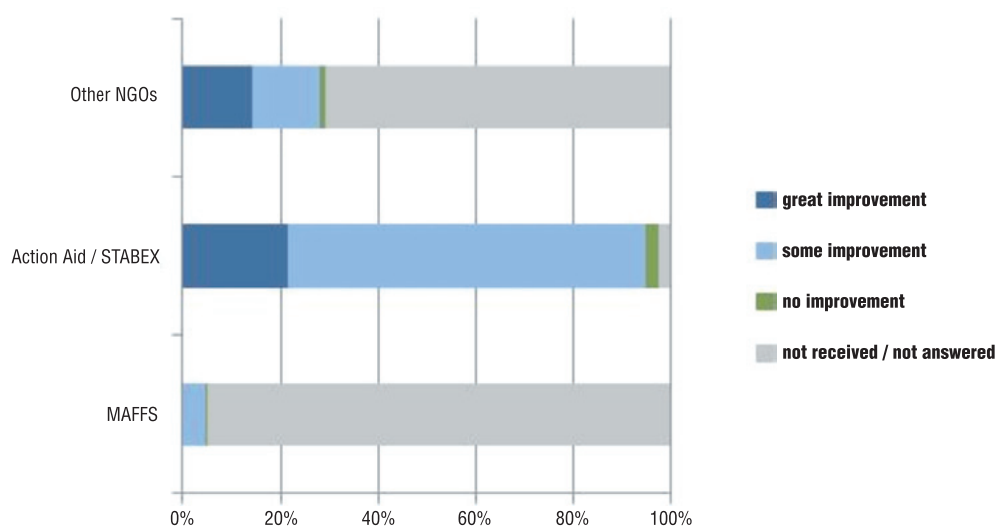


Figure 95. Change in income as a result of engaging in technical assistance projects the Eastern region of Sierra Leone

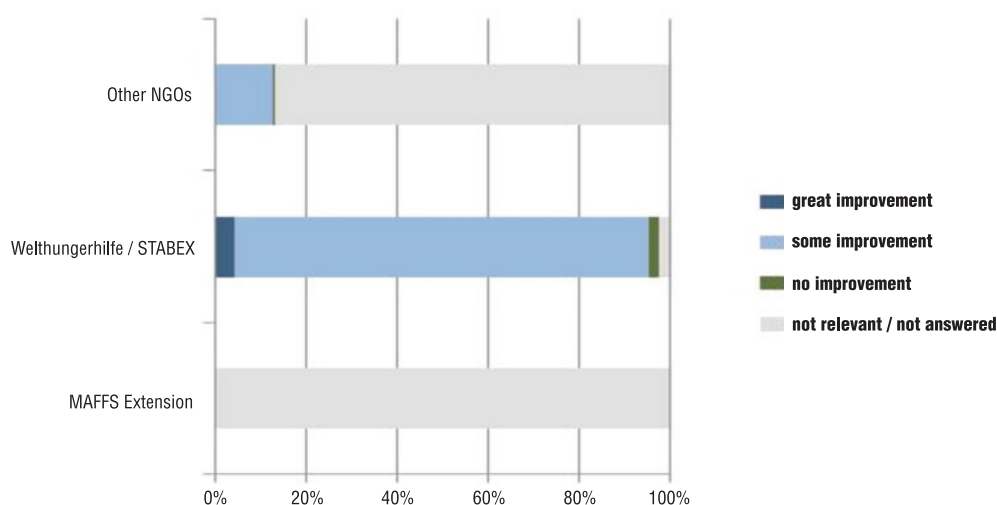
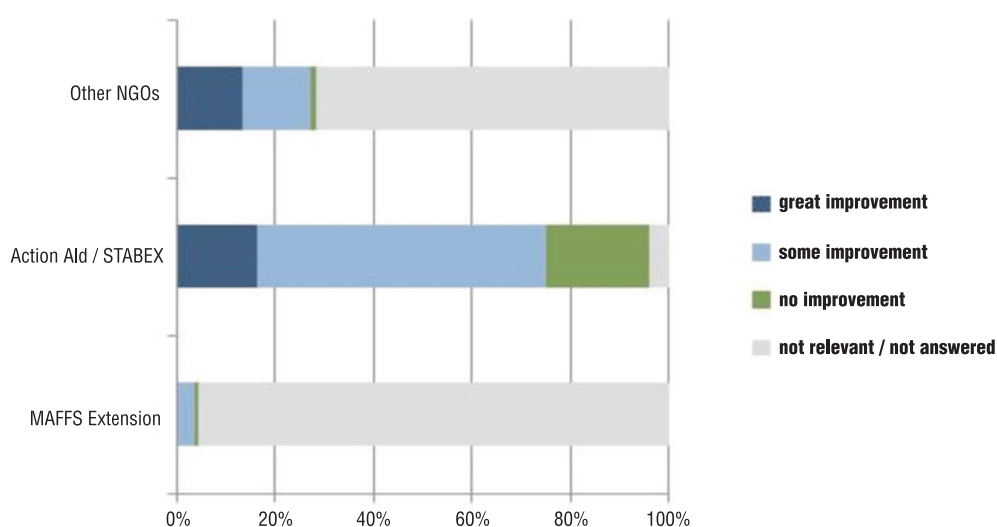


Figure 96. Change in income as a result of engaging in technical assistance in the Northern region of Sierra Leone



the different initiatives undertaken by Action Aid, Welthungerhilfe, MAFS (projects and extension services) and NGO's. In other words, the question posed to assess the issue of effectiveness was correlated to that of adequacy. Specifically, smallholders were asked the following: "Describe the level of improvement (*Great* improvement, *Some* improvement or *No* improvement) experienced in your production and income as a result of engaging in the measures developed

by Action Aid/STABEX, Welthungerhilfe/STABEX, MAFFS Extension, MAFFS Service Projects or Other NGO". The responses to this question are presented per region for production and income changes respectively.

In both the Eastern and the Northern regions, in the case of NGOs and STABEX, only few respondents stated that there was no improvement in production. In the Eastern districts most

respondents reported some improvement and some (up to 5%) replied that great improvement was observed from the development initiatives which STABEX was implemented. The most satisfactory results were found in the Northern region where more than 20% of respondents agreed that great improvement was achieved (Figure 93 and Figure 94) the rest stating that there was some improvement and hardly any stated no improvement in production. In the Northern region the relative proportion of farms perceiving great improvement was higher in case of NGOs compared to Action Aid support, however in the Eastern region Welthungerhilfe was perceived better providing greater improvement in production compared to other NGOs.

Regarding government-based support, smallholders did not comment on the effectiveness of such measures (mainly related to training in the East and to drying/storage facilities in the North which were previously reported as inadequate in quantity) as these were not perceived to directly affect their production performance (nor their income as illustrated below), possibly due to the fact that most government related initiatives were also deemed as not adequate and/or not provided. In any case, the results illustrate that STABEX-funded initiatives were indeed filling a gap in terms of the services provided by the Sierra Leone government in these districts and they managed to secure a certain degree of improvement in terms of farm household production and income.

Smallholders were also asked to evaluate the level of improvement in income resulting from the aid programmes in which they were engaged (Figure 95 and Figure 96). The results in terms of income closely match those for production, with one main difference: In the Northern region, more than 20% of the respondents (involved in the Action Aid initiatives) stated that the aid did not directly contribute to improve their income. This may imply that the reported "some improvement" in

production may have contributed to increasing household consumption rather than achieving higher commercialisation of the farm produce. Although cash income may not have improved from the point of view of respondents in the Northern region, the reported improvement in production may imply that an increase in food security was nonetheless observed. Once again, government-based measures through MAFFS project and extension services were regarded as not directly affecting farm-household incomes.

6.4.3 Impact

Impact measures to what extent the completion of project tasks have had an effect on food security and livelihood at the household level. In the Sierra Leone survey, the latter was addressed by asking smallholders the following: "Describe (in terms of "Great Improvement", "Some improvement" or "No Improvement") the impact of the STABEX support received on your food security by commenting on the change perceived or experienced under the categories specified as follows: on-farm food storage capacity, access to markets, prices for staple food, consumption of staples, yields of staple food, cultivated area, food production".

The smallholders' responses are summarised in Figure 97 and Figure 98. The results show that the impact on food security perceived by farmers slightly differs across the regions, though the majority of the households stated some kind of improvement in most of the categories assessed.

In the Eastern region, the results are mixed. On one hand, changes concerning on-farm food storage capacity were perceived as having the lowest impact on their food security; followed closely by changes in the prices and yields of staple foods. On the other hand, the highest impact to the improvement of their food security is believed to be in measures related to market access, cultivated area and food production, which is directly related to the provision of

Figure 97. Impact of support on different aspects of food security in the Eastern region of Sierra Leone

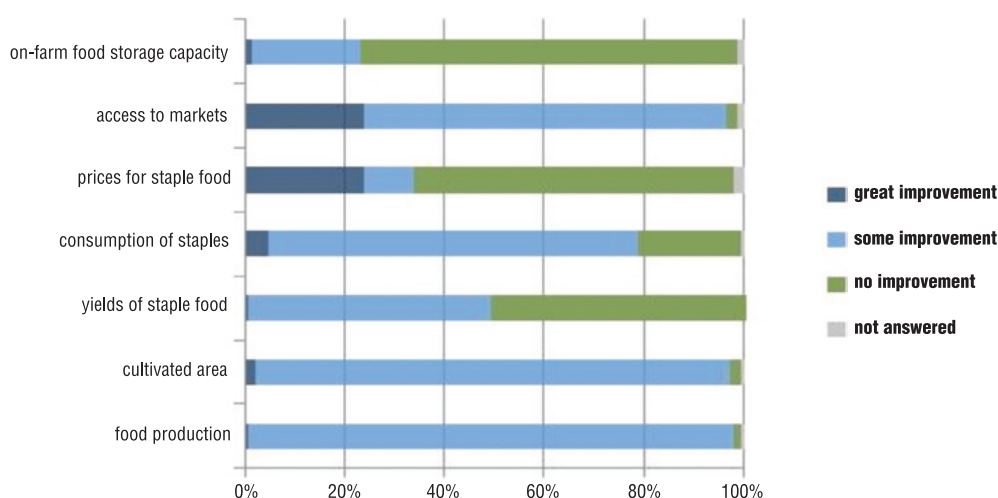
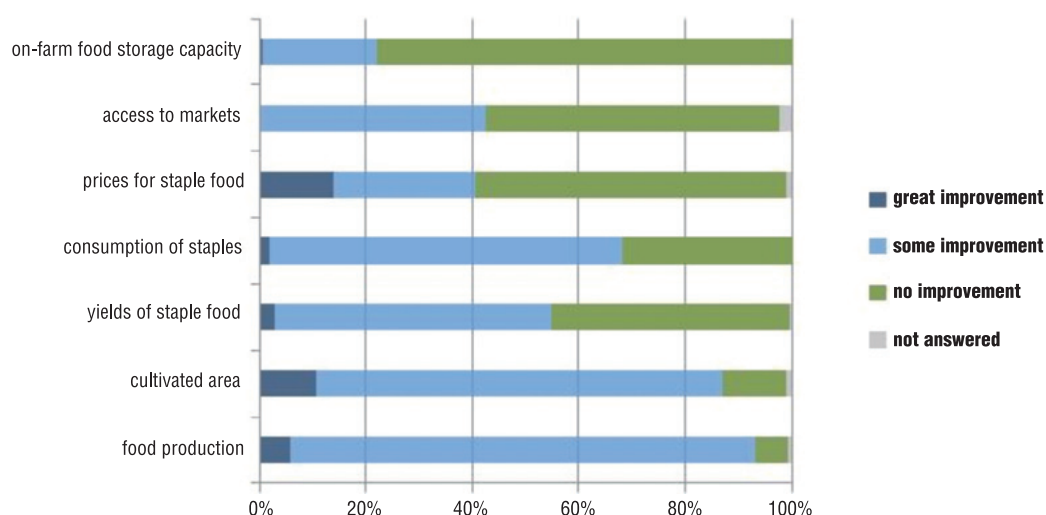


Figure 98. Impact of support on different aspects of food security in the Northern region of Sierra Leone



market information, building market centres and the provision of tools and seeds to most of the smallholders in the region. In other words, in the Eastern region smallholders are very much aware that any changes which improve their marketing mechanisms and area of production of cash crop are bound to ameliorate their food security and livelihoods.

In the Northern region higher impact to improving food security is associated to changes in staple food prices, cultivated area and food production. Unlike the Eastern districts, change

in the degree of access to markets is deemed (by approximately 40% of respondents) to have less of an impact; which is consistent given their current crop production orientation aimed mainly at domestic consumption (i.e. no presence of cash crops such as cocoa and coffee due to the different agro-ecological settings between the Northern and Eastern region of Sierra Leone). Likewise, changes in on-farm food storage capacity are also recognised as having reduced impact on their food security, most likely because the largest proportion of harvest output is usually consumed every year.

In general we can say that in several aspects of food security there was some kind of improvement perceived by majority of the households, especially, concerning the cultivated area and improvement in food production in both regions and access to markets in the Eastern region, which were specifically targeted by the STABEX program.

6.4.4 Sustainability

Sustainability can only be evaluated several years after implementation of the STABEX projects. Consequently, in the Sierra Leone survey only expected future sustainability could be asked for the different components of the projects. The following question was posed: "Could you continue to apply the proposals of the interventions (specified below) after the end of the project implementation period?". The interventions were defined as follows (same categories as for the relevance assessment of the support described in section 6.4.1): provision of market information, training in business management, training in processing, training in marketing, training in agronomic activities, processing equipment, tools, storage facilities, drying facilities, seeds, pesticides and insecticides, fertilizers, capital (micro-credit).

Results are separately summarised in Figure 99 and Figure 100 for the Eastern region and for the Northern region.

In both regions most of the respondents who have received some kind of support stated that those will serve for their long term benefit. Only a few smallholders were stating the opposite or that they were not aware of the sustainability impact of the initiative they have received. In the Eastern region, almost all the activities are perceived to be sustainable, except drying and storage facilities, where some smallholders perceived it as unsustainable. Northern region respondents' largely coincided with Eastern region respondents except for three issues i) training and information related components and ii) processing equipment and iii) drying and storage facilities. Concerning the first two activities, Northern smallholders believe much less than Eastern ones that these activities would be sustainable in their area, while a more positive outlook was associated to the third aspect.

After having analyzed relevance, effectiveness, impact and sustainability of STABEX-funded projects (and to a minor extent also of MAFFS and NGO's projects) in the

Figure 99. Expected sustainability of different components of the projects in the Eastern region of Sierra Leone

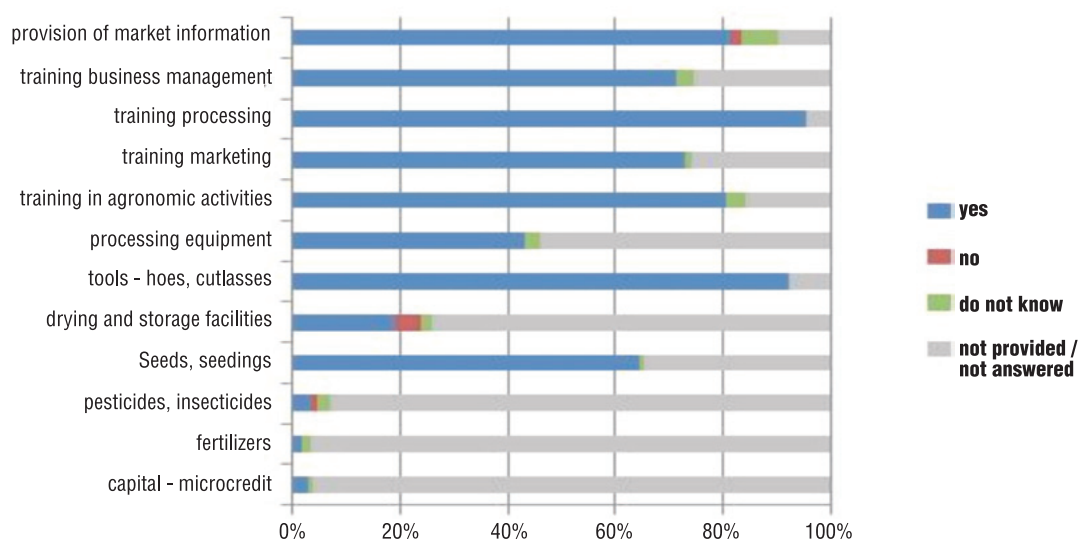
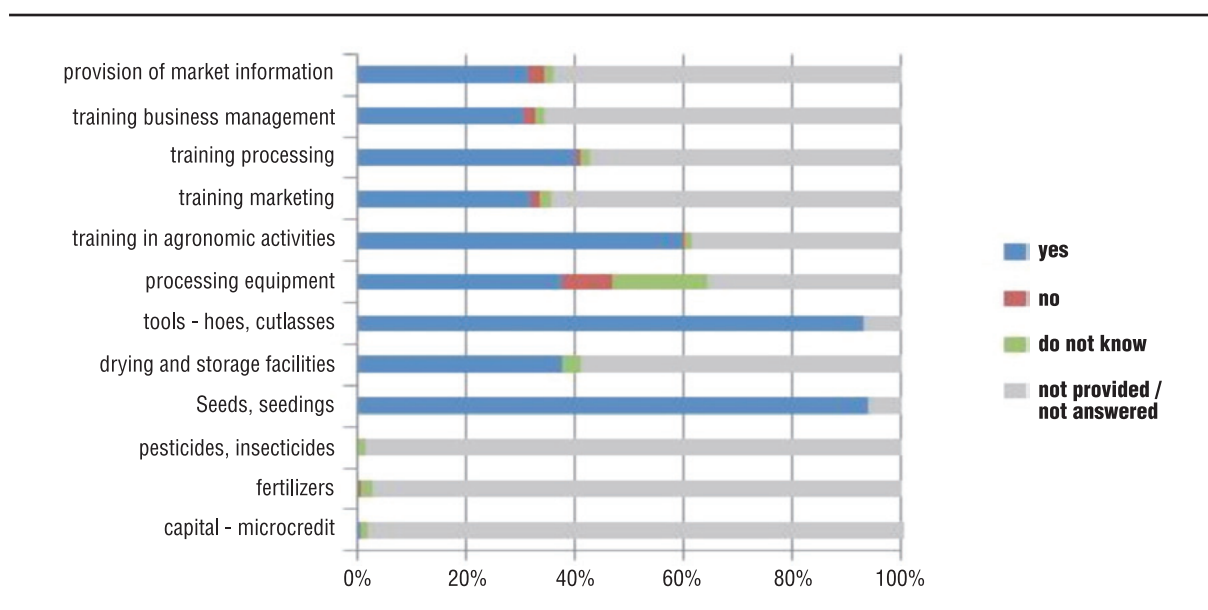


Figure 100. Expected sustainability of different components of the projects in the Northern region of Sierra Leone



selected Northern and Eastern districts of Sierra Leone, it can be said that these initiatives have achieved positive effects on involved farm households' livelihood. Despite the negative feedback on perceived adequacy on the amount of aid, (particularly for the support on activities which require cash), the objectives of contributing to the improvement of food security were partially achieved as reflected in the evaluation of the *effectiveness* and *impact* criteria. It is also interesting to note that the initiatives that were provided were perceived sustainable and benefiting the smallholders also on a longer term. However, more efforts are needed if the final objective is to raise the population out of the poverty trap.

6.4.5 General Improvement in the Community Area

As the STABEX, Government projects and other NGOs in the surveyed districts also had the objective of improving rural livelihoods. In this case respondents were also asked to evaluate any improvement experienced in different areas of development during the two years in which STABEX-funded initiatives were undertaken. Smallholders were explicitly asked: "Have you

experienced or seen any improvement in the following areas of development in your area during the last two years?" Areas of development considered were the following: general household wellbeing in the area, opportunities of education for kids, health care facilities or opportunities, food security situation of the household, provision of agricultural services by the government, opportunities of buying fertilisers and opportunities to sell farm produce. The replies are listed below for the Eastern (Figure 101) and Northern region (Figure 102) respectively.

In general, the results show that in both Eastern and Northern regions around 20-35% of smallholders perceived improvement in several areas of development, as the result of STABEX-funded and Governmental and NGO initiatives. The improvements have been observed in areas such as the general well-being, education, health care, food security and opportunities to sell farm produce. From their experience, improvements were perceived especially related to the areas of food security and opportunities to sell farm produce in both regions, which was a specific aim of STABEX-funded measures (i.e. improvement in production and marketing). One particular issue which appears to have worsened from the point of

Figure 101. Changes in different areas of development during the last two years in the Eastern region of Sierra Leone

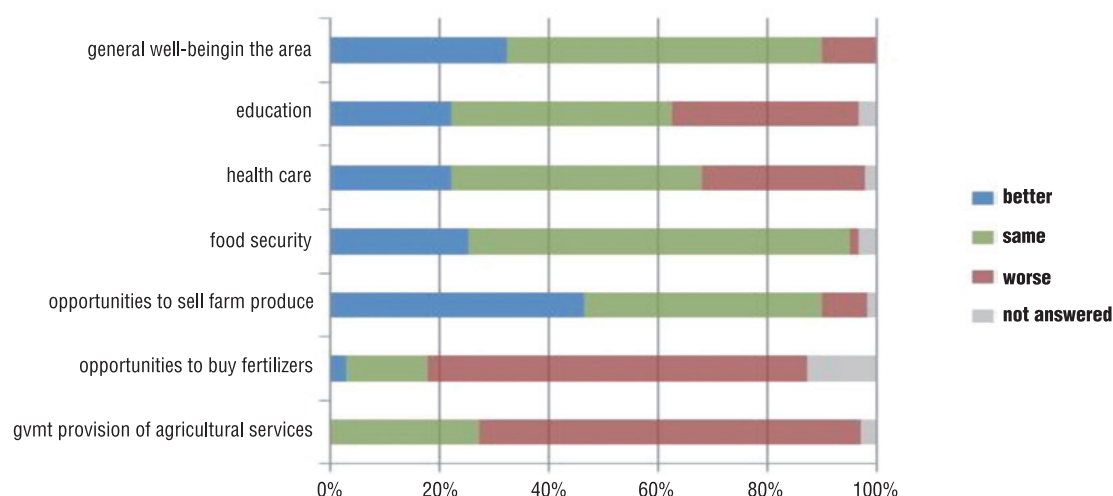
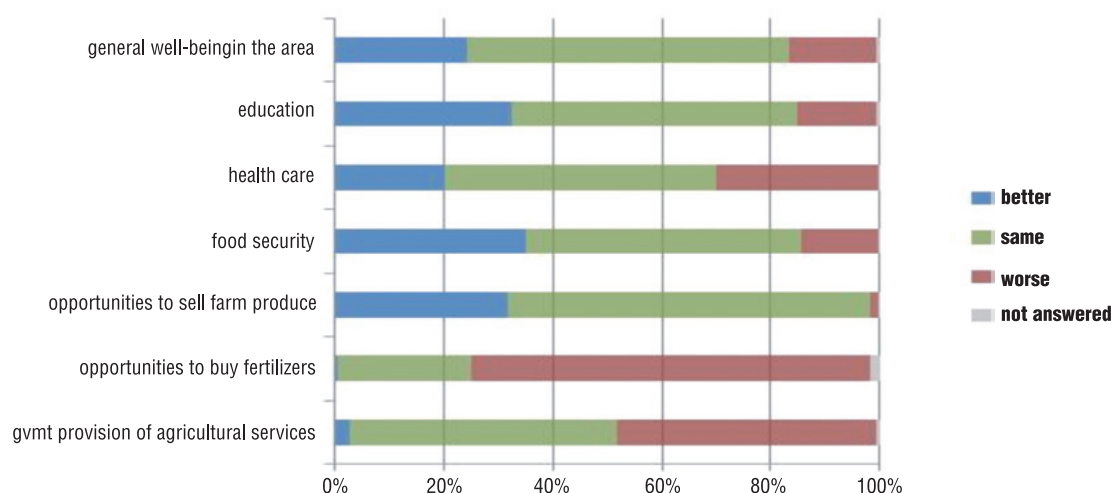


Figure 102. Change in different areas of development during the last two years in the Northern region of Sierra Leone



view smallholders in the Northern districts as well as in the Eastern districts is concerned with the opportunities to buy fertilizers, an activity which clearly requires cash in order to be performed. According to the responses, government provided services (agricultural, educational and health care) have also worsened for at least 20% of respondents (except for education in the Northern region which is considered to have worsened by only 10% of respondents).

As a summary it can be said that in the development areas where STABEX was

operational (food security and opportunities to sell farm produce) a relatively higher improvement was perceived by smallholders compared to other areas of development which was not targeted by the STABEX program.

6.4.6 Non-Supported Farmers

Another way to evaluate the impact of the STABEX funded initiatives is to assess how non-supported farmers differ from supported farmers (control group). In this sub-section their differences in terms of farm net income, poverty

Figure 103. Average farm net income (FNI) per farm household unit (hhUnit) for non-supported and supported farmers (Leones)

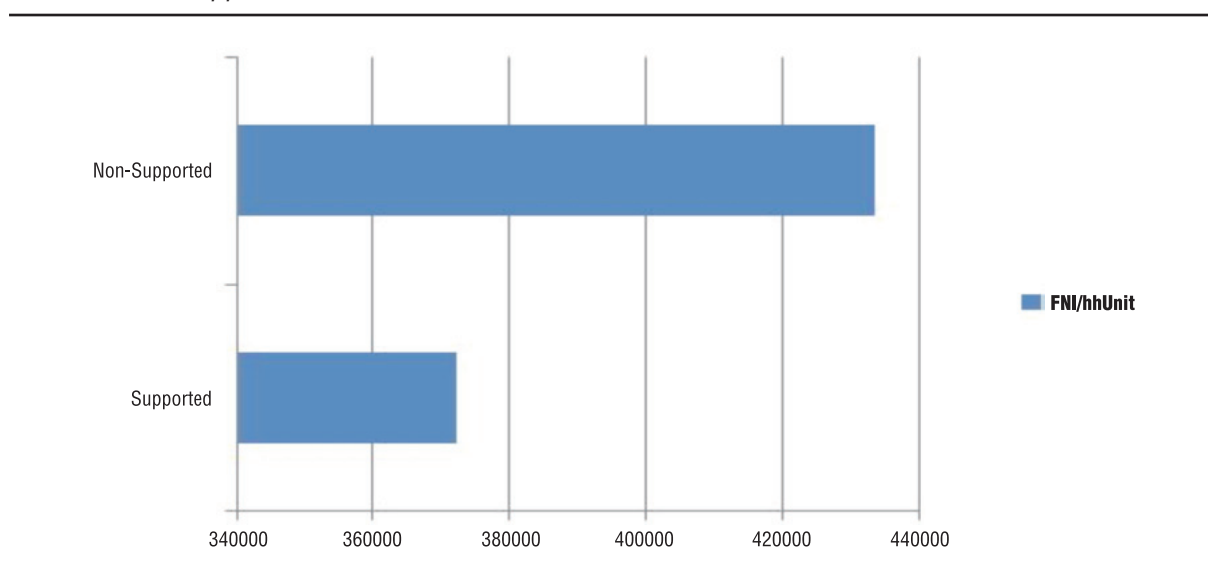
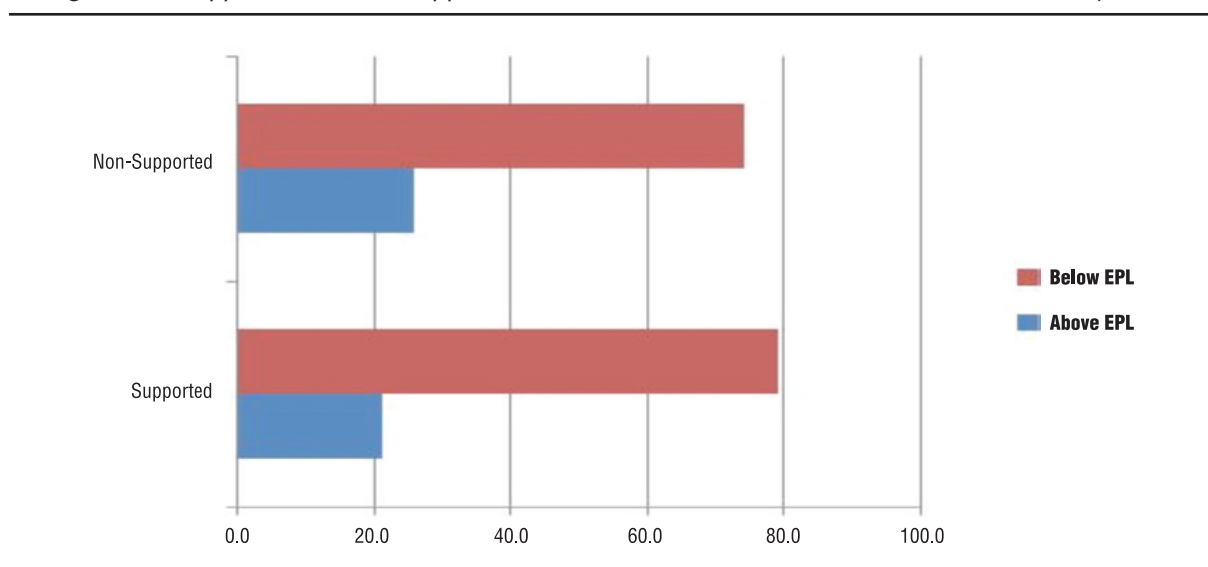


Figure 104. Supported and non-supported farms below and above the Extreme (Food) Poverty Line (%)



level, land and asset availability as well as other social variables such as gender, education or association to cooperatives or farmer groups are reviewed in detail.

In terms of Farm Net Income (FNI) per farm household unit, Figure 103 illustrates that the control group has a FNI which is around 15% higher than the average FNI of supported farmers. However, as shown in Figure 104, this does not

necessarily imply that the non-supported farmers are all above the extreme (food) poverty line. In fact, the percentages of farmers within the supported and non-supported groups which are above and below the Extreme (Food) Poverty Line are very similar; roughly 20% are situated above and 80% are below the Extreme (Food) Poverty Line.

Yet, a more detailed analysis at regional level reveals that the majority of farmers (more

Figure 105. Supported and non-supported farms below and above the Extreme (Food) Poverty Line per region (%)

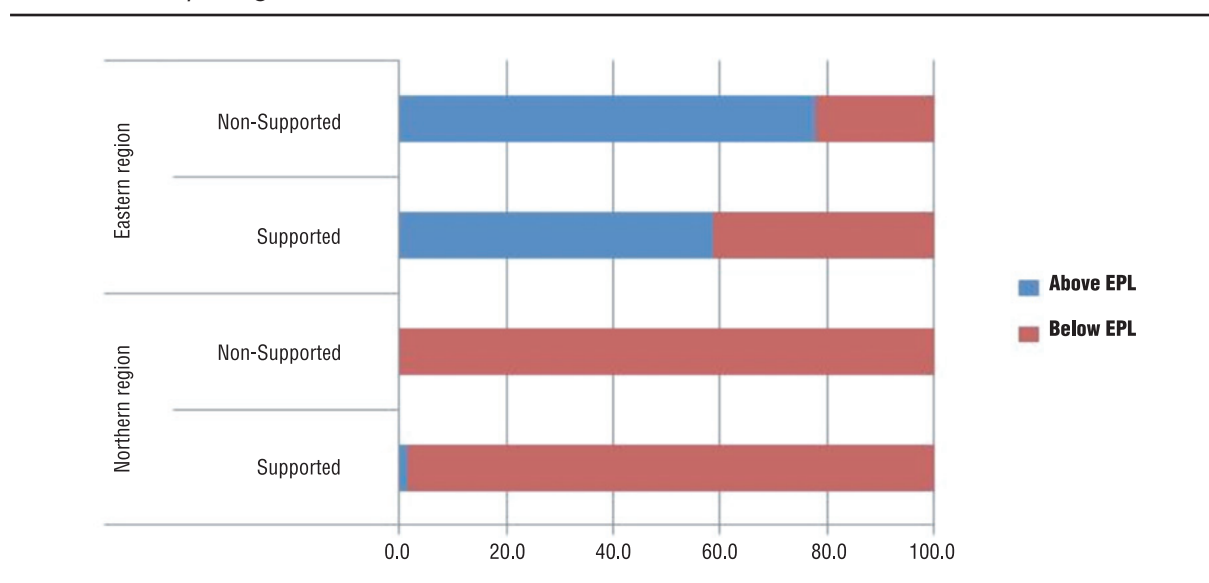
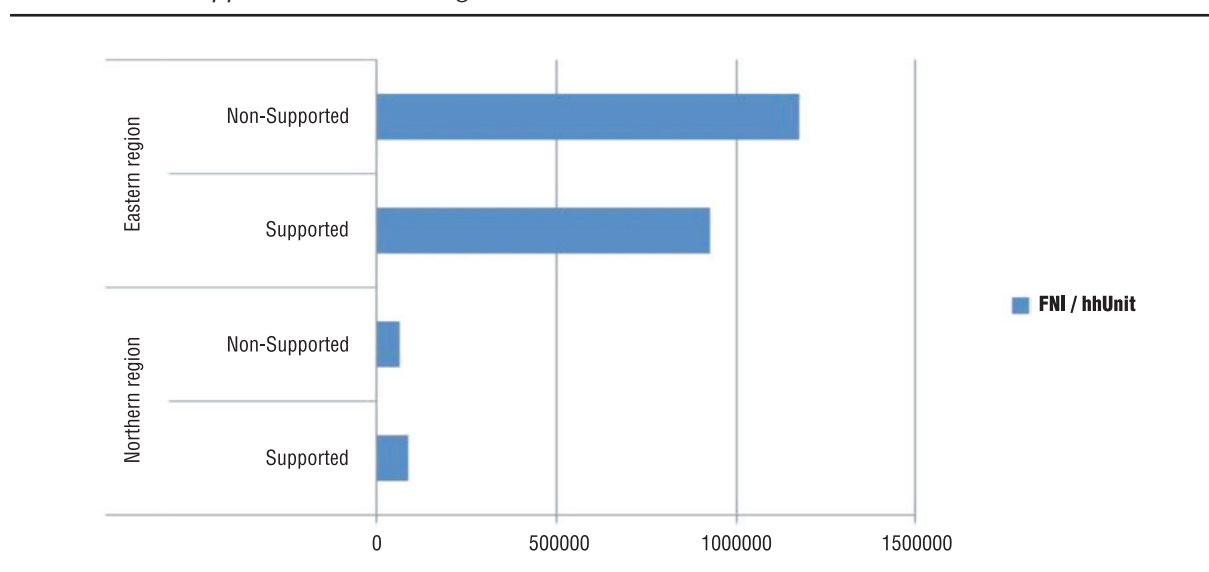


Figure 106. Average net farm income (NFI) per farm household unit (hhUnit) for non-supported and supported farmers at regional level (Leones)



than 99%) in the Northern region from both the supported and the control group are actually below the Extreme (Food) Poverty Line (EPL). While in the Eastern regions, the percentage of non-supported farmers above EPL is almost 80%, and 60% of the supported farmers group are also above the EPL (see Figure 105). In other words, the differences in terms of poverty levels are accentuated from a regional point of view.

In relation to NFI per farm household unit, in the Eastern region, the non-supported group achieves the highest average level of the entire sample (1 174 252 Leones); suggesting that these farmers are indeed the better off (Figure 106). The supported farmers of the Eastern districts achieve the second position with 925 590 Leones per farm household unit. However, in the Northern region, where both the control

Figure 107. Cultivated area of non-supported and supported farmers per region: Number of acres per farm household

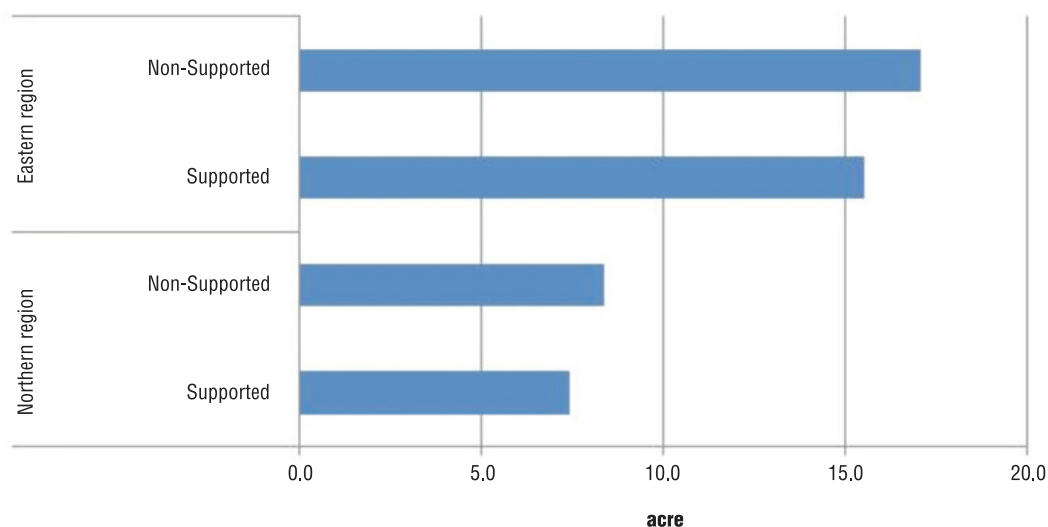
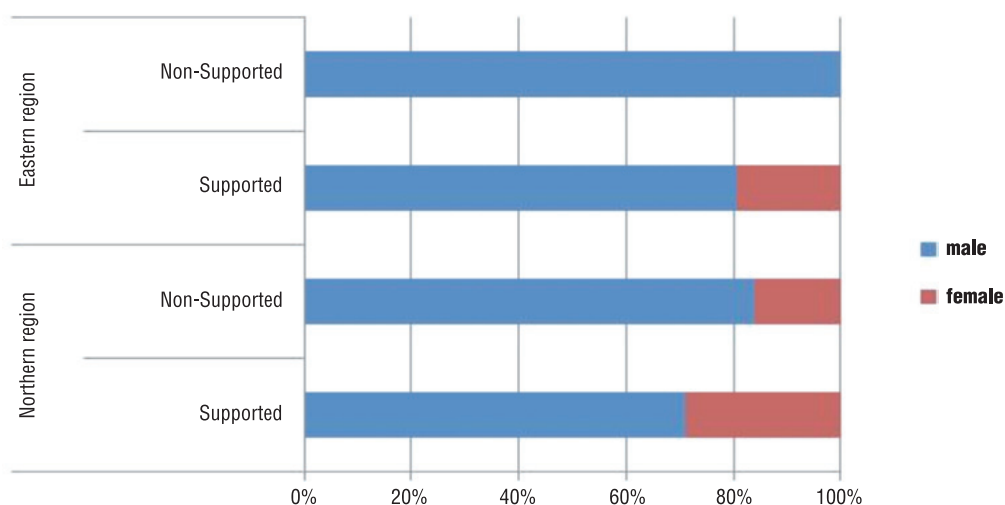


Figure 108. Sex of household head for supported and non-supported farmers



and supported group were equally below the EPL, it can be observed that on average the supported farmers achieve a slightly higher NFI (89 386 Leones) with respect to the non-supported group of farmers (62 930). The latter can be partly attributed to the effect of STABEX-funded initiatives and other government sponsored activities in the area, as this survey was conducted after the technical assistance was provided to surveyed smallholders.

When analysing the amount of cultivated acres between supported and non-supported farmers, it appears that non-supported farmers have larger land availability in their respective regions; on average 2 more acres in the Eastern region and 1 additional acre in the Northern region (see Figure 107).

Figure 108 and Figure 109 illustrate the existing divergence between supported

Figure 109. Years of education of household head of supported and non-supported farmers

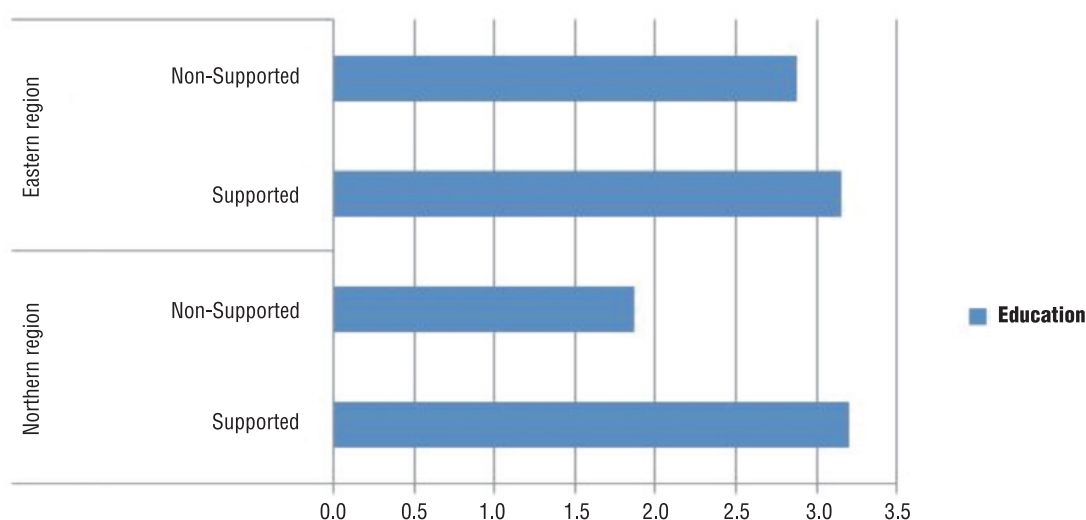
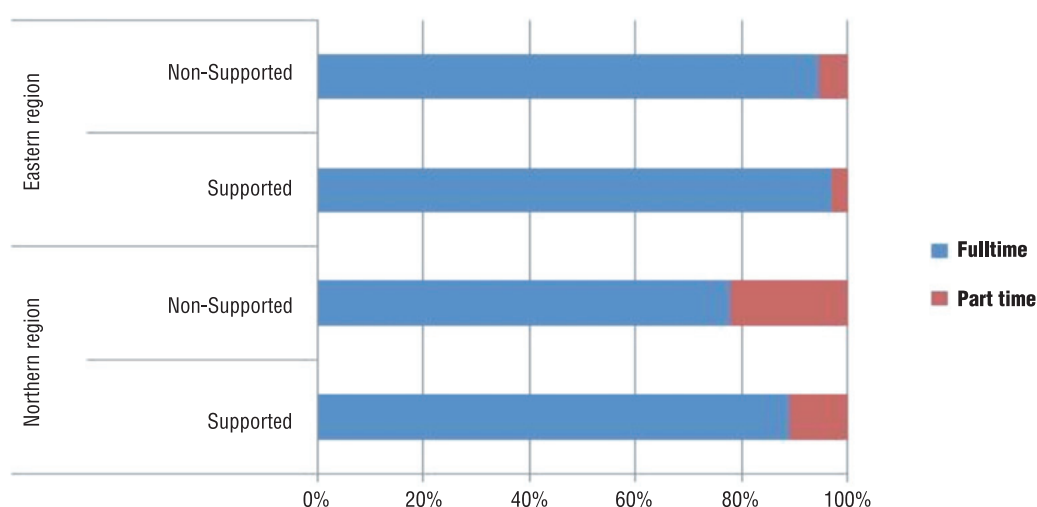


Figure 110. Head of household engagement in farming for supported and non-supported



and non-supported in terms of gender and achieved educational level of the farm household heads. It appears that the STABEX-funded initiatives tended to target more female headed households compared to the targeting of non-supported initiatives, as well as farmers who had more years of formal education. The latter is particularly striking in the Northern districts where the average number of years of education among supported and non-supported is almost double for the former (i.e.

3 years for supported farmers versus 1.5 years for non-supported farmers).

Figure 110 provides information on the degree of engagement on farming activities. In the case of non-supported farmers, a larger percentage declares to be involved in farming on a part – time basis; particularly in the Northern region with up to 20% of smallholders in the control group (that is, non-supported farm households) versus 10% of the group of farmers

Figure 111. Relevance of income sources for supported and non-supported farmers

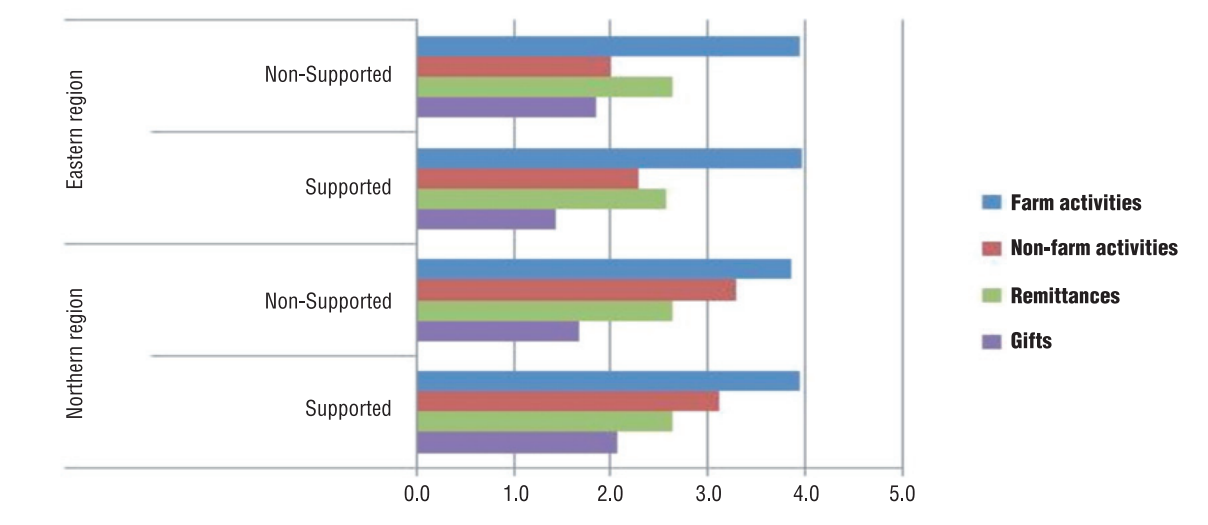
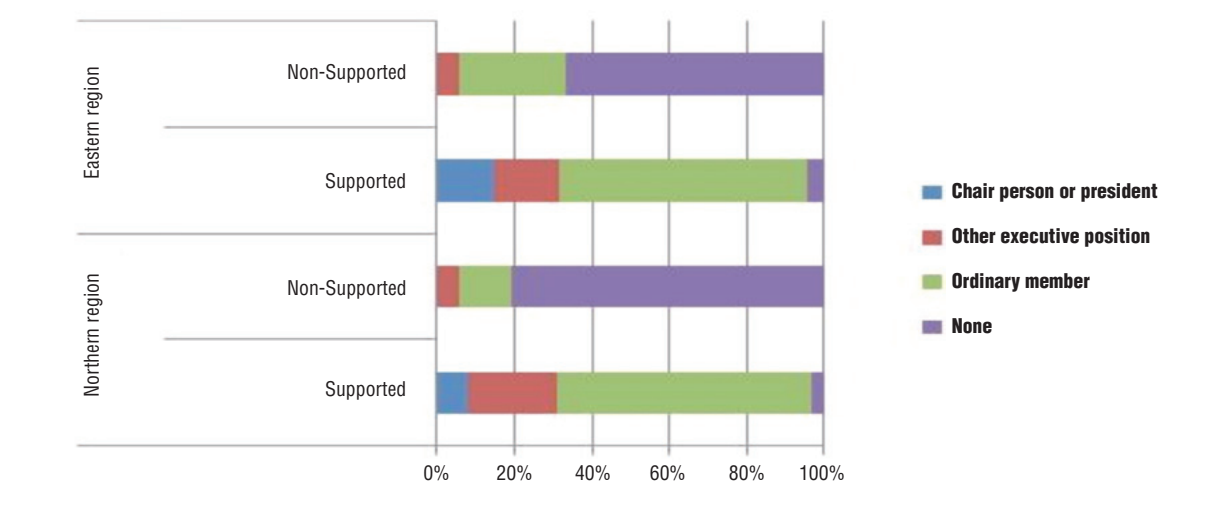


Figure 112. Position of Head of households in a farming group or association for supported and non-supported farmers



who received support. Likewise in the Eastern region (although in a smaller percentage) a larger percentage of non-supported farmers appear to be engaged in farming on a part-time basis.

Figure 111 shows the relevance of different farm household income sources among supported and non-supported farm households. For all of them, farming appears as the most important source of income and gifts as the least important. One difference, for both supported

and non-supported farmers of the Eastern region in comparison to the Northern region is that “remittances” are considered a more relevant income source than “non-farming” activities. The latter may be reflecting that farm households in the Eastern region being larger and slightly better off may have household members outside their local area who are able to send these remittances. In addition, the fact that “non-farming activities” are left to a third level of importance may be further indicating the great dependence on cash

Figure 113. Number of tool assets per household of supported and non-supported farmers

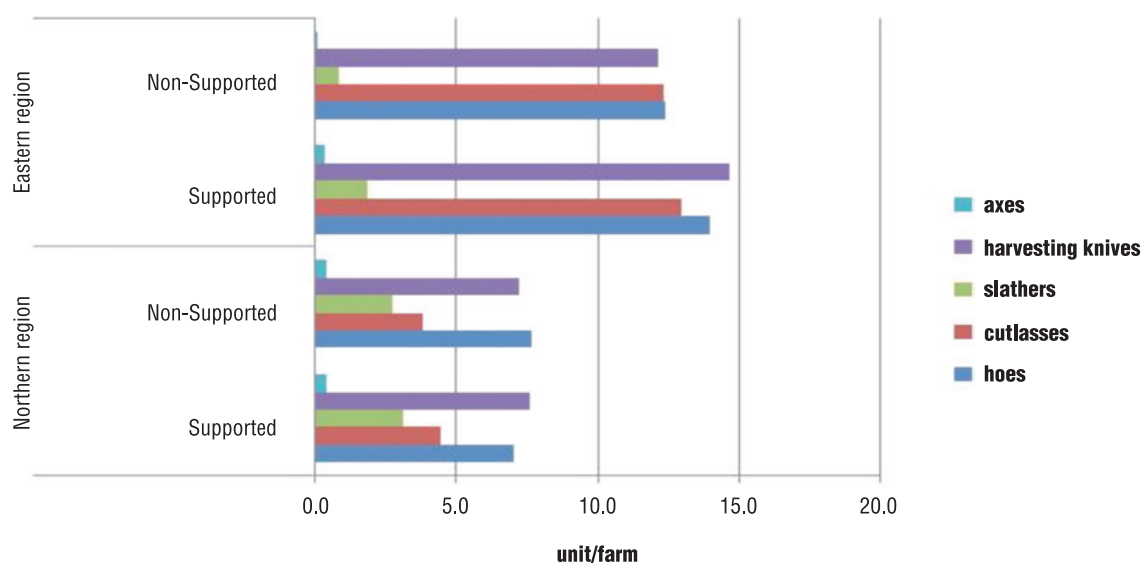
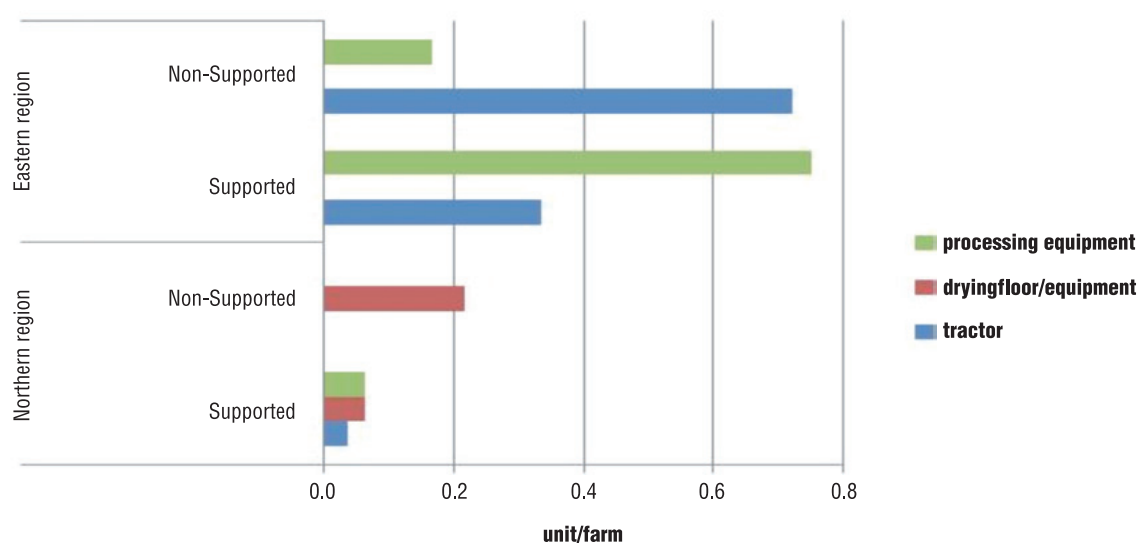


Figure 114. Number of equipment and tractor assets per household of supported and non-supported farmers



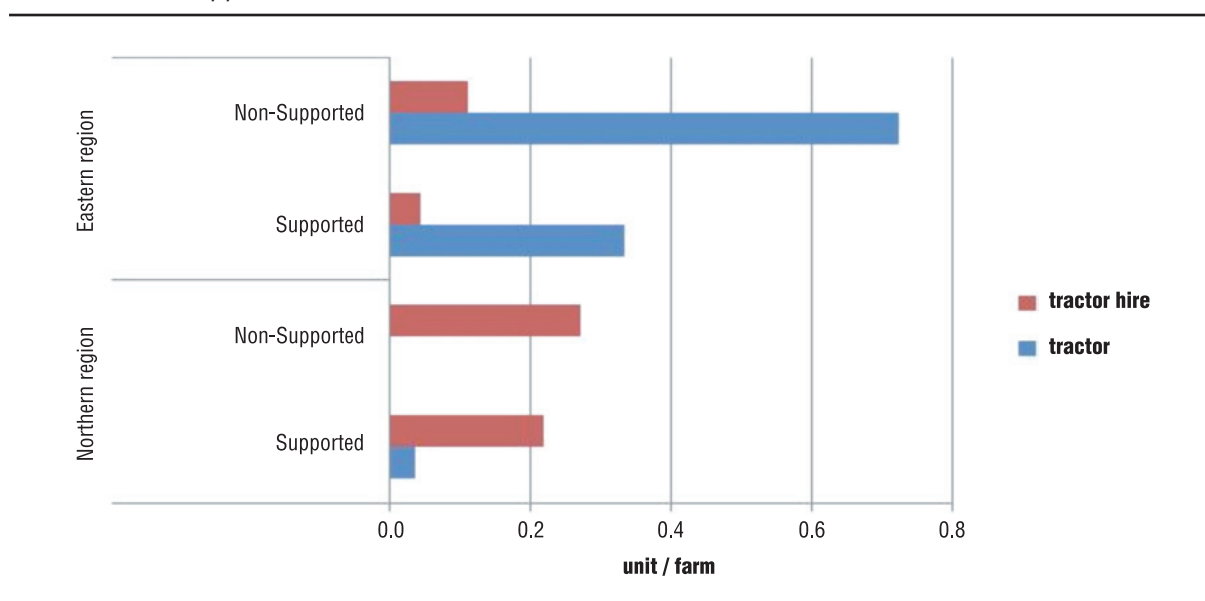
tree crops in this area, which generates higher farm income for households than in the Northern districts for whom other activities such as local petty trade or small-scale manufacturing may be of higher relevance to meet household needs.

Figure 112 suggests that non-supported farmers are also the ones less integrated to cooperative or associative movements in their region. For instance, more than 50% of farmers

in the control group (in both the Northern and Eastern region) were not part of a farming group or association account. This may imply that the targeting strategy of the implementing agencies mainly focused on individuals who are involved in collective actions or organised in groups.

Differences in asset ownership and access to tools and machinery are also relevant between supported and non-supported farmers. The

Figure 115. Number of tractors hired and in possession of the households of supported and non-supported farmers



differences are not so much in terms of relatively accessible hand tools (Figure 113) but mainly concerning heavy machinery such as tractors, drying or processing equipment.

Non-supported farmers in the Eastern districts appear to be better off concerning the use of tractors (Figure 114 and Figure 115). While in the Northern district, the non-supported farmers also appear to have a secure access to drying space and facilities, although this group also depends on tractor hire. In any case, the data suggests that the non-supported group has a relatively stable supply channel of key agricultural assets potentially creating for them a disincentive to participate in participatory/rural development groups or joint initiatives.

To conclude, the selected traits described above illustrate that the STABEX-funded initiatives in the selected Northern and Eastern districts of Sierra Leone mainly focused on smallholders who were for the most part:

- cultivating smaller plots (than the control group),
- associated to an existing cooperative or association and

- highly dependent on farming as the main source of income activity.

Likewise, the supported farmers included a substantial percentage of female headed household and household heads that had an educational achievement slightly above the average of the control group. Regarding assets, the non-supported group of farmers appear to have a relatively good access to agricultural equipment (mainly tractors and processing equipment in the Eastern districts and drying facilities in the Northern districts). It is possible that the latter could be influencing not only their reduced participation in farmer associations but also in the participatory movements organised through the STABEX-funded measures of Action Aid and Welthungerhilfe.

In conclusion, in both the Eastern and in the Northern region the control group appears to be better off than the supported group. However, in the Northern region the difference between the supported and non-supported farmers seem to be lower, and both group are (almost) equally poor. The latter suggests that the slightly improved average NFI of the supported farmers in the North may be attributed to the development initiatives they were involved in.

■ 7 Conclusions

The aim of this study is to analyse the livelihood and prospects of smallholders in Sierra Leone, particularly those who benefitted between 2007 and 2009 from aid financed by the STABEX instrument of the 8th European Development Fund. In Sierra Leone, the majority of farm households (who amounted to approximately 400,000 in 2006 (Jalloh, 2006)) are managing plots which do not exceed 2 cropped hectares.

A sample of 604 farm households was surveyed via face to face interviews. They represent the most vulnerable segment of the country's farming sector which is also the most relevant from the rural poverty-reduction point of view. From the experiences of the STABEX-funded initiatives and the evaluation of survey results, several lessons may be drawn both in terms of aid policy enactment processes and methodological approaches. Evidence from the present Sierra Leone case study illustrates that farm household decisions and resources should be analyzed taking into account the village or chiefdom context. This has implications not only in the survey design, but also in the calculation of smallholders' income and ultimately in the adequate understanding and assessment of the impact of technical assistance programmes.

In this concluding section, key findings and insights will be summarised concerning the following issues: (7.1) the sample and the context in which smallholders in Sierra Leone operate both from an institutional and agronomic point of view, (7.2) the quantitative results in terms of income calculation approaches, poverty level and productivity of surveyed smallholders, (7.3) main achievements of STABEX-funded projects in improving livelihood and food security, (7.4) insights for future technical assistance programmes in Sierra Leone (also applicable to regions under tropical agricultural systems) and (7.5)

methodological lessons for analysing rural farm household performance in developing countries.

7.1 Surveyed Smallholders, Agrarian System and Institutional Background

Primary data was collected through surveys and enriched with available secondary data from statistics and technical literature review. The survey addressed 604 smallholders from selected districts located in the Northern and Eastern regions of Sierra Leone where the STABEX-funded projects were implemented by Action Aid and Deutsche Welthungerhilfe, respectively. The sample represents the main agricultural systems in the country that received support from the STABEX, i.e. food crop cultivation (largely rice growers) concentrated in the Northern region, and cash tree cropping (i.e. coffee and cocoa) in the Eastern region. Table 34 provides a summary of the main differences between farm households in the two regions in terms of average plot and household size, crop mix, market orientation, yields and reliance on different income sources.

Despite the dissimilarities highlighted in Table 34 between the two regions, smallholders in Sierra Leone are generally embedded in a system of *slash and burn* (or *shifting cultivation*) for most of their food cropping; which in the light of decreasing idle/fallow periods and increasing population becomes progressively unsustainable. The latter is due to the markedly declining of idle periods which are needed for forest regeneration, and renewing fertility – being at levels between 4 and 7 years from the original 25-30 year. Consequently, the soil fertility is only partially restored, inducing decrease in crops yields.

On the whole, the production technology and agrarian system of smallholders in Sierra

Table 34. Basic Comparison of smallholders in the surveyed Northern and Eastern regions of Sierra Leone

Northern region: Tonkolili and Bombali districts	Eastern region: Kenema, Kono and Kailahun districts
Factors of production:	
Smaller cultivated area	Larger cultivated area
Crop orientation: mainly rice and hardly any cash tree crops	Crop orientation: mainly cash tree crops (coffee, cocoa)
Production (rice):	
Lower yields	Higher yields
Higher losses	Lower losses
Limited cash income	
Higher reliance on secondary off-farm activities than on remittances	Lower reliance on secondary off-farm activities than on remittances

Sierra Leone is deficient. Based on our survey, under current technology and farming conditions, an average of 3 acres in the uplands and 2 acres in the lowland (IVS) per person would be needed in order to fulfil the basic dietary requirement; however, only around 1-2 acres/person is available on average. This implies that production technology and *shifting cultivation* system must be altered so that not only yields are increased sufficiently to maintain the present (and future) household population, but that resources (mainly land under cultivation or idle/fallow and forests) are managed in a sustainable manner. The national development plan NSADP (2009) favours permanent cropping systems as a way to overcome the current situation and preserve forest cover. The latter could also be ideally accompanied by a reduction of output losses both at pre- and post-harvest periods. However, the introduction of a new agrarian system in Sierra Leone is not straightforward (as will be further explained in section 7.5). For instance, if permanent cultivation is promoted, not only a timely supply of (mainly imported) inputs (fertilizers, machinery, fuel) must be ensured to a large number of smallholders dispersed in remote areas but also adequate training must be provided. This translates into higher dependence on international markets and agricultural research which is at present not sufficiently focused on the needs of tropical agricultural systems (Pingali, 2007). Thus, specific challenges

must be addressed. For instance, regarding the use of chemical fertilizers and improved seeds effective schooling is essential in order to reduce land pollution/degradation in the case of the former and achieve higher yields for the latter. The impact of introducing new equipment or machinery is also not entirely unambiguous as it could either release labour to the off-farm sector or/and increase the rate of deforestation (i.e. Jevons paradox or effect). However, machinery could be a solution to harvest losses due to labour shortages in peak periods. It will be necessary to review in further detail how the labour requirements of a permanent cultivation system will be fulfilled. In fact, it is rather the number of family members that determine the size of the cultivated area than the actual total land area available to the family (Sesay, *et al*, 2004). Anyhow, although the survey at hand was not meant to address the issue of mechanisation, it is clearly of the utmost importance to the future development of the agricultural sector in Sierra Leone, West Africa and most tropical agricultural systems under shifting cultivation.

Another similarity in agrarian systems of both surveyed regions (and for the rest of Sierra Leone as well) is that only the most basic agricultural equipment and tools (e.g. hand-hoe) are available and transport infrastructure is considered largely inadequate. Also, it is common for farmers within villages to organise

labour groups in order to look after the different plots (especially for labour intensive rice production and during the harvesting period of coffee and cocoa). Smallholders maintain strong bonds at the village level which allow them to secure access to other inputs such as seeds. The exchange of the above mentioned inputs is based on the notion of reciprocity. As explained by Ellis (2000) “reciprocity may involve social norms of sharing and redistribution which are designed to ensure that all members of the community survive irrespective of the year to year productive performance of individual households”. Other authors have denominated this behaviour as “the economy of affection” (Hyden, 1980) or “the moral economy” (Scott, 1976)

Another important institutional factor is that farm household land decisions across the country are not entirely independent of the decisions made by their *Paramount Chiefs* (particularly regarding access to land to foreigners or solving land disputes with returnees); however it is common that decisions on crop cultivation is made at the household level⁴⁶. Land market transactions (renting, selling or buying) are therefore strongly reduced by customary rules. Although selling and buying can be said to be non-existent, the option of long term land leasing is slowly becoming more frequent due to government involvement. For instance, the notion that the enlarged farm-household family (including the dead and the unborn) has to be taken into account in land transactions represents a crucial bottleneck. Likewise, the short (1-2 years) time horizon of renting agreements, inhibits renters’ investments in facilities (such as irrigation, drainage, processing constructions, etc.) and in permanent crops (trees), resulting, in the very end, in a crucial limiting factor for growth of land and labour productivity. In this context, where land is not considered to

belong to individuals but rather to the extended families and the village, land markets are largely constrained.

7.2 Income Calculation, Poverty Level and Productivity Analysis

In order to account for the existing socio-economic connections between farm households and their village or chiefdom, two approaches were implemented when estimating smallholders’ agricultural income (off-farm incomes were not accounted for in quantitative terms in this analysis). In the first one, a Neoclassic approach is followed and thus market values are used in order to impute the costs of all inputs employed at the farm level (i.e. household labour, hired labour, seeds, etc.) and non-marketed output. A second approach denominated ‘Peasant Farming’ is followed to explicitly consider that farm households in Sierra Leone are embedded in a village/chiefdom network which allows them to reduce direct and indirect/transaction costs associated to hiring labour or securing access to key inputs such as seeds or tools, as well as the high value strategic function of non-marketed output (to a great extent self-consumed).

Under the Neoclassical approach results are not entirely capturing the inter-farm-household relations and farm net income is unrealistically low. For instance, by ignoring the institutional background, the majority of farmers in the Northern region were deemed unviable to the point that simple reproduction of the farming system would not be even ensured; and thus only the cash croppers in the Eastern districts were considered to a great extent viable. This neoclassical assessment of income and farmer-householder’s behaviour can be highly misleading because it does not account for the fact that farmers in the Northern districts have managed (or rather struggled) to continue cropping year after year, greatly due to the given socio-economic and cultural underpinnings of village life and environment.

46 The head of the family selects the main crops for cultivation (i.e. rice or cash crops) and the wife focuses on food crops around the house (mix of vegetables, root crops, etc), (expert knowledge – Dr. Alpha Lakoh)

Under the Peasant Farming income calculation approach where the chiefdom/village institutional setting is explicitly considered, 86% of the farm households located in the Northern districts were found to be above the reproduction threshold, meaning that they are viable, and only 14% fell below this threshold. In the Eastern districts, 97% of the smallholders were above and only 3% fell below the reproduction threshold. The fact that under both income calculation approaches, smallholders in the Eastern region come out as viable farm households reflects their closer interaction and integration to related tree crop output and labour markets. In the cases of cocoa and coffee, harvested output is not for self-consumption but rather for market sales. Likewise, hiring labour for peak collection periods or post-harvest requires additional support than that of village work sharing schemes. The latter implies that to a certain extent, farm households in the Eastern districts engaged in cash tree cropping are better equipped to act as a separate or self-standing unit of production and are therefore less dependent than farmers in the Northern districts on the village institutional arrangements to secure agricultural production. However, it should be noted, that most of these households are viable by not assigning value to their own labour use, which should be also accounted for under the hypothesis that labour market exists (as is illustrated in the calculation of FNI under the Neoclassic approach).

A poverty level assessment of surveyed farm households is also included in the present report. It should be highlighted that in the poverty analysis only income from farming was taken into consideration. Accordingly, despite the relatively high percentage of farm viability in both regions (97% in the East and 86% in the North), a much lower proportion of farm-household were above the poverty lines. Namely, 37% of farms in the Eastern districts were situated above the Extreme (Food) Poverty Line (i.e. food balance corresponding to 648 079 Leones per year or 160 per year), while in the case of farms in the Northern districts only 1% were situated above the Extreme (Food) Poverty Line.

The apparent contradiction between viability and poverty results is explained as follows. A relatively high percentage of farms are viable, i.e. their net income is higher than the reproduction threshold at the time of the survey, and presumably it will stay the same in the short-medium term. The latter is strongly determined, among other reasons, by the nature of the reproduction threshold considered which illustrates that farmers are able to cover their costs with their (gross) output value. The reproduction threshold in the viability analysis incorporates the constraints of the resource poor environment in which small-holders in Sierra Leone operate. In the Northern region where the reproduction threshold it is set at zero, it is particularly reflecting the limited/non-existent labour market which could provide an alternative to farming. Despite the fact that farm households are to some extent able to sustain their farming activity (as reflected by the viability results), most of farm-household are (food) poor when comparing their agricultural incomes to national poverty lines. In any case, the results indicate that viable farms are able to fulfil a relevant quota (varying among farming systems and regions) of their basic food needs when compared to the Extreme (Food) Poverty Line. Yet, for the purpose of this analysis is relevant to highlight that a modest increase in agricultural productivity could allow farmers to move above the food poverty line.

The results suggest that 60% of surveyed smallholders rely on other sources of income (i.e. non-farm activities, remittances, gifts) to fulfil their basic needs. The percentage of surveyed smallholders claiming to partially rely on off-farm income sources is higher in the Eastern region (68%) than in the Northern region (52%). The latter can be explained in terms of relatively larger household sizes (which gives higher probability of members migrating to urban centres or abroad), opportunities to engage in off-farm activities within the region (i.e. mining, coffee or cocoa collection) and differences in labour use (due to crop specialisation) between farms located in the Eastern region vis-à-vis the Northern region.

Production of food crops such as rice fulfils a strategic role regarding food security objectives at household level. On average, 70 to 80% of rice output is self-consumed by the surveyed farm-households. Food security is a key concept, particularly for those countries/regions where subsistence farming dominates the economy. From a food security perspective, producing not only the main staple crop (e.g. rice, cassava, etc.) but also engaging in value added production (e.g. drying, processing, commercialising) is as relevant as the focus on purely profit-oriented perspective based on cash tree crop cultivation (i.e. cocoa and coffee). In this sense, and in the context of Sierra Leone, rice production, while not necessarily representing the most profitable crop, remains crucial since it provides for the main component of the local diet and helps closing the gap between demand and local production, protecting smallholders from international price volatility. Although smallholders in disbursed supply chains (rice) are exposed to a higher risks of lower returns than those operating in integrated markets (cocoa, coffee)⁴⁷ it is not advisable to entirely substitute rice cultivation because, thanks to the above mentioned on-going village arrangements (e.g. barter and labour exchange), part of self-consumption is guaranteed to most farm households. The latter implies that basic food needs are partially covered. In the case of rice production alone, self-consumption fulfils the requirements of approximately half a year, while the rest of the year households depend on purchases of local or imported rice. Thus, the increase of rice production per farm household would be essential in order to be able to sustain the whole family. Moreover, it is important to consider that concerning the Northern region, the agro-ecology particularly supports rice cultivation (mainly in the lowlands) and cash cropping is also possible for tree crops such as sugar cane and oil palm although not for the traditional export crops of cocoa and coffee, which is more suited to the agro-ecology of the Eastern and Southern part of the

country. At any rate, additional crops to rice could be pursued in the Northern areas (i.e. legumes, vegetables, cassava, citric fruits or plantain)⁴⁸ so that higher diversification could help farmers reduce uncertainty, secure a minimum of self-sufficiency and increase food security. The latter is also supported at Government level where the most recent strategy document on the agricultural sector (NSADP 2009) contemplates not only the above mentioned crop diversification but also agro-industrialisation and commercialisation of output.

7.3 Main Achievements of STABEX – funded projects

It is under the context described in the previous sub-sections that the STABEX funded programmes in Sierra Leone were developed between 2007 and 2009. Their objective has been to increase rural incomes and improve the livelihood of smallholders through improved production and marketing of basic food commodities (rice in the Northern districts) and export commodities (cocoa and coffee in the Eastern districts). This goal is in line with the idea that “in developing countries, 80 percent of the necessary production increases would come from increases in yields and cropping intensity and only 20 percent from expansion of arable land” (FAO, 1999) (in relation to this potential, the current study has showed via survey results that rice production could be increased from current 10 to approximately 30 bushels per acre, as illustrated in section 6.3). Action Aid conducted in the Northern districts activities related to: training, access to seeds, rehabilitation of production facilities (mills, store rooms), improvement of feeder roads, transfer of price information and support to farmer associations.

47 IFAD 2011, Conference on New Directions for Smallholder Agriculture 24-25 January 2011, Rome, IFAD HQ

48 In this respect, cassava given its low nutritional value would not be considered as a primary candidate although the area under cultivation for this particular crop has increased substantially in recent years in Sierra Leone, since the Government supports the production diversification of self-sufficient crops in the country.

In the Eastern districts, Deutsche Welthungerhilfe engaged in similar tasks directed to cocoa and coffee producers but with a higher emphasis on the development of marketing structures, output quality controls, rehabilitation of plantations and promoting access to credit to cooperatives. Contrary to many post war agricultural measures that have been conceived in a top-down framework, with limited/no involvement of farmers and their representatives, most of these activities were conceived and conducted using a participatory approach. Under this approach, awareness, ownership and trust on aid policies are more likely to emerge, thus positively affecting the achievement of overall project objectives.

The qualitative data available in the survey allows for assessing the *relevance*, *effectiveness*, *impact* and *sustainability* of the aid programmes to which smallholders had access. In addition, the survey provided information on the perceived *General Improvement in the Community Area*. In terms of *relevance* (or perceived adequacy) of the support received to the farmer-householder's needs, smallholders considered it was very low in general (and only Action Aid received slightly higher positive feedback). The evaluation of *effectiveness* entailed measuring how far the specific objectives of the projects implemented have been met from the point of view of farm household beneficiaries. However, when evaluating the level of improvement in production and income resulting from their interaction with the implementing agencies, most respondents reported some improvement, and especially a great improvement was perceived by 20% of the smallholders in the Northern region. Regarding the measures with the highest *impact* on food security and livelihood at the household level there were discrepancies between smallholders from the Northern and Eastern regions. In the Eastern region, the improvement of market access was deemed the most important to achieve food security. In the Northern region higher impact to improving food security is associated to staple food prices, cultivated area and food production. Unlike the Eastern districts, access to markets

is in the Northern districts deemed to have less of an impact; which makes sense given that in the Northern region there is limited presence of cash crops. *Sustainability* can only be evaluated several years after implementation of the projects. Consequently, smallholders were asked about expected future sustainability of project components. Around 80% of respondents in the Eastern region and 50% of respondents in the Northern region perceived that the initiatives that were provided to them will serve to their long term benefit. Concerning the answers to *General Improvement in the Community Area* with respect to different development areas, the respondents perceived some enhancement in food security and the opportunities to sell farm produce (which were specifically targeted by STABEX). However, areas such as education, health care, provision of agricultural services and opportunities to buy fertilizers appear to have worsened from the point of view of targeted smallholders.

Overall, one issue worthwhile exploring is related to aid programmes undertaken at village level since smallholders appear to work in a collaborative manner and many resources are shared. In this manner it would be necessary to identify the type of common assets and strategies which could benefit the majority of smallholders within their communities; for example: feeder roads, market information, cooperatives (e.g. Agro-Business Centres) to gain access to key inputs, including credit. Accordingly, aid should come in a format which not only supports yield increase but also guarantees food security in a more comprehensive manner and connects farm households to market opportunities. For this it is necessary to take into account the socio-economic and cultural context of farm households while considering potential constraints specific to crop orientation. In the Eastern districts both cash tree crops and food crops play an important role in achieving food security objectives; while in the North, where the cultivation of cocoa and coffee is not advisable due to agro-ecological constraints (lower rainfall gradient inducing lower and highly variable yields), farm households

need to undertake complimentary activities which could include cash crops such as sugar cane, oil palm and/or citrus. Equally they should attempt to improve on their off-farm value added activities, which are in line with the Government development strategy for the rural areas of Sierra Leone. In this respect, it is central to underline that on one hand the cultivation of the most frequently exported cash tree crops which are coffee and cocoa cannot be spread to all regions, while on the other hand, staple cropping plays an important role in reducing food consumption uncertainties and increase food security.

7.4 Insights for Technical Assistance

Insights or future technical assistance programmes in Sierra Leone are discussed in this sub-section. Ideas expressed in this sub-section may be relevant also for EU food aid policy in West Africa in general, or other areas under tropical agriculture. Three main aspects are considered and are discussed in detail: (i) reduction of crop production losses & enhancement to access to improved technology, services and inputs; (ii) support to off-farm income activities and (iii) explore alternatives to the current agrarian system and fostering of market integration.

Reduction of pre- and post-harvest losses & enhancement of smallholders' access to improved technology, services and inputs

Given the high percentages of output loss in both food and tree cropping, one approach would be to continue with supporting yield enhancing measures under the current shift cultivation system. Although, it should be acknowledged that the sustainability of such an agrarian system is questionable both in Sierra Leone and other tropical agricultural areas worldwide. Moreover, smallholders could be involved in more specific measures aiming at yield increase, pest control, labour saving technologies, and increase investment into research and extension service especially for rice and coffee/cocoa production.

Provision and access to harvesting machinery, storage capacity, processing equipments would also help to reduce post-harvest losses.

Support to off-farm income activities

Sustainability of smallholders in Sierra Leone depends on other income sources. Family members who work outside and send remittances constitute a critical source for farm household subsistence. Likewise, integration to other business sectors in the rural areas could also be considered (i.e. fishing, mining and/or sustainable forest management⁴⁹, which could also serve as an alternative to deter the ongoing deregulated forest exploitation observed during the project team's validation visit in 2009). It would be relevant to analyse available diversification strategies both in terms of inter-cropping mechanism and inter-village trade or low scale manufacturing (i.e. crafting).

Explore alternatives to the current agrarian system and fostering of market integration

Although income calculations under the Peasant Farming approach indicate that a significant part of the surveyed farms are viable in the specific context of the village or chiefdom, sustainability in the long run is questionable under the current agrarian system in Sierra Leone. Therefore it is crucial to explore alternatives to the current system and the integration of smallholders to different markets. However, it should be stated that large capital-intensive estates is not the only route which may be taken in paths of agrarian change; an alternative is the transition from (semi)subsistence peasant farming to more commercial oriented family farming in a context of fully developed input and output markets (Friedmann, 1980 in Ellis 1993, p 54). However, a most important consideration is that of effective agronomic alternatives to the current *slash and burn* system as well as the way in which farmers

49 For more on the economics of tropical deforestation refer to Barbier and Burgess (2001) and/or Cattaneo (2001)

may actually benefit from market interaction. The review of the literature concerning these issues indicates several technical alternatives which require a more detailed evaluation from a socio-economic point of view (Cornell *et al.*, 2007). Although the socio-economic assessment of technology and agronomic issues escapes the scope of the present report, agronomic practices that are seen as relevant to address the challenges in Sierra Leone are briefly discussed. Some experts argue for the benefits of “conservation agriculture” which consists in *a series of techniques aiming at minimise soil disturbance via maximising year round soil cover (with residue from previous crops or a cover crop), minimising hoeing / tilling, and rotating crops to discourage pests, and improve soil health (soil structure)*⁵⁰. Another approach in seeing the future of *slash and burn* consists in preventing its decline by creating a *financial value for the carbon stored in forests, through offering incentives for developing countries to reduce emissions from forested lands and invest in low carbon paths to sustainable development*⁵¹. From this perspective, agro-forestry practices could also be included in order to support large populations who harvest fruit, leaves, bark, gums and resins leaving the forest structure more or less intact (*ibid*). In addition, trees provide multiple benefits such as nitrogen fixing, mulching, fodder, fuel wood, food, medicines, among other uses which can serve to diversify the income sources of (semi)subsistence farming. In this respect, it is also highlighted by the author the crucial importance of communities having entitlement and benefiting from the management of their natural resources, so that they become the key custodians thus ensuring sustainable exploitation practices. Other authors (Egashira *et al.*, 2006) argue for *slash and mulch* as a technique to prevent soil from degradation (so common under slash

and burn practices). According to the authors, putting sufficient amounts of fallen tree leaves mixed with livestock excretions on the top of soil, followed by a cover of weeds, rice straws and maize stalks, activates small animals and microorganisms in soil hence improving soil structure and soil fertility status suitable for crop production. Ultimately, enrichment of organic matter in the soils increases the water holding capacity in the ground.

According to Cornell *et al.* (2007) alternatives to the slash and burn system may be clustered into three groups:

- (i) Poverty alleviation alternative. Consists in providing jobs, incomes, and social services to growing populations; specifically, orienting poor people to relocate off farming and/or out of the forested areas (i.e. offering livelihood possibilities others than shifting cultivation).
- (ii) Improving productivity and subsequently economic returns on cultivated land under slash and burn systems; the objective is to limit the growth of the area under shifting cultivation. Methods include use of improved seeds, increased use of fertilizers both minerals and manure. Concerning fertilizers, while the first is difficult to realise since it implies increasing imports, the second might be a more sustainable alternative once cattle species adapted to local environment (trypanosome-tolerant) are introduced, supported and widespread.
- (iii) To increase the area devoted to modern, intensive farming, thus producing enough food to feed growing populations. It should be noted however that the mechanisation requirements (e.g. due to the high density of multi-cropping and/or agro-forestry) may not be possible or sustainable at all in the tropics. Therefore this alternative may only be partially applied.

50 Theo Dillaha Program Director of the SANREM CRSP and Professor of Biological Systems Engineering at Virginia Tech in <http://www.ourfutureplanet.org/news/331>

51 Yemi Katerere, Head of the UN-REDD Programme in <http://www.ourfutureplanet.org/news/331>

7.5 Methodological Lessons and Insights for further Analysis

The provision of data is, in practice, the most fundamental problem facing the development of statistics on the income and wealth of agricultural households (Wye Group Handbook, 2007). In the case of low income countries, particularly in Africa, the adequate collection of farm household data is crucial not only to address aid efficiency but to further understand the key determinants to improve smallholders' livelihoods. Therefore, there is urgency in securing better statistics for rural areas, villages and farm households' incomes which need to capture income sources outside agriculture as well. In this respect, the survey designed for the assessment of STABEX-funded projects can shed some light on potential improvements both in terms of data measurement techniques of key variables and in assessing the interconnections of farm households with their immediate chiefdom or village context.

There are specific challenges related to the data collection and measurement processes in West Africa which are well reflected in the Sierra Leone experience. These challenges, as argued by Ellis (2000), are mainly due to the complex interrelationships between farm households' assets, access to inputs, and activities. Moreover, understanding the nature of a reciprocal economy (as that of the villages surveyed in the context of Sierra Leone) is also particularly troublesome (see section 7.1). Clearly, as Ellis (ibid) emphasises, it is difficult to conduct data collection which allows for an accurate reflection of (semi) subsistence farmers' reality, which is in the same time timely and cost effective, especially when the transactions between farm households and the rest of its immediate community are obscured in non-monetary transactions.

One relevant issue thus concerns that of income measurement at the farm level. On one hand, it is difficult to impute value to self-consumption; on the other hand, there is the question of how to calculate opportunity cost in

absence of functioning markets, particularly when it comes to household labour use and decisions. Equally, there are problems in the accounting in monetary terms for village labour sharing schemes which entail socialising labour to an uncertain degree. Overall, the main limitation in income calculation rises from the fact that incomes are usually derived from spatially dispersed sources and self-employment activities in which personal income and business cash flow are inextricably woven together (Ellis 2000). It is in this last issue where one of the main limitations of the survey, due to budget constraints, was encountered as basically data on different off-farm sources was not quantified and only the relative importance of different sources was captured. As a consequence, it is impossible to analyze whether diversification (beyond that of agricultural activity) is in fact an effective livelihood strategies for the surveyed smallholders. As stated by Ellis (2000) it is important to know the real rather than the hypothesised activity portfolios of poor rural people, and how these are changing over time, so that support can be provided that facilitates and strengthens emerging, rather than declining patterns of activities (timeliness). It is also useful to know in a particular location how poor people's livelihood strategies differ from those of the better off. From Ellis (2000) viewpoint, diversification is likely to have an equalising effect on rural incomes. In principle, diversification could contribute to the reduction of risk, of seasonality, credit market failures etc.

Equally, the collection of data should be performed at the farm household and the village or chiefdom level. The main objective of this approach is not only to capture reciprocal behaviour between farm households but to evaluate the impact of *Paramount Chief's* decisions on relevant aspects mainly agricultural but also social. For instance, according to Ellis (2000) education and skills are shown to be critical factors distinguishing the livelihood strategy options of the poor from those of the rural better off. However, rural social relations, institutions and governance at local levels play key role in

determining the differential success of individuals and households in securing viable livelihoods that can provide higher material standards of living. Concerning agricultural aspects, it has been already explained that it is the *Paramount Chief* who solves land disputes, assigns lands to new or foreign claimants and in the cases of certain families may even organises land rotation and allocate plots to farm households. This implies that as land is rotated every one or two years, plot sizes cultivated by each farm household may vary regarding situation and crop orientation and mixes. This also indicates that property rights and the necessary mechanisms to access credit are not in place, thus limiting smallholders' possibility of investing. Ultimately, a major improvement in future surveys lies in distinguishing key players in the decision-making process regarding agricultural production as well as a deeper understanding of the institutional background. Also, it would be interesting to analyze whether the *Paramount Chief* has

influence in other off farm economic activities, such as petty trade or small scale manufacturing.

Ellis (2000) argues that field methods aimed at investigating rural poverty may be improved by combining sample surveys with participatory approaches such as the Participatory Rural Appraisal (PRA). Other participatory approaches include the Community Development Approach (CDA) promoted by the World Bank. While the principal strength of the sample survey is its capacity to yield detailed quantitative information at a household/individual level, PRA or CDA may allow capturing some of the complexity involving farm-household relations and their immediate socio-economic and institutional environment.

By explicitly considering these issues in the elaboration of farm household surveys, the analysis of income generation and production practices could be substantially enhanced, mainly for the contexts of agro-forestry systems in West Africa.

■ 8 References

Action Aid International Sierra Leone (2008) *Baseline survey report, Use of STABEX transfers project SL/ RFMO/2006/002*.

ActionAid International Sierra Leone (2009) *Annual Report*. <http://www.actionaid.org/assets/pdf/ActionAid-Annual-Report-2009-web.pdf>.

Barbier, E.B. and Burgess, J.C. (2001) The Economics of Deforestation *Journal of Economic Surveys* Vol. 15 No. 3 pp 413 - 433.

Becker, M., and Johnson D. E. (2001) Cropping intensity effects on upland rice yield and sustainability in West Africa, *Nutrient Cycling in Agro ecosystems* Vol. 59 pp 107–117.

Bernard Tinker, P., Ingram J.S.I. and Struew, S. (1996) Effects of slash-and-burn agriculture and deforestation on climate *Agriculture, Ecosystems & Environment* Vol 58 Issue 1 pp 13 -22.

Boadway, R. (2006): Principles of Cost-Benefit Analysis *Public Policy Review*, Vol.2, No.1 2006.

Canali, M. and Slaviero, F. (2010) *Food in security and risk management of smallholder farming systems in Ethiopia*. 9th European IFSA Symposium, 4-7 July 2010, Vienna.

Cattaneo, A. (2001) Deforestation in the Brazilian Amazon: Comparing the Impacts of Macroeconomic Shocks, Land Tenure, and Technological Change. *Land Economics* May 2011 77 (2) pp 219-240.

Chayanov, A.V. (1966) *The Theory of Peasant Economy* (translated from Russian and German editions published in 1920) Homewood, Illinois.

Cherif M., Audebert A., Fofana M. and Zouzou M. (2009) *Evaluation of iron toxicity on lowland irrigated rice in West Africa*, Tropicultura, CTB/BTC, KAOW/ARSOM, Belgium, Vol. 27 n°2, <http://www.bib.fsagx.ac.be/tropicultura/text/v27n2.pdf> Accessed on 10/12/2009.

Chibnik, M. (1978) Value of Subsistence Production, *Journal of Anthropological Research*, Vol 34, No. 4, p 561-576 1978. <http://www.jstor.org/pss/3629650>.

Coelli TJ and Prasada Rao DS (2005) Total factor productivity growth in agriculture: a Malmquist index analysis of 93 countries. 1980-2000. *Agricultural Economics* Vol 32 No1 pp115-134.

Colman, D. and Young, T. (1989) *Principles of Agricultural Economics. Markets and Prices in Less Developed Countries*. Cambridge University Press.

Cornell, J.D. and Miller, M. “*Slash and burn*” Encyclopedia of Earth. Eds. Cutler J. C. Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment First published in the Encyclopedia of Earth January 31, 2007 http://www.eoearth.org/article/Slash_and_burn.

Crowley, E.L. (1997) *Rapid data collection using wealth ranking and other techniques*. International Centre for Research Agro forestry (ICRAF) Nairobi, Kenya, 16 p.

CSAO/OCDE (2007), *Foncier, transformation de l'agriculture et conflits en Afrique de l'Ouest: enjeux régionaux soulevés par les cas de la Sierra Leone, du Liberia et de la Côte d'Ivoire*, Revue historique SAH/D(2007)568 Paris <http://www.oecd.org/dataoecd/44/54/39496045.pdf> Accessed on the 11/12/09.

CSP (2007) *Country Strategy Paper* Government of Sierra Leone, GoSL.

CWIQ (2007) *Core welfare indicator questionnaire survey, Final Statistical Report* Department for International Development, Government of Sierra Leone <http://www.statistics.sl/CWIQ%20Report.pdf>.

Dasgupta, P., Stephen M. and Sen, A. (1972), *Guidelines for Project Evaluation* New York: UNIDO.

De Rouw, A. (1995) The fallow period as a weed-break in shifting cultivation (tropical wet forests) *Agriculture, Ecosystems & Environment* Vol. 54, 1-2, June pp 31-43 1995.

Dufumier, M. (1996) *Les projets de développement agricole, manuel d'expertise*, Karthala.

EC European Commission (2010) *Families of Evaluation Criteria* http://ec.europa.eu/europeaid/evaluation/methodology/methods/mth_ccr_en.htm.

EC European Commission (2010), *Food Facility: Interim report on Measures Taken* COM (2010)81 http://ec.europa.eu/development/icenter/repository/1_EN_ACT_part1_v1%5B1%5D.pdf.

EDS Enterprise Development Services (2009) *Economics of Rice Production in Sierra Leone*. Funded by the Soros Economic Development Fund.

Ellis, F 1993 *Peasant Economics. Farm households and agrarian development*. Second edition. Book, p.309 Oxford University Press.

Ellis, F. 2000 *Rural Livelihoods and Diversity in Developing Countries*. Book p. 273 Cambridge University Press.

Egashira K., Gusmao MNA and Kurosawa K. (2006) The Present and Future Land Management in East Timor-from "Slush and Burn" to "Slush and Mulch." *Journal Faculty of Agriculture of Kyushu University* Vol. 51 No. 2 pp 367-372.

FAO Food and Agriculture Organization (1996) *Sierra Leone country report to the FAO International conference on plant genetic resource*, Leipzig. Department of Agriculture and Forestry, Freetown, June 1995 www.fao.org/ag/AGP/agps/Pgrfa/pdf/SIERRALE.PDF. Rome, Italy.

FAO Food and Agriculture Organization (1999) *Guidelines for Agrarian Systems Diagnosis* <http://www.fao.org/sd/LTdirect/LTre0010.htm>. Rome, Italy.

FAO Food and Agriculture Organization (2003) *Vulnerability Assessment Report 2003*. Rome, Italy.

FAO Food and Agriculture Organization (2004) *Proceedings of the FAO Rice Conference, Rice is life, International rice commission newsletter, Special edition*, Vol. 53 <http://www.fao.org/docrep/008/y5682e/y5682e0d.htm> Accessed on the 04/05/10. Rome, Italy.

FAO Food and Agriculture Organization (2005) FAO information system on water and agriculture *Irrigation in Africa in figures* – AQUASTAT Survey 2005, FAO Water report n°29 (Frenken, K. ed.) FAO Land and Water Development Division http://www.fao.org/nr/water/aquastat/countries/sierra_leone/sierraleone_cp.pdf. Rome, Italy.

FAO (2009) *How to feed the World in 2050* Rome, Italy.

FAO Food and Agriculture Organization *Statistical Database (FAOSTAT)* <http://faostat.fao.org> Accessed in 2009, 2010 and 2011. Rome, Italy.

Fanthorpe (1998) Locating the Politics of Sierra Leonean Chiefdom. *Africa*, Vol. 68, No 4, 1998 pp 558 – 83.

Fagnäs, S. and Wallace, L. (2007) *Determinants of Poverty in Sierra Leone 2003* ESAU Working Paper 19 Overseas Development Institute London.

Frankema, E. (2010) The Colonial Roots of Land Inequality: Geography, Factor Endowments, or Institutions? *Economic History Review* Vol 63 No.2 pp 418 - 451.

Gomez y Paloma, S. Cristoiu, A. Delgado Sancho, L. Segré, A. Canali, M., Vrolijk, H. Bratka, V. Csátri, K.E., Dambina, L., Darasteanu, C. Fitt, J., Goraj, L., Hanibal, J., Medonos, T., Keszthelyi, S., Osuch, D., Rusu, M., Skulimowski, A., van der Eerden, L. (2006) *Prospects for the Agricultural Income of European Farming Systems*. EC-JRC-IPTS Technical Report, EUR 22506 EN <http://ftp.jrc.es/EURdoc/eur22506en.pdf>.

German. L., Schoneveld, G., Skutch M., Andriani R., Obidzinski, K. and Pacheco, P. with Komarudin H., Andrianto A., Lima, M. and Dayang Norwana AAB (2010) The local social and environmental impacts of biofuel feedstock expansion: A synthesis of case studies from Asia, Africa and Latin America. Info Brief No. 34, December 2010. The Center for International Forestry Research (CIFOR) Indonesia.

GoSL Government of Sierra Leone (2005a) *Poverty reduction strategy paper (2005 – 2007)* <http://planipolis.iiep.unesco.org/upload/Sierra%20Leone/PRSP/Sierra%20Leone%20PRSP2005.pdf>.

GoSL Government of Sierra Leone (2005b) *Food Security and Nutrition Survey Sierra Leone*.

GoSL Government of Sierra Leone (2006) *Vision 2025 Sierra Leone*.

GoSL Government of Sierra Leone (2008) *Annual Statistical Digests 2005/2006* <http://www.statistics.sl/FINAL%20DIGEST%202006.pdf>.

GoSL Government of Sierra Leone (2009) *Use of STABEX Transfers Project Coordination Unit, European Union Delegation of the European Commission (2009) USTP Component one: Support to cash crop production, Completion report, Use of STABEX transfers project in Sierra Leone, Technical assistance to the Ministry of Agriculture, Forestry and Food Security for the Management of STABEX funds SL/ RFMO/2006/001*.

GoSL and EC Government of Sierra Leone and the European Community (2009): *Country strategy paper and national indicative programme for the period 2008-2013* http://ec.europa.eu/development/icenter/repository/scanned_sl_csp10_en.pdf Accessed on 12/12/2009.

Grigg (1974) *The Agricultural Systems of the World*. Cambridge Press.

Hyden, G. (1980) *Beyond Ujamaa in Tanzania: Underdevelopment and an Uncaptured Peasantry*. London: Heinemann.

Howe, P. and Devreux S. (2004): Famine Intensity and Magnitude Scales: A Proposal for an Instrumental Definition of Famine *Disasters* Vol 28 No. 4 pp. 353–372 2004.

IFAD International Fund for Agricultural Development (2006) *Rural Finance and Community Improvement Programme (RFCIP)*.

IFPRI International Food Policy Research Institute (2006) *Regional strategic alternatives for agriculture-led growth and poverty reduction in West Africa*. Washington, DC.

IFPRI International Food Policy Research Institute (2009) *Rebuilding after Emergency Revamping Agricultural Research in Sierra Leone after Civil War*. IFPRI Discussion Paper 00869 May 2009.

IMF International Monetary Fund (2008) *Sierra Leone Poverty Reduction Strategy Paper - Progress Report*, Country report No. 08/250. <http://www.imf.org/external/pubs/ft/scr/2008/cr08250.pdf>.

IMF International Monetary Fund (2009) *Sierra Leone: 2008 Article IV Consultation, Third review under the three-year arrangement under the poverty reduction and growth facility, financing assurances review, and requests for waivers of non-observance of performance criteria, augmentation of access, and modification of performance criterion - Staff Report* Country report No. 09/2. <http://www.imf.org/external/pubs/ft/scr/2009/cr0902.pdf>.

ILO International Labour Organization (1993) *Resolutions Concerning Statistics of Employment in the Informal Sector* 15th International Conference of Labour Statisticians <http://www.ilo.org/public/english/bureau/stat/download/res/infsec.pdf>.

IRRI International Rice Research Institute (1982) *An overview of Upland Rice Research* Proceedings of the 1982 Bouaké Ivory Coast Upland Rice Workshop.

Jacobs, R., Smith, P.C. and Street, A. (2006) *Measuring Efficiency in Health Care, Analytic Techniques and Health Policy*. Cambridge University Press.

Jalloh (2006) *Country Study: Sierra Leone. re for Agricultural and Rural cooperation* CTA July 2006. Project 4-7-41-2007/5b.

Kumbhakar, S. C. and Knox Lovell, C.A. (2000) *Stochastic Frontier Analysis*. Cambridge University Press.

Little, I. and Mirrlees J. (1974) *Project Appraisal and Planning for Developing Countries* New York.

Martin, L.R.(ed.) (1992). A Survey of Agricultural Economics Literature. Vol.4 of *Agriculture in Economic Development, 1940s to 1990s* Minneapolis, Minnesota: University of Minnesota Press.

MAFFS Ministry of Agriculture, Forestry & Food Security in Sierra Leone (2007) *The Food Security Policy for Sierra Leone*.

MAFFS Ministry of Agriculture, Forestry & Food Security in Sierra Leone (2001) *Special Programme for Food Security 2001*.

MAFFS Ministry of Agriculture, Forestry & Food Security in Sierra Leone (2009a) CAADP/NSADP Compact Process <http://www.maffs.gov.sl/AgricultureandMacroeconomy/tabid/67/Default.aspx>.

MAFFS Ministry of Agriculture, Forestry & Food Security in Sierra Leone (2009b) 'Planning, Evaluation, Monitoring and Statistics Division', *Agricultural statistics bulletin*, Volume 1 <http://www.agriculture.gov.sl/PlanningMonitoringEvaluation/TheSystem/tabid/111/Default.aspx> Accessed on 10/12/09.

MAFFS Ministry of Agriculture, Forestry & Food Security in Sierra Leone (2009c) *The Situation of crop post harvest losses in Sierra Leone and the way forward* <http://www.agriculture.gov.sl/DocumentsandReports/SectorNews/abid/57/ctl/ArticleView/mid/384/articleId/53/The-Situation-of-Crop-Post-Harvest-Losses-in-Sierra-Leone-and-the-Way-Forward.aspx>.

MAFFS and MFMR Ministry of Agriculture, Forestry & Food Security and Ministry of Fishery and Marine Resources in Sierra Leone (2004) *Agricultural sector review and agricultural development strategy*, Volume I, Main report <http://www.agriculture.gov.sl/AgriculturalSectorReview/tabid/125/Default.aspx>.

MAFFS, WFP, UNDP, UNICEF, WHO, FAO Ministry of Agriculture, Forestry & Food Security in Sierra Leone, World Food Programme, United National Development Program, World Health Organization, Food and Agriculture Organization (2005) Statistics related to food crop reduction 2005 *Vulnerability analysis and mapping report* <http://www.agriculture.gov.sl/LinkClick.aspx?fileticket=XflmVbprPxs%3d&tabid=96&mid=460>.

MAFFS, WFP, UNDP, UNICEF, WHO, FAO Ministry of Agriculture, Forestry & Food Security in Sierra Leone, World Food Programme, United National Development Program, World Health Organization, Food and Agriculture Organization (2006) *Food Security, Farm Production, Health and Nutrition Survey*.

MANR&F Ministry of Agriculture, Natural Resources and Forestry (1996) *Statistics* GoSL Government of Sierra Leone.

Mazoyer, M. (1981) Origins and mechanisms of reproduction of the regional discrepancies in agricultural development in Europe. *European Review of Agricultural Economics* Vol 8 pp 177 - 191.

Mazoyer, M. (2001) *"Protecting Small Farmers and the rural Poor in the Context of Globalization"* Commissioned Paper, Food and Agriculture Organization, Rome.

Mazoyer, M. and Roudart, L. (2006) *A History of World Agriculture: From the Neolithic Age to the Current Crisis*. Monthly Review Press. New York pp 528. First Published (French) 1997.

Moreau P., F. Mabon, T. Rimbault, L. Ruiz, P. Durand, L. Delaby, Vertès F. (2011) Reconciling technical, economic and environmental efficiency of farming systems in vulnerable areas. *Agr. Ecosyst. Environ.*, doi:10.1016/j.agee.2011.06.005.

Ministry of Finance Government of Sierra Leone (2007) *Prospects for the Poor in the Face of National Agriculture Reforms: A Poverty & Social Impact Analysis of Changes to Agricultural Policy in Sierra Leone*. Economic Policy and Research Unit. May 2007.

Ministry of Health and Sanitation (2007) *National operational handbook for primary health care in Sierra Leone*.

National Authorising Office (2007) *Use of STABEX transfers in Sierra Leone, Support to rice production, Guidelines for grant applicants responding to the call for proposals for 2007-2008 STABEX/CFP/2*.

NRDS (2009) *National Rice Development Strategy* Government of Sierra Leone http://www.jica.go.jp/english/operations/thematic_issues/agricultural/pdf/sierraleone_en.pdf.

NRS (2002) *National Recovery Strategy* Government of Sierra Leone.

NSADP (2009) *National Sustainable Agriculture Development Plan 2010-2030* GoSL Government of Sierra Leone http://typo3.fao.org/fileadmin/user_upload/fsn/docs/NSADP_CAADP_discussion_paper_for_Compact_double_sided.pdf.

Nyoka, G.C. (1982) The influence of fallow period on weed vegetation and rice yields in Sierra Leone, *International Journal of Pest Management*, Vol 28, No.1, pp 1-9.

Oakland Institute (2011) *Understanding Land Investment in Deals in Africa, Country Report: Sierra Leone*. Mousseau, F. and Sosnoff, G (Eds.) Oakland, USA.

OECD and Europe Aid (2010) *DAC Criteria for Evaluating Development Assistance* http://www.oecd.org/document/22/0,2340,en_2649_34435_2086550_1_1_1_1,00.html.

Pierre, M., Ruiz, L., Mabon, F., Rimbault, T., Durand, P., Delaby, L., Devienne, S. and Vertès, F. (2011). Reconciling technical, economic and environmental efficiency of farming systems in vulnerable areas. *Agriculture, Ecosystems and Environment* forthcoming.

Pingali P (2007) Will the Gene Revolution reach the poor? – Lessons from the Green Revolution. 7th Manshold Lecture. Wageningen, January 26, 2007.

PRSP (2005) *Poverty Reduction Strategy Paper* 1st and 2nd phases (PRSP, 2005-2007) Government of Sierra Leone.

PRSP (2006) *Interim Poverty Reduction Strategy Paper (I-PRSP)* Government of Sierra Leone.

PRSP (2009) *Poverty reduction strategy paper (PRSP-II) (2008-2012)* Government of Sierra Leone.

Powell JM and Williams TD (1993) An overview of mixed farming systems in sub-Saharan Africa. In: Powell JM, Fernandez-Rivera S Williams TO and Renard C (eds.) *Livestock and Sustainable Nutrient Cycling in Mixed Farming Systems of Sub-Saharan Africa*:1-36.

Raemaekers R. (2001) *Agriculture en Afrique Tropicale*, Direction Générale de la Coopération Internationale, Ministère des Affaires Etrangères, du Commerce extérieur et de la Coopération Internationale, Belgium.

Salazar R (2004) Mission report, Sierra Leone, Section on assessment of the agrarian situation. Unpublished manuscript.

Scott, J.C. (1976) *The Moral Economy of the Peasant*. New Haven. Yale University Press.

Sheriff M. (2008) *MAFFS annual retreat presentation* Njala, Moyamba District on the 15th – 17th December 2008.

SLIHS (2007) *Sierra Leone integrated household survey (SLIHS) 2003/04* Department for International Development, GoSL Government of Sierra Leone http://www.statistics.sl/SLIHS_REPORT.pdf.

Sesay J. (2008) *Synopsis, challenges, potential and vision for agriculture in Sierra Leone with emphasis on rice production*, Minister of Agriculture, Forestry & Food Security of Sierra Leone <http://www.maffs.gov.sl/DocumentsandReports/Sectorrelated/tabid/114/Default.aspx> Accessed on the 11/12/09.

Sesay A., Tejan-Kella M. and Thompson A. (2004) *Agricultural sector, Background review for the PRSP*.

Tittonell, P., A. Muriuki, K.D. Shepherd, D. Mugendi K.C. Kaizzi, J. Okeyo, L. Verchot, R. Coe and B. Vanlauwe (2010) The diversity of rural livelihoods and their influence on soil fertility in agricultural systems of East Africa – A typology of smallholder farms *Agricultural Systems*. Vol 103, No. 2 pp 83 -97.

UN United Nations (2005) *The Millennium Development Goals Report*. <http://www.un.org/en/development/desa/publications/mdg-report-2012.html>.

UN United Nations (2008) *World Population Prospects*. <http://esa.un.org/unpp/>.

UNAIDS United Nation Program on HIV/AIDS (2008) *Report on the global AIDS epidemic* <http://www.unaids.org/en/KnowledgeCentre/HIVData/GlobalReport/2008/default.asp>.

UNDP United Nations Development Program (2007) *Sierra Leone Human Development Report. Empowering Local Government for Sustainable Development and Poverty Reduction*.

UNDP United Nations Development Program (2009) *Sierra Leone human development report*, [on line], http://hdrstats.undp.org/en/countries/country_fact_sheets/cty_fs_SLE.html.

UNICEF United Nations Children's Fund (2008), 'Maternal and newborn health' *The state of the world's children 2009* <http://www.unicef.org/sowc09/report/report.php>.

Unruh, J.D. and Turray, H. (2006), 'Land tenure, food security and investment in postwar Sierra Leone', LSP Working Paper 22 Access to Natural Resources Sub-Programme <ftp://ftp.fao.org/docrep/fao/009/ah243e/ah243e00.pdf>.

van Wessenbeeck C.F.A, Keyzer M. and Nubé M. (2009): Estimation of undernutrition and mean calorie intake in Africa: methodology, findings and implications *International Journal of Health Geographics* Vol 8.

Wang L. (2007). *Education in Sierra Leone: Present Challenges, Future Opportunities*. Washington, DC: World Bank.

Welthungerhilfe (2007) *Welthungerhilfe in Sierra Leone, Current Programs* Wesenbeck.

Welthungerhilfe (2009) Support to Cash Crop (Cocoa/Coffee) Production in the Districts of Kenema, Kailahun and Kono Sierra Leone AF 1498 / SLE 1006-07 European Union: Use of Stabex Transfers, SL/ RFMO/2006/003.

World Bank (2007) *Education in Sierra Leone: present challenges, future opportunities* <http://lnweb90.worldbank.org/ext/epic.nsf/ImportDocs/1EFCA13C76DFBEEF4725749D002F9446?opendocument&query=ID>.

World Bank (2008) *Program Document for a Proposed Grant in the Amount of US\$3 Million to the Republic of Sierra Leone for a Food Crisis Response Development Policy Grant*. Food Price Crisis Response Trust Fund Washington D. C.

World Bank (2009) *Sierra Leone Country Brief and Data Profile, World development indicators database 2009*, <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/SIERRALEONEEXTN/0,,menuPK:367833~pagePK:141132~piPK:141107~theSitePK:367809,00.html>.

World Bank (2010) *World Development Indicators 2010* Washington D.C.

World Health Organization (2009) *World Malaria Report*.
http://www.who.int/malaria/world_malaria_report_2009/en/.

■ 9 Appendices

Appendix I. Questionnaire A

Small farmers household study: Questionnaire A

Name of the farmer:		Name of the enumerator:	
IDENTIFICATION VARIABLES			
To collect information that will enable the identification or location of the household geographically			
Region/Province		Eastern Province	<input type="checkbox"/>
		Northern Province	<input type="checkbox"/>
		Kenema	<input type="checkbox"/>
		Kono	<input type="checkbox"/>
		Kailahun	<input type="checkbox"/>
		Bombali	<input type="checkbox"/>
		Tonkolili	<input type="checkbox"/>
Chiefdom			
Section			
Village			
Household number			

HOUSEHOLD DEMOGRAPHICS Please tell us about the people in your household			
Gender Composition	Sex of Head of household	Male <input type="checkbox"/>	Female <input type="checkbox"/>
	Number of male adults		
	Number of female adults		
	Number of male children		
	Number of female children		
Age Composition	Age of household head		
	Age of spouse		
	Number of Children under 10 yrs		
	Number of children 10-18 yrs		
	Number of dependants above 18 yrs		
Educational Level Please tell us how far you and members of your household went with education	Years of education of head		
	Years of education of spouse		
	Number of children in school		
	Number of children not schooling		
		Fulltime <input type="checkbox"/>	Part time <input type="checkbox"/>
	Head is fulltime farming or part time	<input type="checkbox"/>	<input type="checkbox"/>
	Others members occupation	<input type="checkbox"/>	<input type="checkbox"/>
	Member 1 is fulltime or part-time farmer	<input type="checkbox"/>	<input type="checkbox"/>
	Member 2 is fulltime or part-time farmer	<input type="checkbox"/>	<input type="checkbox"/>
	Member 3 is fulltime or part-time farmer	<input type="checkbox"/>	<input type="checkbox"/>
	Member 4 is fulltime or part-time farmer	<input type="checkbox"/>	<input type="checkbox"/>
	Member 5 is fulltime or part-time farmer	<input type="checkbox"/>	<input type="checkbox"/>
	...	<input type="checkbox"/>	<input type="checkbox"/>
	...	<input type="checkbox"/>	<input type="checkbox"/>
	...	<input type="checkbox"/>	<input type="checkbox"/>
Occupation Of Members We would like to know what you do for a living			

Major Economic Activities		Agriculture	Petty trading	Paid employment	Artisan self employment
Household head	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spouse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sources of Income Where does the family get money for running the household (Multiple answers are allowed)	Farm Proceed	<input type="checkbox"/>			
	Livestock	<input type="checkbox"/>			
	Non-farm activities	<input type="checkbox"/>			
	Remittances from relatives	<input type="checkbox"/>			
	Gifts from friends and relatives	<input type="checkbox"/>			

Most important Source of Income Can you rank these sources of income from the most important (1) to least important (4)*	Farm Proceeds	1	2	3	4
	Non-farm activities	1	2	3	4
	Remittances from relatives	1	2	3	4
	Gifts from friends and relatives	1	2	3	4

*Note for the investigator: surround the corresponding figures

Access to staple food How do you access your staple food? (Rank in decreasing order)	Purchase (market)	1	2		3
	Food aid	1	2		3
	Own harvest	1	2		3

Debt What are the two most important types of debts you have accumulated? (rank in order of importance)	Food (staple food purchase)	1	2	3	4	5	6	7
	Non-staple food	1	2	3	4	5	6	7
	Transport	1	2	3	4	5	6	7
	Livestock health services	1	2	3	4	5	6	7
	Health services	1	2	3	4	5	6	7
	Water	1	2	3	4	5	6	7
	Other	1	2	3	4	5	6	7

COMMUNITY LEADERSHIP/SOCIAL PARTICIPATION					
We would like to know what kind of governance position you hold in this community, and also the post you hold in the farmer organisation you may belong.					
Local Governance What official Local governance position do you hold in the community?	Councillor	<input type="checkbox"/>			
	Section Chief	<input type="checkbox"/>			
	Village Chief	<input type="checkbox"/>			
	Village Headman	<input type="checkbox"/>			
	Tribal Authority	<input type="checkbox"/>			
	Ordinary Citizen	<input type="checkbox"/>			
Social/Group Leadership What position do you hold in any farmer group or association	Other	<input type="checkbox"/>			
	Chair Person or president	<input type="checkbox"/>			
	Other executive position	<input type="checkbox"/>			
	Ordinary member	<input type="checkbox"/>			
Membership Of Farmer Associations Or Groups Please name the agricultural related organisations you belong to.	National Association of farmers of SL	<input type="checkbox"/>			
	National Farmers Coop. Union	<input type="checkbox"/>			
	ABU/FFS	<input type="checkbox"/>			
	Cocoa/Coffee Farmers Cooperative	<input type="checkbox"/>			
	Other farmers groups/NGO formations	<input type="checkbox"/>			
	None	<input type="checkbox"/>			
Perceived Benefits How much have you benefited from your membership to those farmer groups		Great	Medium	Little	None
	Access to Planting materials/Seeds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Access to Fertilizer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Access to pesticides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Access to markets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Access to market information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Access to production technology / tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Exchange of ideas and knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INSTITUTIONAL SUPPORT			
Please name the governmental and none governmental development organisations that you have worked with the last two years and how much they have helped you improve your livelihood			
	Yes	No	
Organisations You Are Working With	Maffs Extension	<input type="checkbox"/>	<input type="checkbox"/>
	Action AID/STABEX	<input type="checkbox"/>	<input type="checkbox"/>
	Welthungerhilfe/STABEX	<input type="checkbox"/>	<input type="checkbox"/>
	MAFFS Projects	<input type="checkbox"/>	<input type="checkbox"/>
	Other NGOs not related to above	<input type="checkbox"/>	<input type="checkbox"/>
Kind Of Support Received Please tell us all the kind of support you have received from the organisations for last one or two years you have worked with them.	Planting materials (seeds, seedlings)	<input type="checkbox"/>	<input type="checkbox"/>
	Fertilizers	<input type="checkbox"/>	<input type="checkbox"/>
	Capital – Micro-credit	<input type="checkbox"/>	<input type="checkbox"/>
	Drying facilities	<input type="checkbox"/>	<input type="checkbox"/>
	Storage facilities	<input type="checkbox"/>	<input type="checkbox"/>
	Tools – hoes, cutlasses	<input type="checkbox"/>	<input type="checkbox"/>
	Processing equipment	<input type="checkbox"/>	<input type="checkbox"/>
	Pesticides/Insecticides	<input type="checkbox"/>	<input type="checkbox"/>
	Training in Agronomic activities	<input type="checkbox"/>	<input type="checkbox"/>
	Training in marketing	<input type="checkbox"/>	<input type="checkbox"/>
	Training in Processing	<input type="checkbox"/>	<input type="checkbox"/>
	Training in business management.	<input type="checkbox"/>	<input type="checkbox"/>
Providing market information	<input type="checkbox"/>	<input type="checkbox"/>	

	Planting materials (seeds, seedlings)	Adequate	Not adequate	Not provided
<p>Adequacy Of Kind Of Support</p> <p>Considering your farming needs do you think the various support you have received were adequate?</p>	Fertilizers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Capital – Micro-credit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Drying facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Storage facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Tools – hoes, cutlasses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Processing equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Pesticides/Insecticides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Training in Agronomic activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Training in marketing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Training in Processing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Training in business management.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Providing market information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

	Great Improvement	Some Improvement	No Improvement
<p>Impact of support on food Security</p>	Change in food production	<input type="checkbox"/>	<input type="checkbox"/>
	Change in cultivated area	<input type="checkbox"/>	<input type="checkbox"/>
	Change in yields of staple food	<input type="checkbox"/>	<input type="checkbox"/>
	Change in consumption of staples	<input type="checkbox"/>	<input type="checkbox"/>
	Change in prices for staple food	<input type="checkbox"/>	<input type="checkbox"/>
	Change in access to markets	<input type="checkbox"/>	<input type="checkbox"/>
	Change in on-farm food storage capacity	<input type="checkbox"/>	<input type="checkbox"/>

	Great Improvement	Some Improvement	No Improvement
<p>Level of Improvement in production</p> <p>As a result of respective agency</p>	MAFFS Extension	<input type="checkbox"/>	<input type="checkbox"/>
	Action Aid/STABEX	<input type="checkbox"/>	<input type="checkbox"/>
	Welthungerhilfe/STABEX	<input type="checkbox"/>	<input type="checkbox"/>
	MAFFS Projects	<input type="checkbox"/>	<input type="checkbox"/>
	Others-NGOs	<input type="checkbox"/>	<input type="checkbox"/>

Level Of Improvement In Income As a result of respective agency	MAFFS Extension	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Action Aid/STABEX	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Welthungerhilfe/STABEX	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	MAFFS Projects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Others-NGOs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>


Sustainability: Could you continue to apply the proposals of the interventions after the end		No	Yes	Don't know
	Planting materials (seeds, seedlings)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Fertilizers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Capital – Micro-credit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Drying and storage facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Tools – hoes, cutlasses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Processing equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Pesticides/insecticides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Training in Agronomic activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		No	Yes	Don't know
	Training in marketing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Training in Processing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Training in business management.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Providing market information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Could you explain why?				
GENERAL IMPROVEMENT OF THE COMMUNITY OR AREA				
Do you experience or see any improvement in the following areas of development in your area during the last two years?	Opportunities to sell farm produce	Better <input type="checkbox"/>	Same <input type="checkbox"/>	Worse <input type="checkbox"/>
	Opportunities to buy fertilizers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Provision of agric. Services by government	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Food security situation of your household	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Health care facilities or opportunities,	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Opportunities of education for your kids	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	General household wellbeing in the area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FARM CHARACTERISTICS				
Now we will like to know a bit about your farm activities. So please tell us about the following.				
The Type Of Crops Grown and area Select all those that you cultivate last year (January to December 2008)	Type of crops	Area (acres)		
	Cocoa	<input type="checkbox"/>		
	Coffee	<input type="checkbox"/>		
	Other tree crops	<input type="checkbox"/>		
	Upland rice- mixed cropping	<input type="checkbox"/>		
	Up land Rice – sole cropping	<input type="checkbox"/>		
	Inland valley swamp (low land) rice	<input type="checkbox"/>		
	Cassava plot	<input type="checkbox"/>		
	Sweet potato	<input type="checkbox"/>		
	Pepper plot	<input type="checkbox"/>		
	Beans plot	<input type="checkbox"/>		
	Vegetable plot	<input type="checkbox"/>		

<p>The Most Important Crop</p> <p>According to your household needs which of the crops is the most important one?</p>	Cocoa	<input type="checkbox"/>
	Coffee	<input type="checkbox"/>
	Other tree crops	<input type="checkbox"/>
	Upland rice- mixed cropping	<input type="checkbox"/>
	Up land Rice – sole cropping	<input type="checkbox"/>
	Inland valley swamp (low land) rice	<input type="checkbox"/>
	Cassava plot	<input type="checkbox"/>
	Sweet potato	<input type="checkbox"/>
	Pepper plot	<input type="checkbox"/>
	Beans plot	<input type="checkbox"/>
Vegetable plot		<input type="checkbox"/>

<p>Livestock Type</p> <p>Select all those that your livestock. Precise the number.</p>			Number
	Work Oxen	<input type="checkbox"/>	
	Cattle	<input type="checkbox"/>	
	Sheep	<input type="checkbox"/>	
	Goat	<input type="checkbox"/>	
	Pigs	<input type="checkbox"/>	
	Rabbits	<input type="checkbox"/>	
	Chicken	<input type="checkbox"/>	
	Other Poultry	<input type="checkbox"/>	
	Other Livestock	<input type="checkbox"/>	
	Fish	<input type="checkbox"/>	
	Crab	<input type="checkbox"/>	
	Other	<input type="checkbox"/>	

Externality Please give us some information about externality which can affect your harvest			
Rainfall	Weather during harvesting period	Normal	Rainy
		<input type="checkbox"/>	<input type="checkbox"/>
	Did you have any problems drying the crop?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Soil condition What is the soil depth that is available for roots in your field(s)? Please give a range (e.g. 50-100 cm) per field (or block of fields) and indicate which crop(s) you grow on this/these field(s). Or length of particular tool if metric system is not known.			
Do you use any of the following on your field(s)	Bringing manure from livestock on the field	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	Have livestock 'graze' the field	<input type="checkbox"/>	<input type="checkbox"/>
	Leave crop residues on the field	<input type="checkbox"/>	<input type="checkbox"/>
	Crop residue burning	<input type="checkbox"/>	<input type="checkbox"/>
	Input of other type of mulch/soil cover	<input type="checkbox"/>	<input type="checkbox"/>
	Intercropping, that is cultivating two or more crops in the same area at the same time	<input type="checkbox"/>	<input type="checkbox"/>
	Crop rotation, that is growing a series of dissimilar types of crops in the same area in sequential seasons	<input type="checkbox"/>	<input type="checkbox"/>
	Fallow grass - if so, for how many years	<input type="checkbox"/>	Number of years <input type="checkbox"/>
	Fallow forest - if so, for how many years	<input type="checkbox"/>	Number of years <input type="checkbox"/>
	Chemical fertilizers	<input type="checkbox"/>	<input type="checkbox"/>
	Other soil improvement practice	<input type="checkbox"/>	<input type="checkbox"/>

Seeds	Did you have enough seeds at the beginning of the season?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
	How is the germination of the seeds?	Bad <input type="checkbox"/>	Average <input type="checkbox"/>
		Good <input type="checkbox"/>	
	Did you have to replant?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Maize In case of Maize	Was your Maize infested by larger grain borer?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
			
Storage	How much of your harvest are you able to store? (In percentage)		
	How long do you store your crop? (Days per year/ crop)		
Compared to last year, your planting area	Increased <input type="checkbox"/>	Decreased <input type="checkbox"/>	Remained the same <input type="checkbox"/>

Infrastructure/communication Please tell us the situation regarding some of the infrastructural facilities or services that could facilitate agricultural production and marketing in your village				
The Condition Of The Physical Facilities	What is the distance between your plots?			
	Whether the roads from the nearest chiefdom headquarter are motorable All year around Seasonal	<input type="checkbox"/> <input type="checkbox"/>		
	What is distance from your village to the nearest motor road? (In miles)			
	How easy is it for you to get your produce to the market Easy Difficult	<input type="checkbox"/> <input type="checkbox"/>		
	How many times per month do commercial vehicles come to your village? (In time)			
	How far is the nearest market where you usually sell your produce? (In miles)			
	Distance from the project officers (In miles)			
The Condition of Communication opportunities		Good	Poor	None exists
	Post office facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Mobile phone coverage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Land Phone Facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Owning a mobile phone	Yes <input type="checkbox"/>	No <input type="checkbox"/>	<input type="checkbox"/>

Appendix II. Questionnaire B

Small farmers household study: Questionnaire B

FARM EXPENDITURES									
We now would like to know how much you spent on your farm the last production season. This will include labour, cost of tools, farm inputs, etc.									
LABOUR INPUTS: Name of Field Crop (Main Field) _____ Field Size (acres) _____									
ACTIVITY	HIRED LABOUR (Man days)			FAMILY LABOUR (Man days)			Total days	Area Labour cost per day (Le)	
	Male	Female	Total	Male	Female	Children			
Nursery establishment									
Bush Clearing									
Land preparation									
Planting									
Weeding									
Pruning									
Spraying									
Staking/stoking									
Harvesting									
Grading									
Fermenting									
Drying									
Fencing									
Milling									
Marketing									
Other									
Other									
Other									

LABOUR INPUT- FOOD CROPS: 1. Name of Crop _____ 2. Main or Secondary _____ 3. Size _____									
ACTIVITY	HIRED LABOUR (Man days)			FAMILY LABOUR (Man days)			Total days	Area Labour cost per day (Le)	
	Male	Female	Total	Male	Female	Children			
Brushing/Felling/Clearing									
Brushing and Mounding									
Ploughing and seeding									
Harrowing									
Planting of minor crops in the mix									
First Bird Scaring									
Puddling									
Transplanting									
Water Control/Channel Maintenance									
Weeding									
Fertilizing									
Fencing									
Second Bird Scaring									
Harvesting									
Threshing/Winnowing									
Drying									
Marketing									
PHYSICAL INPUTS 1. Crop Field _____ 2. Main or Secondary _____ 3. Size _____									

7.3.1 INDIVIDUAL ITEMS	QUANT	UNIT COST	AGE	life expectancy	TOTAL COST
Hoes					
Cutlasses					
Slathers					
Harvesting knives					
Tractor					
Tractor hire					
Drying Floor/equipment					
Processing Equipment					
Land Rent					
Bags					
Baskets					

7.3.2 INDIVIDUAL ITEMS	QUANT	UNIT COST	AGE	life expectancy	TOTAL COST
Hoes					
Cutlasses					
Slathers					
Harvesting knives					
Tractor					
Tractor hire					
Drying Floor/equipment					
Processing Equipment					
Land Rent					
Bags					
Baskets					

OTHER INPUTS						
	QUANT	UNIT COST	AGE	life expectancy		
Seed Rice						
Rice Seedlings						
Cocoa Seedlings						
Coffee Seedlings						
Cassava Cuttings						
Sorghum Seeds						
Beans/vegetables Seeds						

FARM OUTPUT/FARM INCOME	
Now we will want to know how big your harvest in your main farm was the last production season or the current one. Kindly provide the information required below	
Yields Outputs: TREE CROPS Main =1 Secondary = 2	

Crop Type	Quantity	Quantity Consumed	Quantity Sold	Quantity stocked	Unit	Unit cost	Total Income
Cocoa							
Coffee							
Bananas							
Orange							
Cola nut							
Other							

Yield/Output: Food Crops: Major = 1 Minor = 2

Crop Type	Quantity	Quantity Consumed	Quantity Sold	Quantity stocked	Unit	Unit cost	Total Income
Rice							
Cassava							
Sorghum							
Ground Nuts							
Beans/vegetables							
Others							
Wood							
Charcoal							
Timber							

Livestock

Now we will want to have some information on you livestock. Kindly provide the information required below

Livestock Type	Quantity	Number Consumed	Number Sold	Unit	Unit cost	Total Income
Work Oxen						
Cattle						
Sheep						
Goat						
Pigs						
Rabbits						
Chicken						
Other Poultry						
Other Livestock						
Fish						
Crab						
Other						

YIELD LOSSES							
Now we would like to characterize the amount of yield loss, both pre- and post-harvest in your main farm from the last production season or the current one							
Crop Type	Estimated loss In percent	Pre-harvest	Post harvest	Principal cause	Other	Don't know	
Cocoa							
2. Coffee							
3. Bananas							
4. Orange							
5. Cola nut							
6. Other							
Rice - upland							
Rice - lowland							
Cassava							
Sorghum							
Ground Nuts							
Beans/vegetables							
Other							
Wood							
Charcoal							
Timber							

Appendix III. Farm types

Figure: Number of farms per farm type in Northern and Eastern districts of Sierra Leone

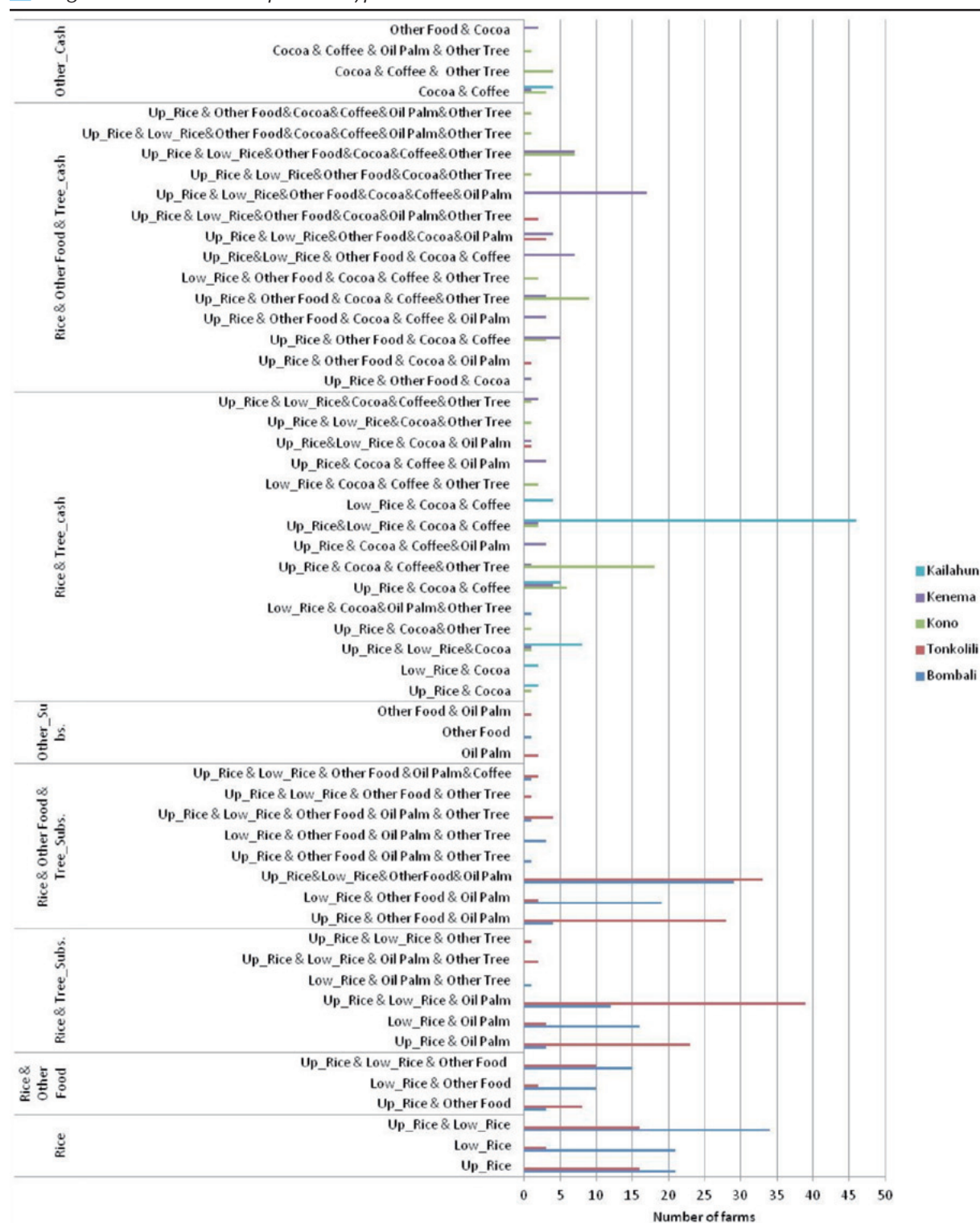


Figure: % of farms per farm type in Northern and Eastern districts of Sierra Leone

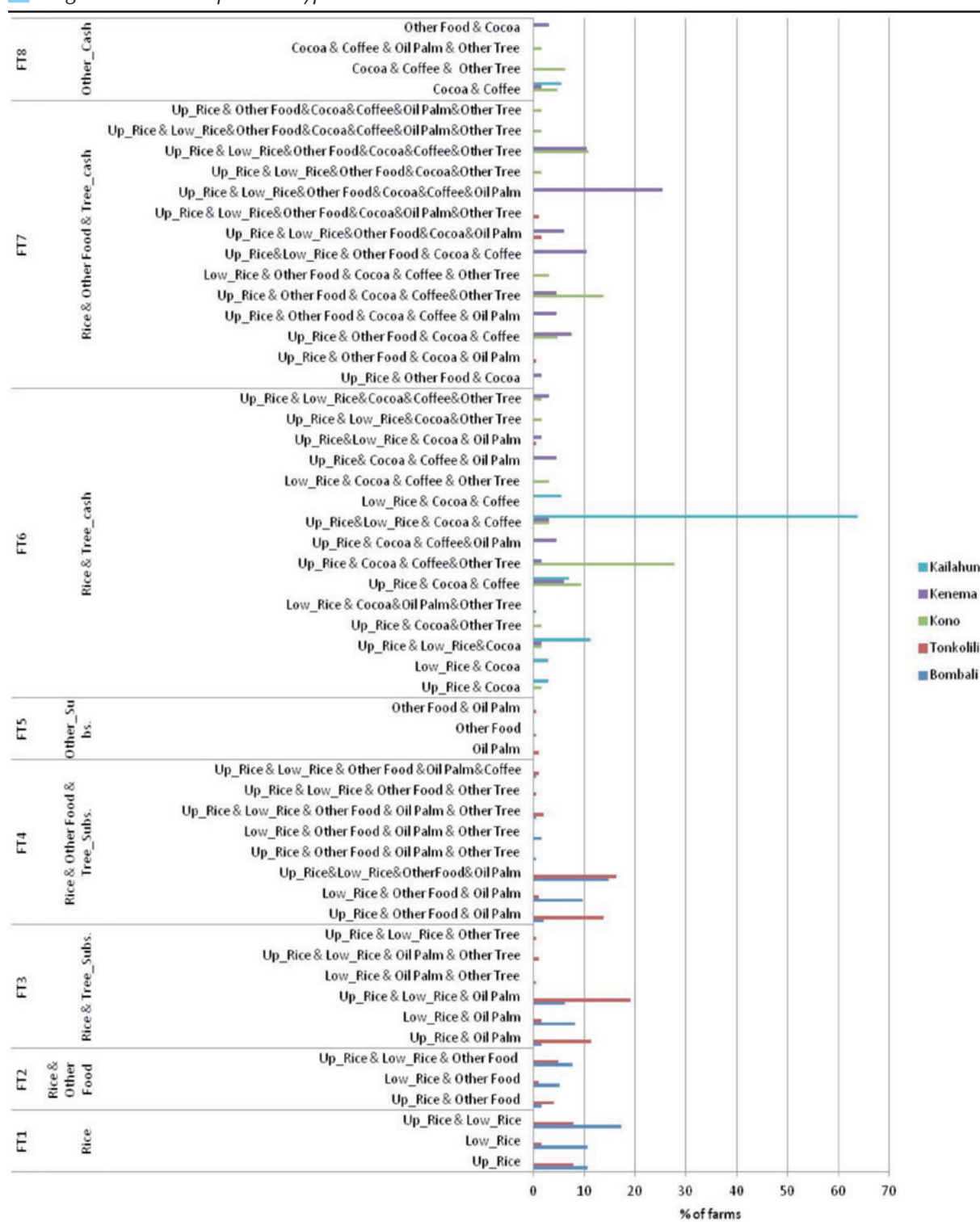


Figure: % of total land area per farm type in Northern and Eastern districts of Sierra Leone

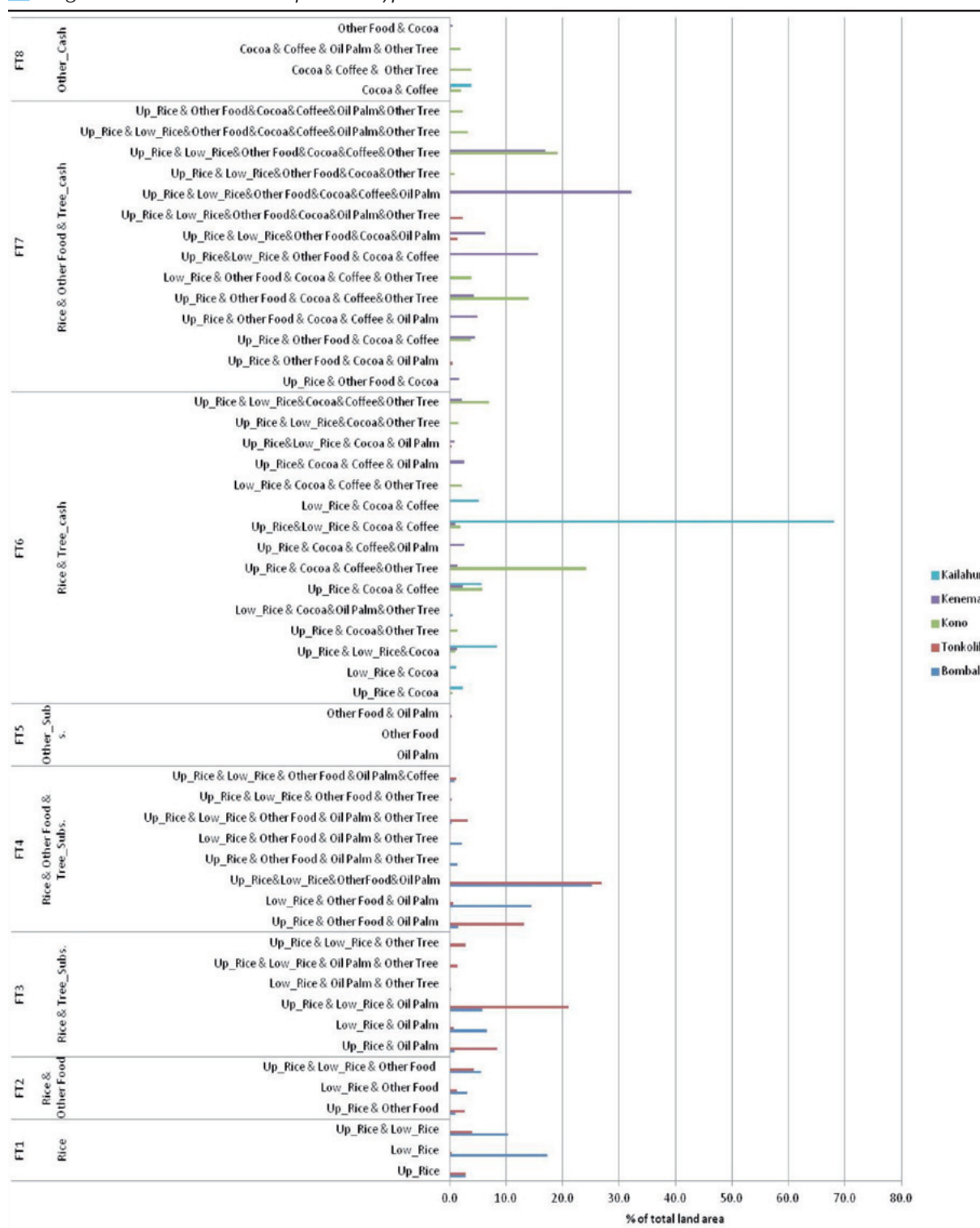
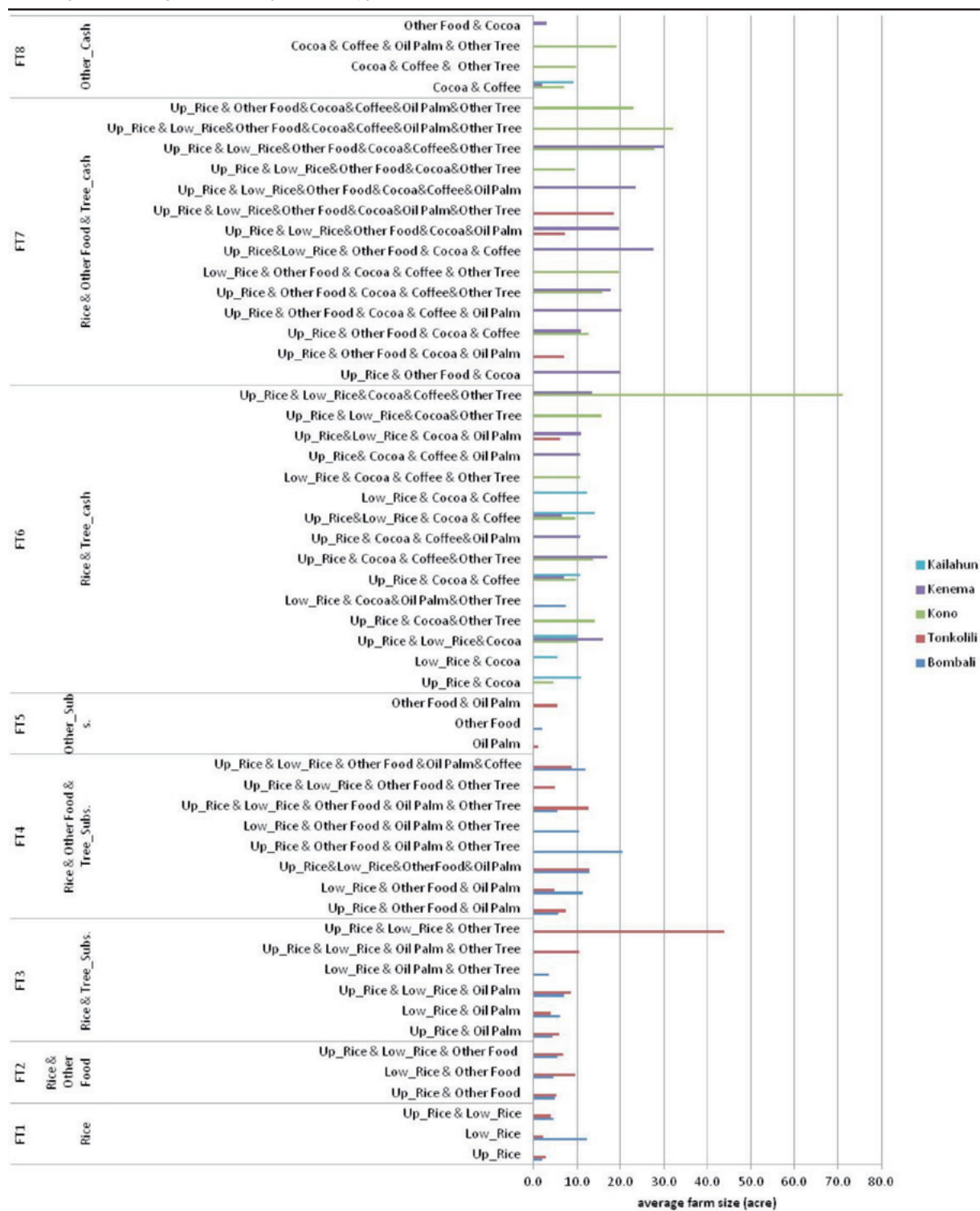


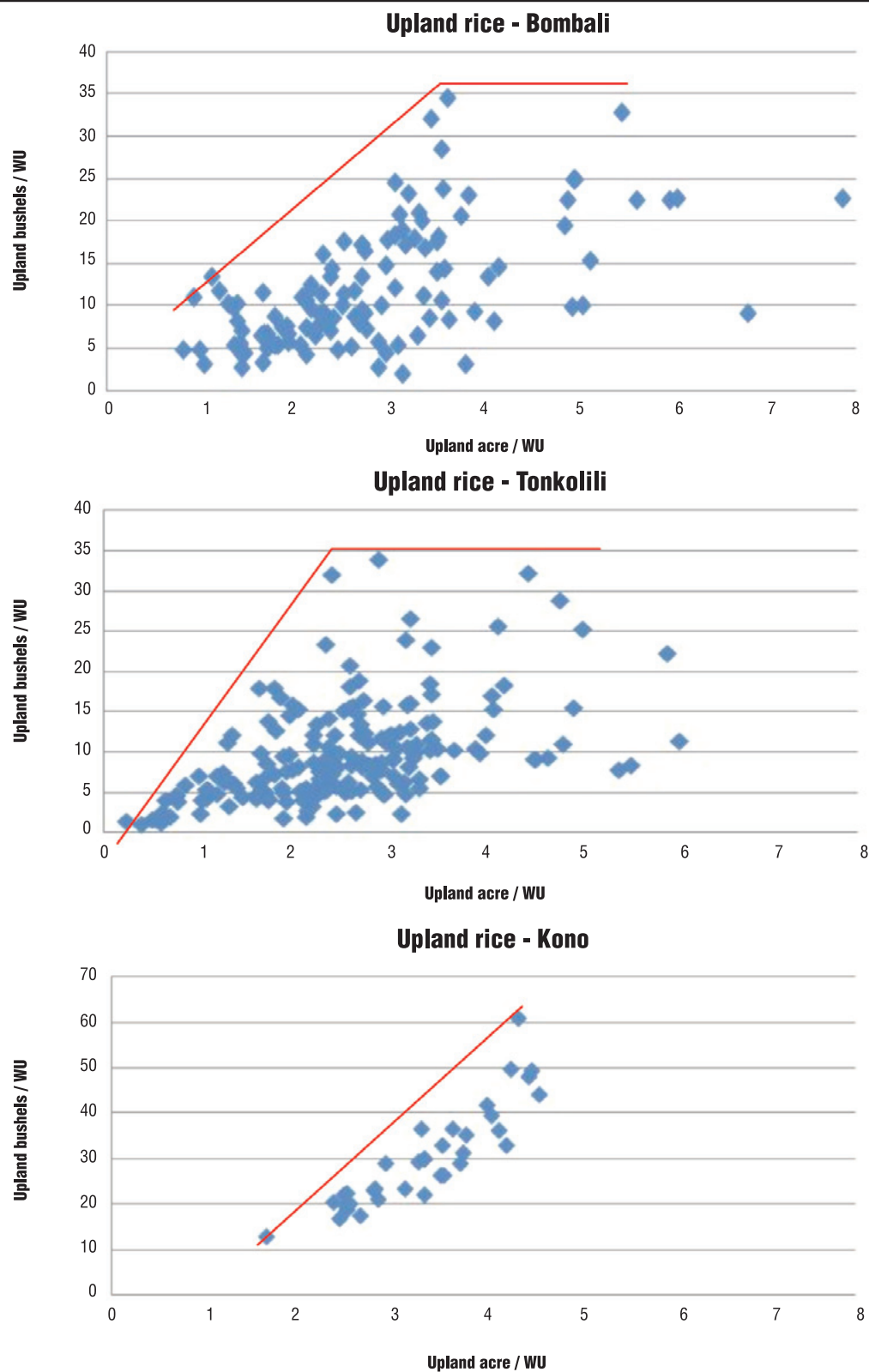
Figure: Average farm size per farm type in Northern and Eastern districts of Sierra Leone

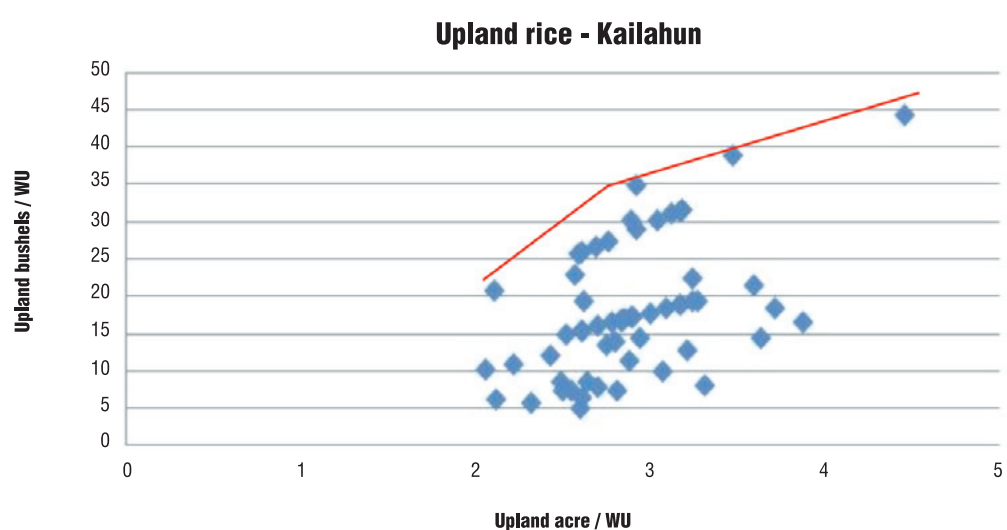
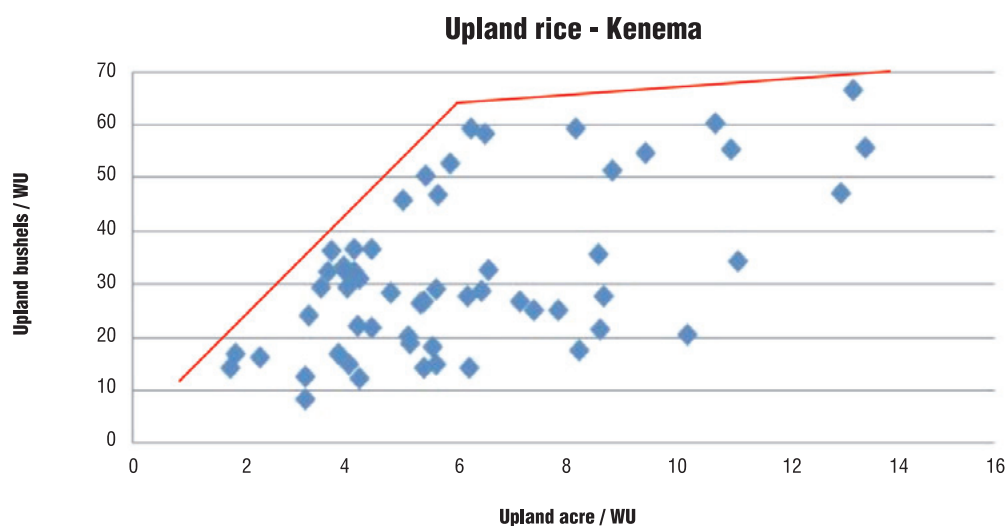


Appendix IV. Combined productivity per working unit for rice, cocoa and coffee per district

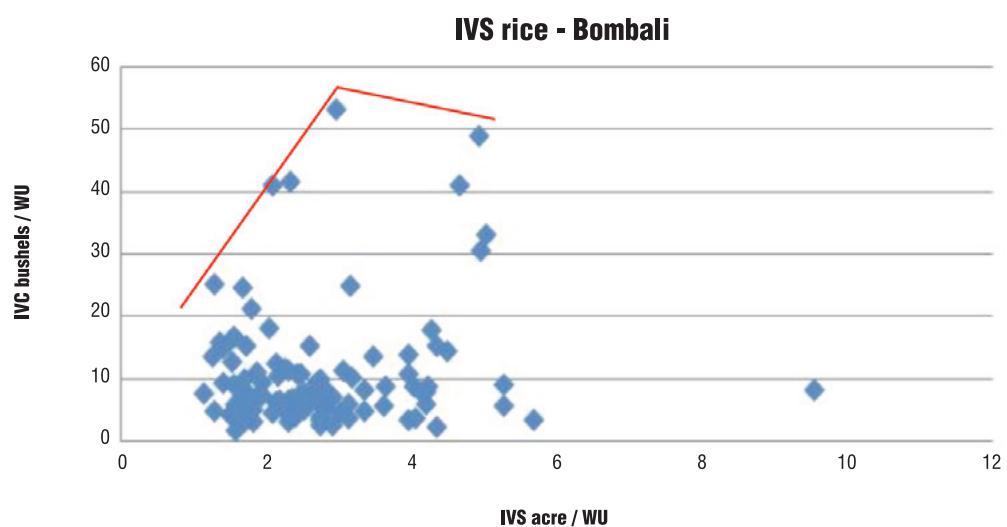
Output per WU and acre per WU for upland rice, IVS rice, Boli rice, coffee and cocoa at district level are illustrated below.

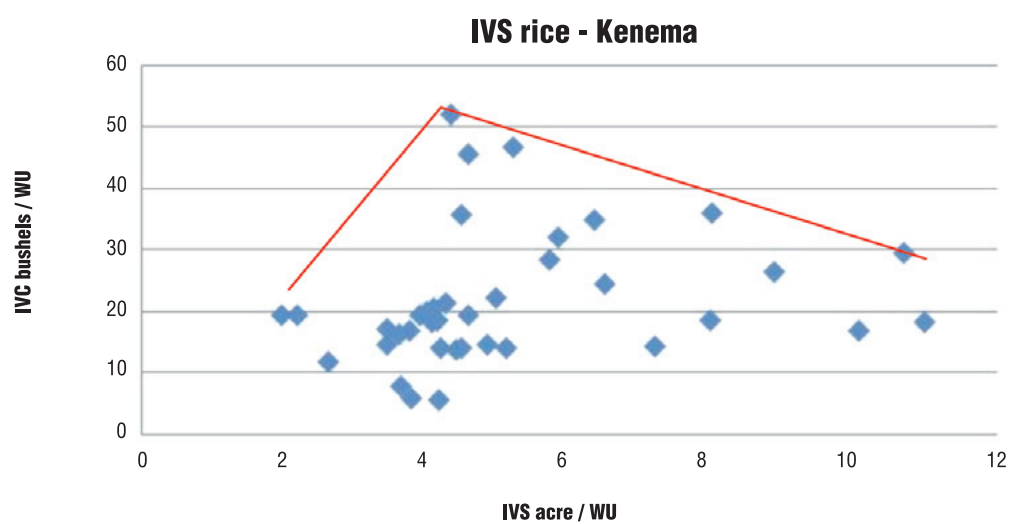
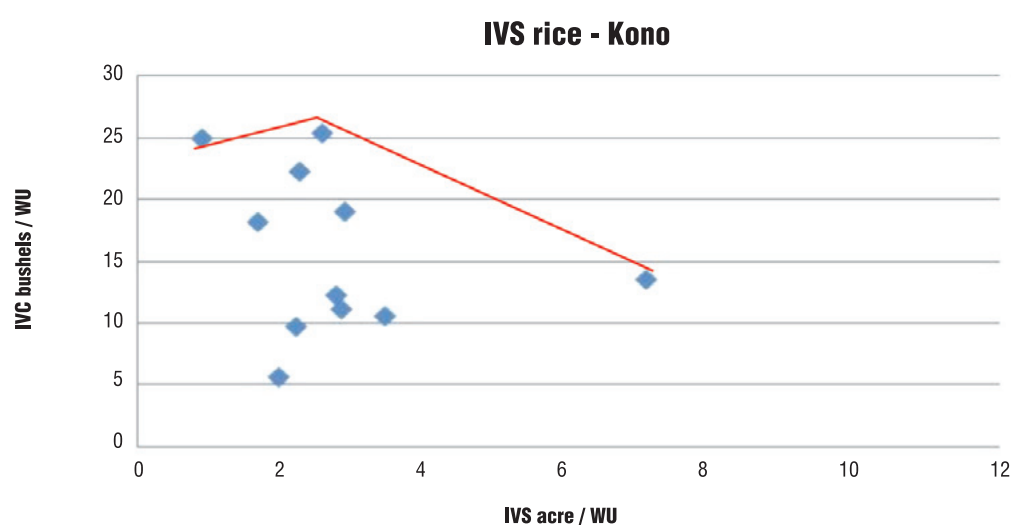
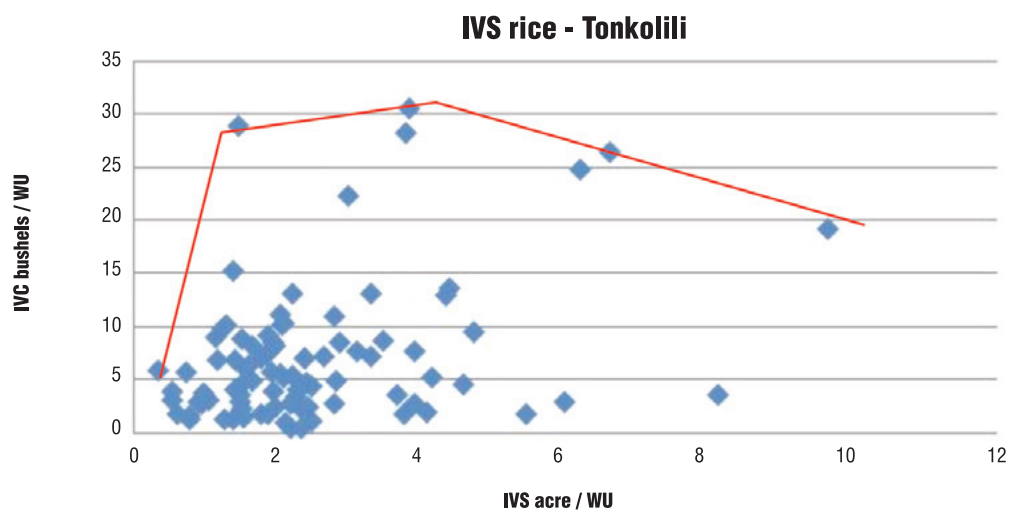
■ Labour productivity for Upland rice per district

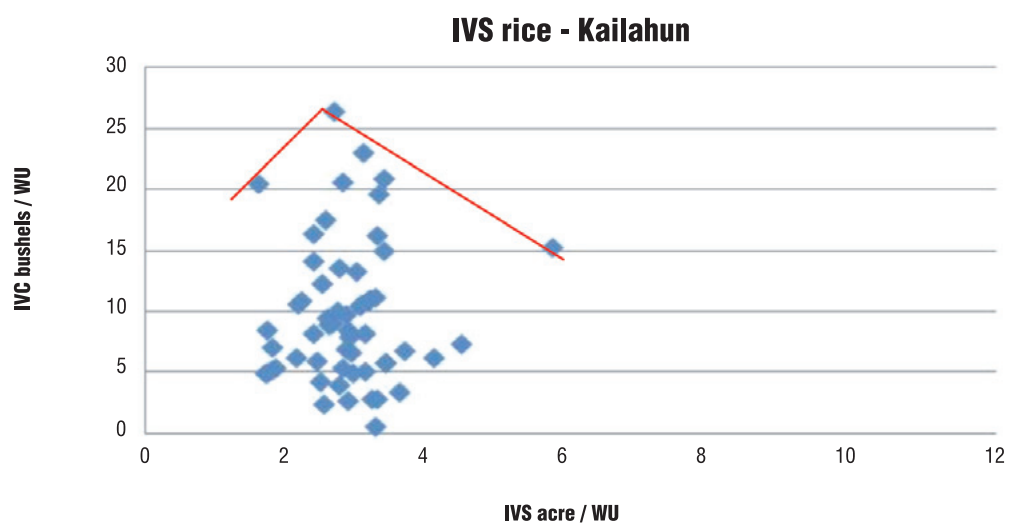




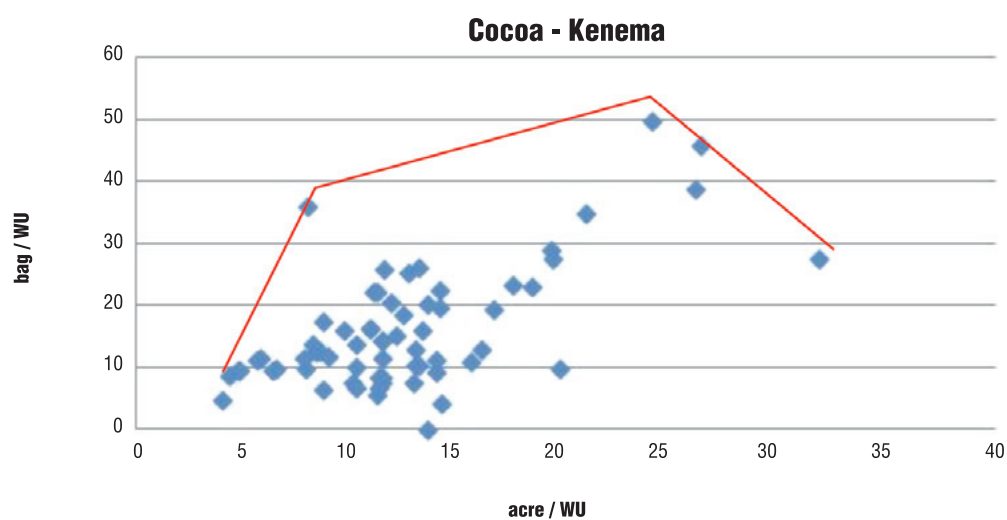
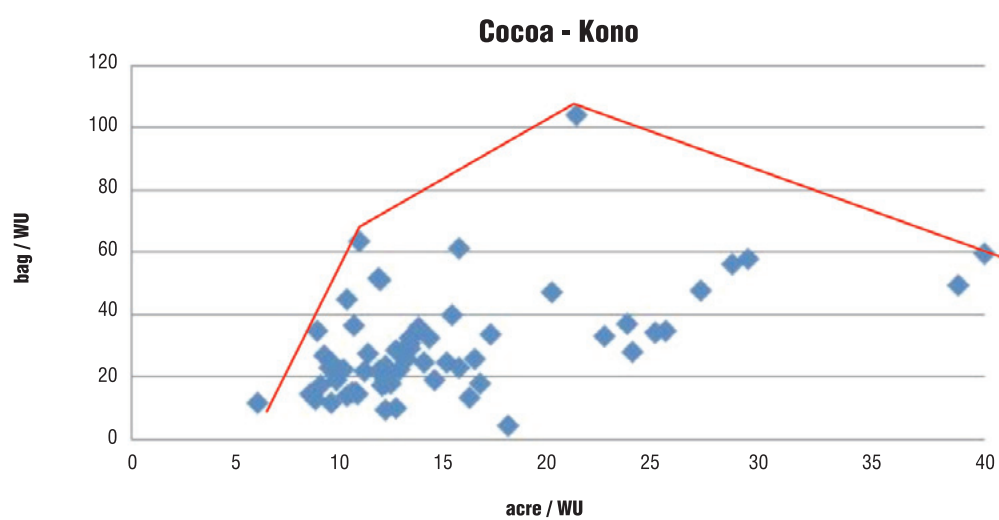
■ Labour productivity for IVS rice per district

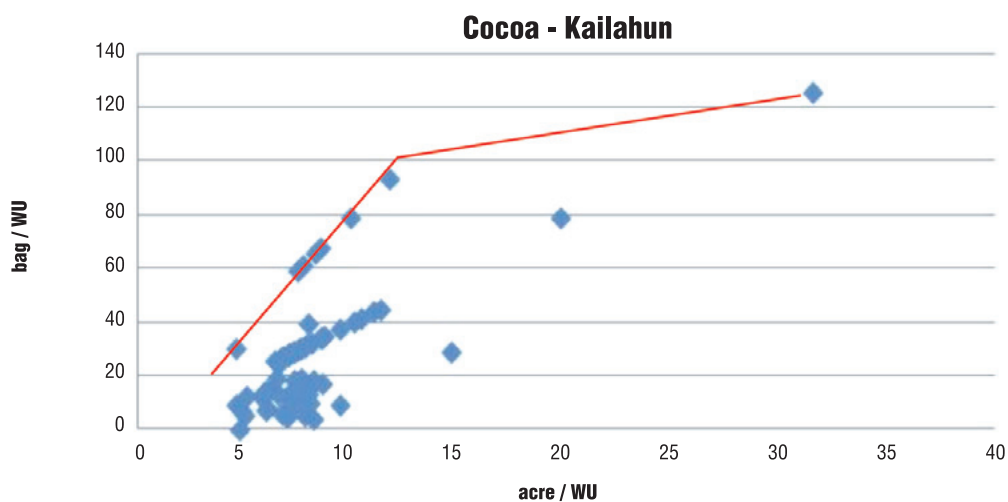




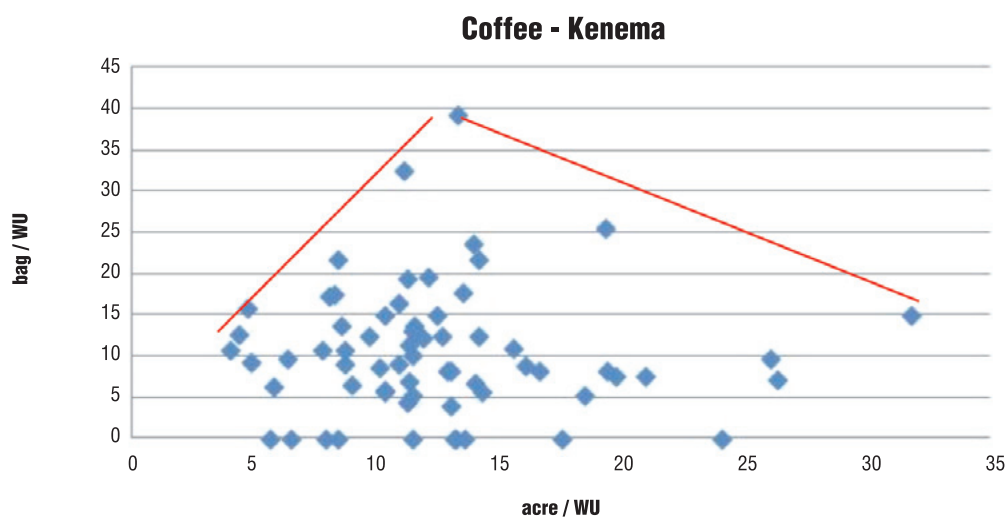
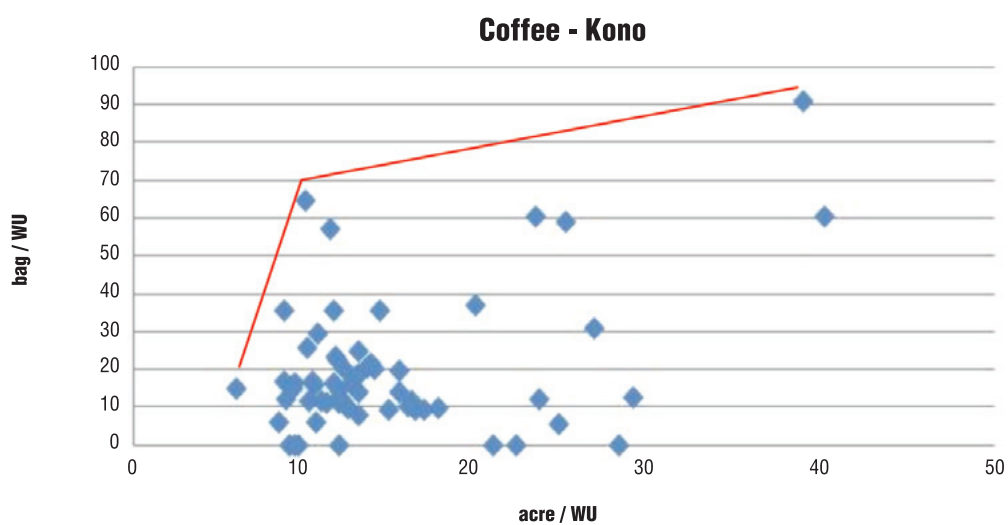


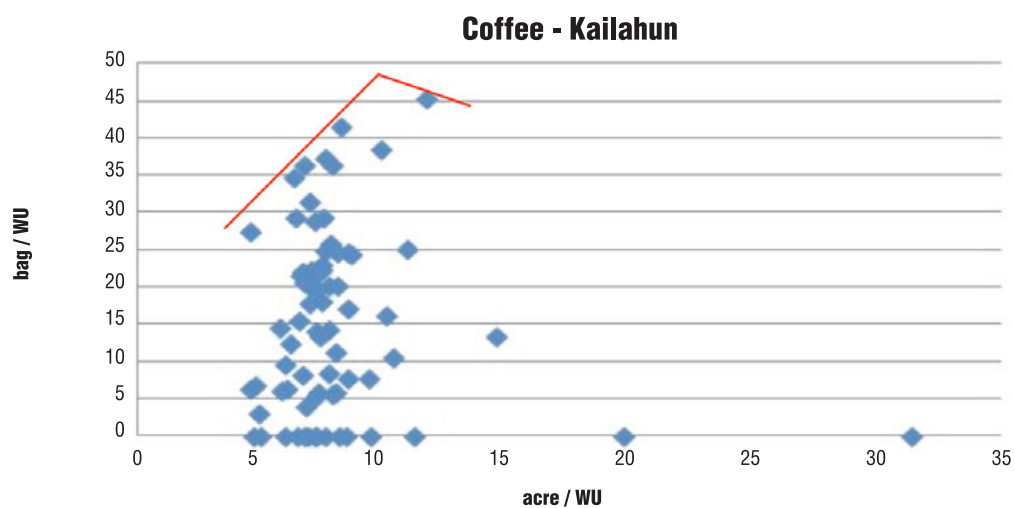
■ Labour productivity for Cocoa per district





■ Labour productivity for Coffee per district



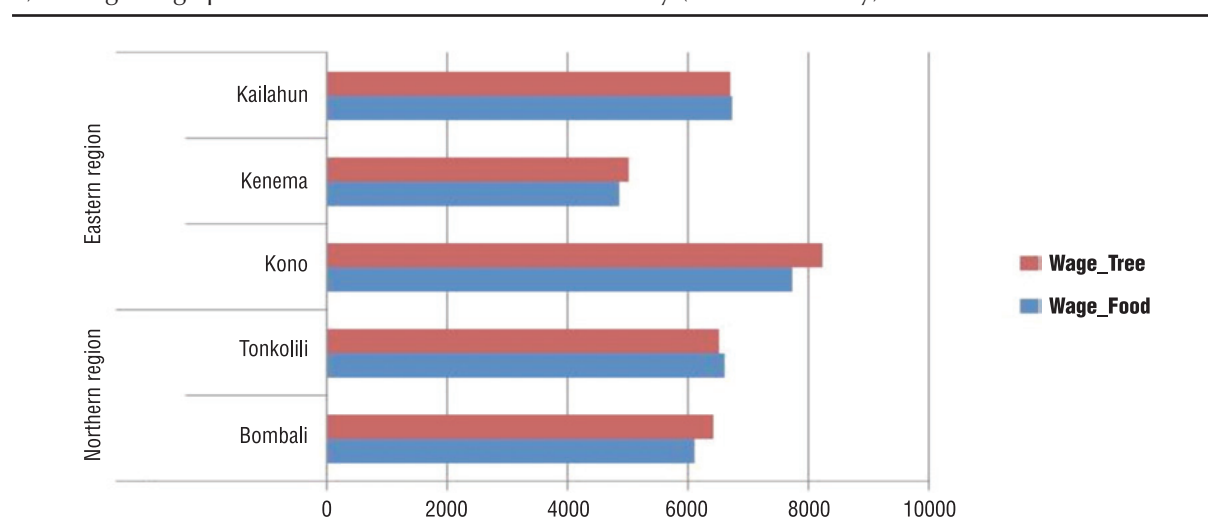


Appendix V. Price of main crops and wage per district in Sierra Leone

a) Average price of main crops per district in Sierra Leone in Leones (based on survey)

Crops	Unit	Bombali	Tonkolili	Kono	Kenema	Kailahun
cocoa	bag	80000	20000	253000	26655	25741
coffee	bag	-	30000	189000	183756	193090
oil palm	tin	50854	38990	90000	58582	77551
cola nut	bag	-	-	96294	-	-
rice	bushel	42279	46802	40000	40000	32995
cassava	bag	9340	11169	15000	15000	-
ground nut	bag	80000	150000	120000	-	-

b) Average wage per district in Sierra Leone in Leones/day (based on survey)



European Commission
EUR 25264 – Joint Research Centre – Institute for Prospective Technological Studies

Title: Rural poverty reduction and food security: The case of smallholders in Sierra Leone

Authors: Sergio Gomez y Paloma, Szvetlana Acs, Silvia Saravia Matus, Alpha Lakoh, Baudouin Michel, Gisele Hites, Frank Sammeth

Luxembourg: Publications Office of the European Union

2012 – 204 pp. – 21.0 x 29.7 cm

EUR – Scientific and Technical Research series – ISSN 1831-9424 (pdf), ISSN 1018-5593 (print)

ISBN 978-92-79-23548-1 (pdf)

ISBN 978-92-79-23547-4 (print)

doi:10.2791/76571

Abstract

Sierra Leone ranks amongst the poorest countries in the world in terms of per capita GDP. Concerning the agricultural sector and more specifically smallholders (which constitute the large majority of farmers), crucial unsolved issues relate to inadequate tools, land preparation and infrastructure, and limited access to markets and inputs, adding to very low labour productivity. This causes that smallholders operate far below their productive potential, with crop production remaining primarily driven by (semi)subsistence households generating very little income. Consequently, Sierra Leone's (semi)subsistence farming systems are characterised by highly inefficient input/output mixes as well as high pre-harvest and post-harvest losses. Farmers lack access to yield-increasing inputs (such as improved tools) and face limited ability to invest in economic activities not only due to credit shortage but also to village-level institutional arrangements which do not support using land as collateral for loans. Lastly, reduced cash-income keeps smallholders particularly vulnerable to remain in the poverty-trap.

The present report analyses the results of a survey of 604 smallholders in 5 districts in the Northern and Eastern regions of Sierra Leone carried out in 2009 when the EU STABEX-funded projects were concluding. The purpose is, on the one hand, to improve knowledge and understanding of the agro-economic and social conditions of rural areas in Sierra Leone, and, on the other hand, to provide a general assessment of aid programmes financed in this area by the 8th European Development Fund. For this reason, the regions selected for the survey were those representatives of the main agricultural areas of the country where support was provided: the Northern region largely dominated by rice farmers, and the Eastern region where rice farmers are also engaged in coffee and cocoa production under agro-forestry plots. While rice (main staple food) production is expected to comply with food security objectives, coffee and cocoa (main export commodities) are high value export commodities which push economic growth. Consequently, both types of crops are considered relevant in contributing to the country's development.

The results of the economic analysis indicate that rice production, which largely covers own household consumption, is far below its potential due to high losses, low productivity and labour-intensity of farming, particularly in the Northern region. On the other hand, coffee and cocoa production in the Eastern region was found to be economically profitable, generating income for most of those smallholders who cultivate these crops.

Regarding farm households' characteristics and income, strong regional differences between the poorer North and relatively wealthier East were observed and reflected throughout all factors analysed: yields, household size, magnitude of losses and productivity. Households in the Eastern region who produce coffee and cocoa, also dispose on average of more family labour, more land and higher income compared to households in the Northern region. Rice was recognised as being an imperative component for food security, while the high market value of coffee and cocoa confirmed both commodities as important sources of income and foreign currency.

Qualitative data from the survey indicated that the STABEX aid programmes were to a great extent perceived as adequate in terms of their technical nature as well as regarding infrastructure and organisational improvements. However, the amount of aid was deemed altogether insufficient considering the number of households requiring assistance. In this sense, the responses to perceived adequacy do not evaluate the measure itself, but rather the amount provided in relation to local needs as understood by the recipients.

Based on this analysis a set of recommendations for the policy are drawn.

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.