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SLARI Sierra Leone Agricultural Research Institute

SIERRA LEONE

RECENT DEVELOPMENTS IN AGRICULTURAL RESEARCH

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INVESTMENT AND CAPACITY TRENDS IN AGRICULTURAL R&D

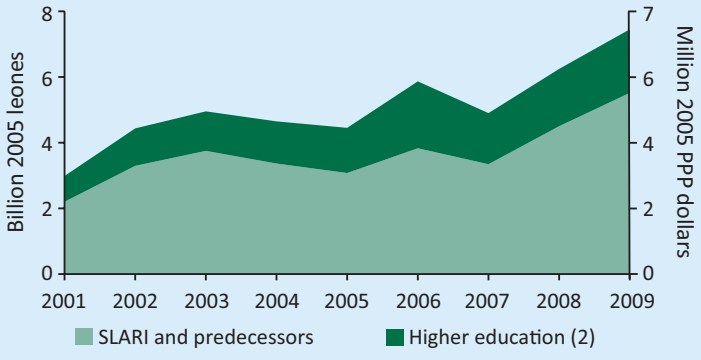
Agricultural research and development (R&D) in Sierra Leone virtually ceased in the 1990s due to the ravages of civil war. Several researchers were killed by rebels, research facilities and equipment were destroyed or severely damaged, and many research stations were abandoned as staff took refuge in Freetown (Asenso-Okyere et al. 2009). When peace was finally declared in 2002, Sierra Leone embarked on what will be a long road toward reconstructing its agricultural research infrastructure and capacity. As a result, agricultural R&D spending rose rapidly. In 2009, the country invested 7.5 billion leones or 6.9 million PPP dollars on agricultural R&D (both in 2005 prices) compared with just 2.2 billion leones or 2.8 million dollars in 2001 (Figure 1; Table 1). Unless otherwise stated, all prices in this note are based on purchasing power parity (PPP) exchange rates, which reflect the purchasing power of currencies more effectively than do standard exchange rates because they compare the prices of a broader range of local—as opposed to internationally traded—goods and services.[1] Total agricultural R&D capacity has also risen gradually since the cessation of hostilities. In 2009, Sierra Leone employed 72 full-time equivalent (FTE) researchers compared with just 49 in 2001 (Figure 2).

Three agencies are involved in agricultural R&D in Sierra Leone. The Sierra Leone Agricultural Research Institute (SLARI)

Key Trends Since 2000

- Agricultural research and development (R&D) expenditures in Sierra Leone more than doubled between 2001 and 2009 in response to the end of a decade of civil war and efforts to reconstruct the country's agricultural R&D system. Despite this high increase, funding levels are still too low and irregular to allow for a timely and effective rehabilitation.
- The Sierra Leone Agricultural Research Institute (SLARI) was established in 2007 as the primary national agricultural research institute. It is planned that SLARI will operate eight research centers focusing on various commodities and research themes, but as of 2009 only two of the eight centers were operating; the remaining centers are in the process of being rehabilitated and staffed.
- The national government funds the vast majority of agricultural research in Sierra Leone, although donor support has been increasing since 2007.
- Total agricultural R&D capacity is expected to increase in the coming years as more SLARI research centers open. Training research staff will be a key challenge, however.

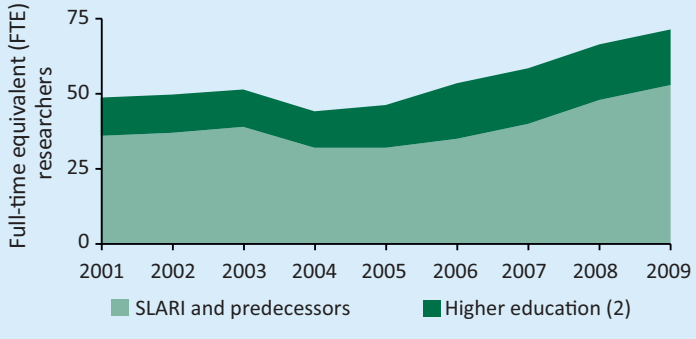
Figure 1—Agricultural R&D spending adjusted for inflation, 2001–09



Source: IFPRI–SLARI 2009/10.

Notes: Figures in parentheses indicate the number of agencies in each category. For more information on coverage and estimation procedures, see the Sierra Leone country page on ASTI's website at asti.cgiar.org/sierraleone.

Figure 2—Agricultural research staff in full-time equivalents, 2001–09



Source: IFPRI–SLARI 2009/10.

Note: Figures in parentheses indicate the number of agencies in each category.

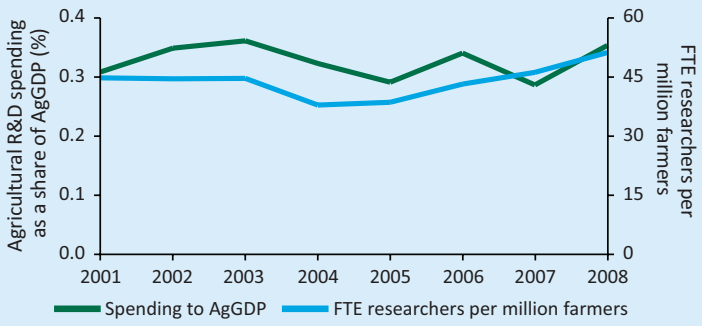
Table 1—Overview of agricultural R&D spending and research staff levels, 2009

Type of agency	Total spending			Total staffing	
	Leones	PPP dollars	Share	Number	Share
	(million 2005 prices)		(%)	(FTEs)	(%)
SLARI	5,515.8	5.1	74	53.0	74
Higher education (2)	1,935.7	1.8	26	18.6	26
Total (3)	**7,451.5**	**6.9**	**100**	**71.6**	**100**

Source: IFPRI–SLARI 2009/10.

Note: Figures in parentheses indicate the number of agencies in each category.

Figure 3—Intensity of agricultural research spending and capacity, 2001–08



Sources: Calculated by authors from IFPRI–SLARI 2009/10; FAO 2009; and World Bank 2009.

under the Ministry of Agriculture, Forestry, and Food Security (MAFFS) is the country's principal agricultural research institute, accounting for close to three-quarters of total agricultural research staff and expenditures in 2009. Two higher education agencies conduct agricultural R&D in Sierra Leone: The Faculty of Agriculture and Environmental Sciences at Njala University College and the Institute of Marine Biology and Oceanography (IMBO) at the University of Sierra Leone. Together, these two agencies accounted for just over a quarter of the country's agricultural R&D staff and expenditures.

In 2008, just 5 percent of agricultural researchers in Sierra Leone were female—representing one of the lowest shares in the world (IFPRI-SLARI 2009/10). SLARI's share was even lower than this nationwide average, given that the institute employed just one female researcher trained to the MSc level in 2008 (2 percent of all agricultural researchers that year). In 2008, for every FTE researcher, the country employed 1.3 technicians, 0.4 administrative support staff, and 3.4 other support staff on average (IFPRI-SLARI 2009/10), although levels differed significantly at the institute level. SLARI's total support-staff-per-researcher ratio was 6.8, compared with 1.4 at Njala University and just 0.5 at IMBO. Lower ratios of support staff are common in the higher education sector, however, given that research is not their primary mandate.

Total public spending as a percentage of agricultural output (AgGDP)—a commonly used indicator of comparative agricultural R&D spending across countries—has risen slightly, from $0.31 for every $100 of agricultural output in 2001 to $0.36 in 2008, indicating that agricultural R&D expenditures rose more rapidly than did AgGDP (Figure 3). Similarly, the number of FTE researchers in agriculture per million farmers rose from 45 to 52 during this period. Obviously these ratios are still very low compared with regional averages, which is not surprising.

INSTITUTIONAL STRUCTURE OF AGRICULTURAL R&D

The structure of Sierra Leone's agricultural research system has undergone many changes since the end of the civil war. In 2007, the national government recognized the need to concentrate on rehabilitating the agricultural sector, which employs the vast majority of the country's population. Agricultural policy stressed national economic growth, poverty reduction, and food security, as well as the commercialization and mechanization of agriculture, the development of irrigation, and increased participation in agriculture by the private sector. That year, SLARI was established as the nation's primary agricultural research agency following a national and regional development strategy based on Pillar IV of the Comprehensive Africa Agriculture Development Program (CAADP) on improving agriculture research, technology dissemination and adoption and the associated Framework for African Agricultural Productivity (FAAP) (Asenso-Okyere et al. 2009).[2,3] In time, SLARI will operate a Directorate in Freetown and eight research centers throughout the country. As of 2009, however, only the Directorate and two of the eight research centers—the Njala Agricultural Research Centre (NARC) and the Rokupr Agricultural Research Centre (RARC)—were operating, despite needing further strengthening due to severe vandalism during the war. The remaining six research centers include Freetown Fisheries Research Centre (FFRC), Teko Livestock Research Centre (TLRC), Woama Plant Genetic Resources Research Centre (WPGRRC), Kenema Forestry and Tree Crops Research Centre (KFTCRC), Magbosi Land and Water Research Centre (MLWRC), and Kabala Horticultural Crops Research Centre (KHCRC). These remaining centers, which also incurred serious damage during the war, are in the process of being rehabilitated and staffed. Three of these centers are

ASTI Website Interaction

- Underlying datasets can be downloaded using ASTI's data tool at www.asti.cgiar.org/data.
- This brief presents aggregated data; additional graphs with more detailed data are available at asti.cgiar.org/sierra-leone/datatrends.
- A list of the three agencies included in this brief is available at asti.cgiar.org/sierra-leone/agencies.

www.asti.cgiar.org/sierra-leone

expected to resume (minimal) operations in 2010. Once fully operational, SLARI will contribute to national economic growth by promoting commercial and mechanical farming, as well as private participation in agriculture. Four research programs have been established to date: the crop and animal improvement program; the crop and animal management program; the socioeconomic policy program; and the postharvest, processing, and engineering program. In 2009, SLARI (that is, NARC, RARC, and the Directorate) employed 53 FTE researchers. This number is expected to increase considerably as the remaining centers open, making the recruitment and training of staff a key concern for SLARI in the coming years.

Njala University College—located in the center of Sierra Leone with a satellite campus in Freetown—is the country's principal agricultural university. Like SLARI, it was severely damaged during the war. For the time being, it is the country's main livestock research agency, carrying out research in the fields of animal science, crop science, and agricultural engineering. This is expected to change, however, when SLARI's TLRC opens. In 2009, Njala University employed 11 FTE researchers in agriculture. They work closely with SLARI scientists given that NARC is located on the university's campus. Further, MAFFS and Njala University established a memorandum of understanding in 2008 paving the way for collaboration in research, technology development and dissemination, and policy analysis.

Although the Ministry of Fisheries and Marine Resources (MFMR) has an official research department, for the time being IMBO is the only agency in Sierra Leone that conducts fisheries research. This will change when FFRC—another of SLARI's research centers—opens. However, there will be a clear distinction between IMBO's and FFRC's mandates with the first focusing on oceanographic research and the latter on inland fisheries and aquaculture (SLARI 2008). IMBO is based on the University of Sierra Leone's campus in Freetown and conducts its research activities at five MFMR fisheries stations along the Gulf of Guinea coast. In 2009, IMBO employed 8 FTE researchers working on various issues related to artisanal fisheries development and fisheries management.

ASTI Website Interaction

- Detailed definitions of PPPs, FTEs, and other methodologies employed by ASTI are available at asti.cgiar.org/methodology.
- The data in this brief are predominantly derived from surveys. Some data are from secondary sources or were estimated. More information on data coverage is available at asti.cgiar.org/sierra-leone/datacoverage.
- More relevant resources on agricultural R&D in Sierra Leone are available at asti.cgiar.org/sierra-leone.

www.asti.cgiar.org/sierra-leone

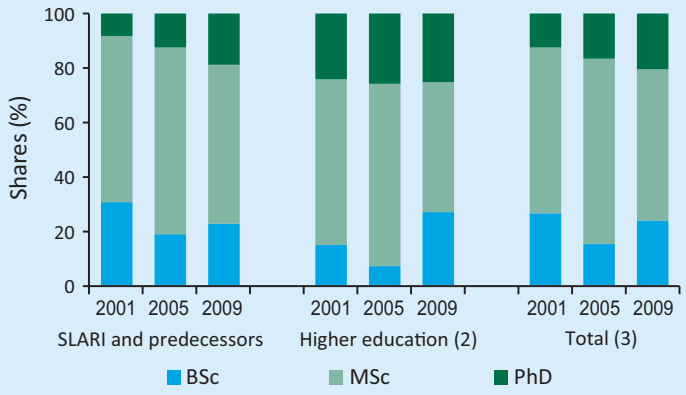
A number of foreign nongovernmental organizations (NGOs)—including World Vision, Care, and ActionAid—conduct some adaptive research in Sierra Leone in collaboration with SLARI. These activities largely involve downstream participatory research, extension, and farmer field schools. The ad hoc nature of these activities, however, makes them difficult to quantify in terms of R&D capacity and expenditures; consequently, these activities are excluded from further analysis in this country note. In addition, no private (for-profit) agencies were identified as being involved in agricultural R&D in Sierra Leone.

SLARI has close linkages with national agricultural research institutes in other West African countries, particularly those in Ghana, Côte d'Ivoire, Nigeria, and Liberia, notably for germplasm exchange. SLARI also maintains close links with the West and Central African Council for Agricultural Research and Development (CORAF/WECARD), and the Forum for Agricultural Research in Africa (FARA). Internationally, SLARI is increasingly working with the Consultative Group on International Agricultural Research (CGIAR), specifically with the Africa Rice Center, the International Institute of Tropical Agriculture (IITA), the International Livestock Research Institute (ILRI), the International Water Management Institute (IWMI), Bioversity International, and the International Food Policy Research Institute (IFPRI). Official linkages between Sierra Leone's higher education sector and (sub)regional and international organizations are more limited, although they do exist at the university level. Long-term cooperation and joint research between IMBO and the University of Portsmouth in the United Kingdom is an example.

RESEARCH STAFF QUALIFICATIONS

In 2009, 70 percent of Sierra Leone's agricultural researchers were trained to the postgraduate level, and 20 percent held PhD degrees (Figure 4). None of the PhD-qualified researchers were female. More scientists on average are qualified to the PhD level in the higher education sector (27 percent at Njala University College and IMBO) than in the public sector (19 percent at SLARI), but this is a consistent finding in other African countries and elsewhere. The gap between SLARI and the higher education agencies in terms of PhD-qualified staff appears to have closed

Figure 4—Researcher qualifications by institutional category, 2001, 2005, and 2009



Source: IFPRI–SLARI 2009/10.

Note: Figures in parentheses indicate the number of agencies included in each category.

somewhat between 2001 and 2009, however.

As previously mentioned, the civil war prompted many well-trained scientists to abandon regional research stations and flee to Freetown or abroad, which eroded agricultural R&D capacity. Many scientists returned to their positions when the war ended, but senior researchers who fled the country during the war have little incentive to return. SLARI has successfully attracted a few, but training and capacity building are key challenges. The average age of RARC researchers is currently over 60 years, exacerbating the challenge of building capacity in the coming years. SLARI hired 20 research assistants in 2009/10, all of whom require MSc-level training if they are to become research officers. SLARI is hopeful of securing World Bank to achieve this important goal. In 2009, the African Development Bank (AfDB) funded MSc-level training for two SLARI scientists in South Africa and the Alliance for a Green Revolution in Africa (AGRA) for one scientist in Ghana. Absence of in-country training facilities means that most researchers have to be trained abroad, increasing the overall cost.

Sierra Leone's universities have been similarly challenged in their efforts to build capacity. Eight young BSc-qualified staff were hired as research assistants at IMBO in 2006, which explains the spike in this category's higher education share in recent years. And although these research assistants are currently undertaking MSc training, the universities reported having difficulties retaining staff. Given that an impressive publication record is a prerequisite for promotion, and research funding is scarce, faculty members reportedly lose motivation and seek advancement opportunities elsewhere.

INVESTMENT TRENDS

Cost Categories

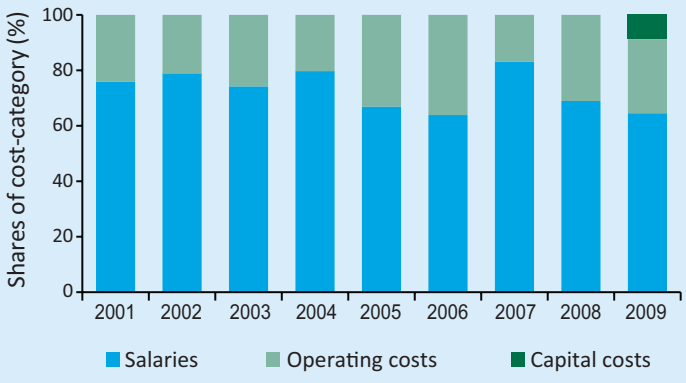
The allocation of research budgets across salaries, operating costs, and capital investments affects the efficiency of agricultural R&D, so detailed data on government agency cost categories were collected as part of this study. Of SLARI's total 2009 expenditures, salaries accounted for close to two-thirds, operating costs accounted for 27 percent, and capital costs accounted for 9 percent (Figure 5). Serious rehabilitation of SLARI's research centers only began in 2009, which explains the lack of capital expenditures between 2001 and 2008. This share is expected to rise significantly in 2010 and beyond, as more of SLARI's research centers are rehabilitated and re-opened. This will involve significant acquisitions of land, construction of administrative buildings and laboratories, and the development of related infrastructure. Initial efforts to rehabilitate KFTCRC and TLRC began late in 2009, but significant injections of capital will be needed to rebuild infrastructure and stock the stations with the necessary equipment. The campus of MLWRC has largely been rehabilitated but will not be ready to re-open until 2011, and construction has yet to begin on three further centers—FFRC, WPGRRC, and KHCRC—based on lack of available funding.

Funding Sources

Funding for agricultural R&D in Sierra Leone is derived from a number of sources, including the national government, foreign donations and development bank loans, and the sale of goods and services. In 2009, 82 percent of SLARI's expenditures were financed by national government allocations, 15 percent was raised through foreign donors and development bank loans, and the sale of goods and services contributed a further 4 percent (Figure 6). SLARI's salaries are entirely financed by the national government, as are recurrent costs and the rehabilitation of certain government assets that were damaged or destroyed during the war. Generally speaking, SLARI receives less than half the amount of government funding it requests at the beginning of each financial year and is therefore left with a shortfall that it meets through commercialization activities, including renting out guesthouses on SLARI grounds, conducting third party consultancies, and selling planting materials.

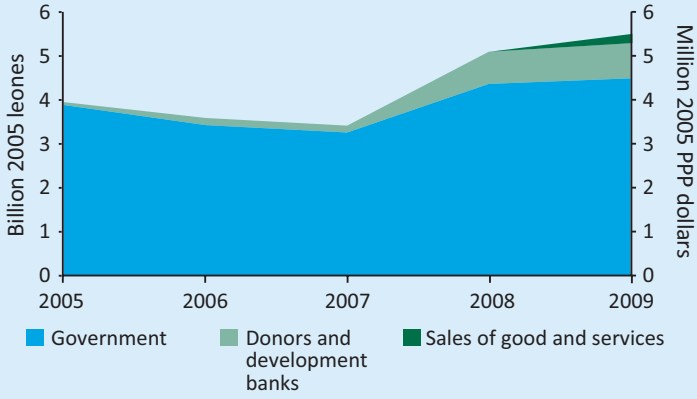
Since 2007, SLARI's share of donor funding has gradually increased, having been totally absent for years during the war. SLARI's clear vision, strategy, and operating plans have signaled the country's intent to re-establish an effective agricultural R&D system and this in turn has attracted important funding from donors like the AfDB, the World Bank, and the International Fund for Agricultural Development (IFAD). AfDB has provided various loans and grants that have indirectly supported RARC through a number of Africa Rice Center and FARA-led projects. The most important project in this regard is the New Rice for Africa (NERICA) project, led by the Africa Rice Center, which promotes the dissemination of new rice varieties in a number of West African countries,

Figure 5—Cost category shares of SLARI, 2001–09



Source: IFPRI–SLARI 2009/10.

Figure 6—SLARI's funding sources, 2005–09



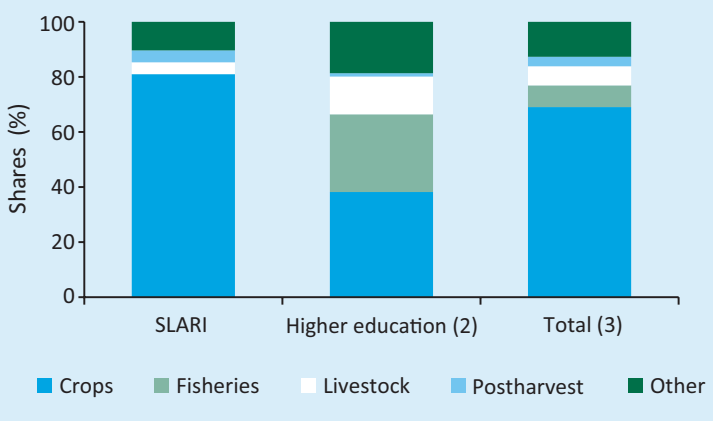
Source: IFPRI–SLARI 2009/10.

including Sierra Leone. NERICA-related funds were the largest source of external SLARI funding in 2009. AfDB has also indirectly supported SLARI through FARA, which manages a capacity building and information technology project in Sierra Leone.

The World Bank–financed Rural and Private Sector Development Project (RPSDP) is intended to stimulate agricultural production in Sierra Leone to pre-war levels, restore its comparative advantage in export crops, and improve domestic supply chains. The US$35 million project, operating from 2007 to 2012, includes a US$7 million component to support farmer-based organizations and technology improvement (World Bank 2007). Under the project, in addition to conducting research on improved cocoa and coffee varieties, SLARI has the responsibility of identifying new areas of comparative advantage in agricultural production and processing. Overall, SLARI is expected to receive US$1.6 million under RPSDP. IFAD is supporting the development of improved planting material for tree crops (in different districts from similar projects led by the World Bank and AfDB). In 2009, SLARI received 71 million current leones for the rehabilitation of Kpuwabu Clonal Garden as part of an IFAD project. Other SLARI donors in 2009 included the International Atomic Energy Agency (IAEA), the Japan International Cooperation Agency (JICA), IITA, the German Organization for Technical Cooperation (GTZ), and the Common Fund for Commodities (CFC).

Given that the University of Sierra Leone has no budget for research, IMBO's research programs are fully sponsored by foreign donors. In 2009, IMBO researchers worked on three donor-financed projects. The European Union financed an institutional support project for fisheries management in close collaboration with the Ministry of Fisheries. The project ends in 2010, and two of the expected outcomes are improved fisheries management and an assessment of the current status of marine fisheries (SLARI 2008). The other two projects are artisanal fisheries development projects funded by the AfDB and the UK Department for International Development (DFID) through the University of Portsmouth. The University of Njala allocates 15 percent of its budget towards research activities. In addition, IAEA and the Food and Agricultural Organization of the United Nations (FAO) have funded work in nuclear techniques in food and agriculture. The university also reported funding from DFID as part of the Development Partnerships in Higher Education (DELPHE) program.

Figure 7—Research focus by major commodity area, 2008



Source: IFPRI–SLARI 2009/10.

Note: Figures in parentheses indicate the number of agencies in each category.

ALLOCATION OF RESEARCH ACROSS THEMES AND COMMODITIES

The allocation of resources across various lines of research is a significant policy decision, so detailed information was collected on the number of FTE researchers working in specific commodity and thematic areas.

In 2008, two-thirds of Sierra Leone's agricultural researchers were conducting crop research (Figure 7). Fisheries research accounted for 8 percent of all FTEs, livestock for 7 percent, and natural resources research for 3 percent. The remaining researchers concentrated forestry, socioeconomic, postharvest, or other issues. These relative shares are expected to change significantly in the coming years, however, as SLARI opens its remaining research centers, thereby increasing research activities in the areas of fisheries, forestry, livestock, and natural resources.

Commodity Focus

Sierra Leone's most researched crops are rice and cassava, which each accounted for a quarter of total crop and livestock research in 2008. Other important crops include sorghum (7 percent), yams (4 percent), and groundnuts (4 percent) (Table 2). The country's livestock researchers concentrated primarily on poultry (4 percent).

Thematic Focus

In 2008, 17 percent of Sierra Leone's agricultural R&D staff focused on crop genetic improvement, 7 percent focused on crop pest and disease control, and 23 percent focused on other crop-related issues (Table 3). Other important research themes include water (9 percent) and soil (6 percent).

CONCLUSION

The 1991–2002 civil war that ravaged Sierra Leone virtually destroyed the country's agricultural R&D infrastructure. When hostilities ended, Sierra Leone began the long and painful process of re-establishing its agricultural R&D system, rehabilitating its

Table 2—Focus of crop and livestock research by major item, 2008

	SLARI	Higher education (2)	Total (3)
Crop items	Shares of FTE researchers (%)		
Rice	30.9	4.9	25.4
Cassava	28.0	14.7	25.2
Sorghum	8.5	—	6.7
Yam	4.9	2.0	4.3
Groundnuts	3.5	4.9	3.8
Other crop	16.1	36.3	20.4
Livestock items			
Poultry	2.1	9.8	3.7
Sheep and goats	1.1	4.9	1.9
Swine	1.1	4.9	1.9
Other livestock	3.8	17.6	6.7
Total crop and livestock	100	100	100

Source: IFPRI–SLARI 2009/10.

Note: Figures in parentheses indicate the number of agencies in each category.

Table 3—Research focus by major theme, 2008

	SLARI	IMBO	Total (2)
Shares by research theme:	Shares of FTE researchers (%)		
Crop genetic improvement	19.8	—	17.1
Crop pest and disease control	8.4	—	7.3
Other crop	26.8	—	23.1
Animal genetic improvement	3.0	—	2.6
Animal pest and disease control	2.3	—	1.9
Other animal	3.0	40.0	8.0
Soil	7.4	—	6.4
Water	4.1	40.0	9.0
Other natural resources	1.3	—	1.1
Postharvest	1.2	—	1.0
Other	22.7	20.0	22.3
Total	100	100	100

Source: IFPRI–SLARI 2009/10.
Note: Figures in parentheses indicate the number of agencies in each category.

research infrastructure, and rebuilding agricultural R&D capacity. The importance of agricultural S&T in bringing about social and economic development in Sierra Leone was quickly recognized by the national government, and a clear agricultural sector policy was developed, including the establishment of SLARI as the nation's primary agricultural research institute.

Much progress has been achieved in recent years. During 2001–09, national agricultural R&D expenditures more than doubled (in real terms), and total agricultural R&D capacity rose by half. Nonetheless, the country still has a long way to go in rehabilitating its research stations and laboratories, as well as recruiting and training research and support staff. In order to achieve all of this, a considerable amount of additional funding is needed. Importantly, the donor community has begun to respond with the implementation of a large number of projects. Reinstating a viable and sustainable agricultural R&D system will take time, but the foundations have been established in the form of solid policies supporting food security and export development, and government and donor funding to effect the necessary changes.

NOTES

[1] Financial data are also available in current local currencies or constant 2005 US dollars in the ASTI data tool (www.asti.cgiar.org/data).

[2] SLARI replaced the National Agricultural Research Coordinating Council (NARCC) when it was established in 2007.

[3] For more information about Pillar IV of CAADP and about FAAP, see <http://www.caadp.net/library-pillar4-documents.php>.

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IFPRI is one of 15 agricultural research centers that receive their principal funding from governments, private foundations, and international and regional organizations, most of which are members of the Consultative Group on International Agricultural Research (www.cgiar.org).

SLARI is Sierra Leone's principal government institute charged with agricultural research. The institute was established in 2007 and falls under the administrative coordination of the country's Ministry of Agriculture, Forestry, and Food Security. The institute holds a broad mandate covering crop, livestock, forestry, fisheries, and socioeconomic research.

The Agricultural Science and Technology Indicators (ASTI) initiative compiles, analyzes, and publishes data on institutional developments, investments, and human resources in agricultural R&D in low- and middle-income countries. The ASTI initiative is managed by the International Food Policy Research Institute (IFPRI) and involves collaborative alliances with many national and regional R&D agencies, as well as international institutions. The initiative, which is funded by the Bill & Melinda Gates Foundation with additional support from IFPRI, is widely recognized as the most authoritative source of information on the support for and structure of agricultural R&D worldwide. To learn more about the ASTI initiative visit www.asti.cgiar.org.

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