

# LAOS

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*This brief reviews the major investment and institutional trends in public agricultural research in Laos since the late 1990s, using recent data collected under the Agricultural Science and Technology Indicators (ASTI) initiative (IFPRI–NAFRI 2005).<sup>1</sup>*

## INTRODUCTION

With a per capita income of just US\$375 in 2003, the landlocked Lao People's Democratic Republic (hereafter, Laos) is one of Asia's poorest countries (World Bank 2005). Laos' socialist government was established in 1975, after a long-lasting war. During the first decade of its rule, the country endured relative political isolation, which seriously hindered economic growth. In 1986, the government of Laos realized that reforms were necessary and slowly took first strides to open up its economy by encouraging private enterprise and foreign direct investment. Rates and prices of agricultural produce were reset to close the gap with actual market prices and import barriers were lifted. These reforms led to remarkable economic growth during the 1990s (albeit from an extremely low base). However, the Asian financial crisis in 1997, along with the Lao government's own inability to manage the country's economy, led to skyrocketing inflation and a sharp depreciation of the Lao kip. Though its share decreased in recent years, the agricultural sector continues to dominate the Lao economy. As this sector is largely based on subsistence activities, it mostly operates outside the fiscal economy. In 2003, nearly 80 percent of the population was active in the agricultural sector, accounting for 49 percent of gross domestic product (GDP) (World Bank 2005). Rice farming predominates. Steady production increases have made Laos self-sufficient in rice production. Other important commodities include coffee, maize, peanut, sesame, soybean, tobacco, cotton, and sugarcane. Forestry also makes a significant contribution to the national economy. Many rural households depend heavily on forests for timber and nontimber forest products.

**Table 1—Composition of agricultural research expenditures and total researchers, 2003**

Type of agency	Spending		Researchers (fte's)	Share		Agencies in sample <sup>a</sup> (number)
	2000 Lao kip (millions)	2000 international dollars		Spending (percent)	Researchers	
<i>Public agencies</i>						
<i>Government</i>						
NAFRI	16,501.5	10.1	105.0	89.9	83.7	1
NUoL	1,723.3	1.1	18.4	9.4	14.7	2
<b>Subtotal</b>	<b>18,224.8</b>	<b>11.1</b>	<b>123.4</b>	<b>99.2</b>	<b>98.4</b>	<b>3</b>
Private enterprises <sup>b</sup>	140.2	0.1	2.0	0.8	1.6	1
<b>Total</b>	<b>18,365.0</b>	<b>11.1</b>	<b>125.4</b>	<b>100</b>	<b>100</b>	<b>4</b>

Source: Compiled by authors from ASTI survey data (IFPRI–NAFRI 2005).

<sup>a</sup> See note 2 for a list of the four agencies included in this sample.

<sup>b</sup> Expenditures for the higher-education agencies in our sample are estimates based on average expenditures per researcher at NAFRI. The 69 faculty staff employed in the two higher-education agencies spent between 25 and 30 percent of their time on research, resulting in 18.4 fte researchers.

## KEY TRENDS

- During 1998–2003, total agricultural researcher numbers in Laos rose steadily, while agricultural R&D expenditures contracted by half in constant prices during 1999–2003.
- The principal agricultural research agency, the National Agriculture and Forestry Research Institute (NAFRI) accounted for 90 percent of Laos' agricultural R&D spending in 2003.
- NAFRI employed only a few scientists holding PhD degrees. However, researcher qualification levels are expected to rise because a large number of NAFRI researchers are currently undertaking PhD and MSc training abroad.
- Since its establishment in 1999, NAFRI has depended almost exclusively on donor support, with the result that its donor-driven research does not always contribute to Laos' overall agricultural R&D needs.
- Private sector involvement in agricultural R&D is limited.

## ABOUT ASTI

The Agricultural Science and Technology Indicators (ASTI) initiative comprises a network of national, regional, and international agricultural R&D agencies and is managed by the International Service for National Agricultural Research (ISNAR) division of the International Food Policy Research Institute (IFPRI). The ASTI initiative compiles, processes, and makes available internationally comparable data on institutional developments and investments in public and private agricultural R&D worldwide, and analyses and reports on these trends in the form of occasional policy digests for research policy formulation and priority setting purposes.

Primary funding for the ASTI initiative's survey round in Asia was provided by the CGIAR Finance Committee/World Bank.

Given the importance of the agricultural sector to the Lao economy, agricultural research and development (R&D) plays an important development role for the country. We identified four agencies involved in agricultural R&D.<sup>2</sup> In 2003, these agencies employed a combined total of 125 full-time equivalent (fte) researchers and spent close to 18 billion Lao kip in 2000 constant prices, the equivalent of 11 million international dollars in 2000 constant prices (Table 1).<sup>3</sup>

The National Agriculture and Forestry Research Institute (NAFRI) is the only government agency involved in agricultural R&D in Laos. In 2003, this institute accounted for roughly 84 percent of the country's total agricultural researchers and 90 percent of expenditures. NAFRI was established in 1999 through the amalgamation of existing agriculture, livestock, fisheries, and forestry research centers, with the tasks of designing, implementing, and coordinating all agriculture and forestry research in Laos.<sup>4</sup> The institute is mandated to play a major role in the National Growth and Poverty Eradication Strategy (NGPES)<sup>5</sup> through the provision of improved technologies and information for crop, livestock, forestry, and aquatic resource production with the aim of improving productivity. NAFRI is administered by the Ministry of Agriculture and Forestry (MAF) and—unlike counterpart institutes in many other Asian countries—is not governed by a Board of Directors. Instead, matters related to the governance of the institute are handled by the office of the Director General and NAFRI's Administration Department. The institute is headquartered just outside the capital, Vientiane, and has an additional eight research centers: the Agriculture Research Centre (ARC), the Coffee Research Centre (CRC), the Forestry Research Centre (FRC), the Horticulture Research Centre (HRC), the Livestock Research Centre (LRC), the Living Aquatic Resources Research Centre (LARReC), the Northern Agriculture and Forestry Research Centre (NAFReC), and the Soil Survey and Land Classification Centre (SSLC). All centers are situated in or around Vientiane with the exception of NAFReC, which is based in northern Laos, and CRC, which is based in the south. As such, the Lao agricultural research system is highly centralized, making it difficult to respond to the needs of farmers in the country's more remote areas (NAFRI 2004). In 2003, the Luang Prabang-based NAFReC was designated a regional research center for the north of Laos. It has been assigned extended responsibilities for applied research and extension in the region, along with three research stations, previously used by the former national centers.<sup>6</sup> NAFRI employed 105 fte researchers in 2003. Its research centers vary considerably in size. In 2003, 24 fte researchers were based at the institute's headquarters; ARC, FRC, and LARReC employed 15, 14, and 13 fte researchers, respectively; and the remaining centers and stations employed 7 or fewer fte researchers each. NAFRI has three formal research programs: Agricultural and Forestry Technologies and Systems (75 fte researchers), Crop Improvement and Seed Production (20 fte researchers), and Resources Assessment (10 fte researchers).

The higher-education sector plays a limited role in the Lao agricultural research system, accounting for just 15 percent of the country's total fte research staff and an estimated 9 percent of agricultural R&D spending. We identified two faculties involved in agricultural R&D under the Vientiane-based National University of Laos (NUoL). The Faculty of Forestry (FoF) is the larger of the two, employing 12 fte researchers in

2003. FoF's research activities concentrate mainly on silvicultural issues and to a limited extent agroforestry and community forest issues. Most research activities are performed by individual staff members as part of collaborative programs initiated by other agencies. The faculty is currently setting up a formal research program for the next five years. NUoL's Faculty of Agriculture (FoA) employed seven fte researchers in 2003. These researchers were spread across three formal research programs: cropping systems and crop management, livestock and fisheries, and agroecomics and agroprocessing.

The private sector is still underdeveloped in Laos, a legacy of the country's Marxist–Leninist past. A number of state-owned enterprises are involved in the agricultural input and agro-industry sector, but very few make a profit. Permits are difficult to obtain for private-sector start-up companies in agriculture and standardized tax laws are largely absent. We identified only one private-sector agency directly involved in agricultural R&D in Laos: the BGA Lao Forestry Plantation Ltd. (BGA). The company has extensive eucalyptus and acacia plantations in the provinces of Bolikhamxai and Khammouane and has been active in Laos since 1996. BGA is 85-percent-owned by Oji Paper of Japan; the government of Laos holds the remaining 15 percent. The company's two fte researchers focus mainly on activities related to pulpwood from eucalyptus and acacia trees. Burapha, a subsidiary of the Swedish forest industry company Silvi Nova AB, conducted research on eucalyptus propagation techniques during the mid-1990s but has not been involved in research since. Nonetheless, there is limited cooperation between NAFRI and the private sector. NAFRI's research activities are not very well linked to market demand, and the private sector does not participate in the institute's research planning (NAFRI 2004).

Laos' agricultural research agencies participate in a significant amount of collaborative research nationally, regionally, and on an international basis. At the national level, NAFRI and NUoL maintain close linkages. The agencies share a portion of their information and communications technology infrastructure, and NAFRI supervises students from NUoL on a regular basis. NAFRI and NUoL staff also participate in joint research activities. NAFRI hires university staff on contract to increase its capacity to develop and deliver products and services. A Memorandum of Understanding (MOU) has also been formalized between NAFRI; the Department of Forestry, under MAF; and NUoL's FoF. The MOU establishes formal cooperation by upgrading the knowledge of teachers and forestry officers; developing curricula; participating in workshops, meetings and training programs; facilitating research work; and sharing information. Linkages have also been established between NAFRI and agricultural research agencies in neighboring countries such as Thailand and Vietnam and with various regional organizations including the Asia Pacific Association of Agricultural Research Institutions (APAARI), the Asia Pacific Association of Forestry Research Institutions (APAFRI), the Mekong River Commission (MRC), and various centers of the Consultative Group on International Agricultural Research (CGIAR)—mainly the International Rice Research Institute (IRRI) and the International Center for Tropical Agriculture (CIAT). Many of the linkages are initiated by NAFRI's nine research centers and are related to specific commodities (NAFRI 2004). NAFRI is also involved in joint research with Lund University in Sweden and the Swedish

University of Agricultural Sciences (SUAS). NUoL collaborates with over 50 foreign universities, institutions, and organizations in training, exchanging lecturers and students, and joint research. NUoL is a member of the ASEAN University Network (AUN) and the Greater Mekong Subregion Academic and Research Network (GMSARN), among other initiatives. The German Technical Co-operation (GTZ) and the International Development Research Center (IDRC, Canada) are other important scientific partners. In addition, NUoL has established cooperation with universities in Australia, Canada, China, France, Germany, Japan, South Korea, New Zealand, Sweden, Thailand, and Vietnam (NUoL 2005).

## HUMAN AND FINANCIAL RESOURCES IN PUBLIC AGRICULTURAL R&D

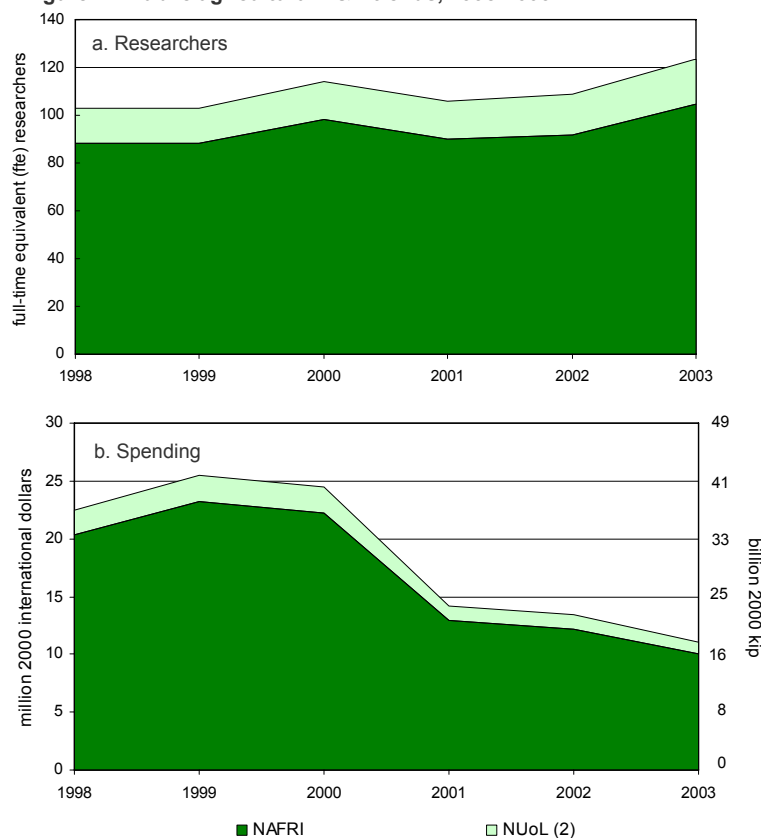
### Overall Trends

The total number of public fte agricultural research staff increased steadily from 103 in 1998 to 123 in 2003, an average annual rate of 2.9 percent (Figure 1a). In 1998, NAFRI's predecessors employed a combined 88 fte researchers. During the first two years after NAFRI's establishment, researcher numbers rose to 98, then contracted to 90 in 2001 when NAFRI's Forest Inventory and Planning Office was transferred to the Department of Forestry and certain researchers were sent abroad for training. Numbers rebounded quickly, however, reaching 105 in 2003 and 125 in 2004, mainly through the recruitment of project-based contract staff. Research staff at the two NUoL faculties rose slightly from 15 in 1998 to 18 in 2003.

NAFRI has invested great effort in developing its human resource capacity through a medium-term, human-resource development plan. As part of this plan, total researcher numbers are scheduled to rise at an annual rate of 4 to 5 percent until 2010. Permanent staff numbers are limited because of a MAF-imposed recruitment quota. To overcome this problem, NAFRI takes on an average of five new graduates from NUoL per year on a contract basis. In addition, 10 NAFRI technicians each year, on average, are sent to NUoL for BSc-level training. Further, 35 researchers are currently abroad for advanced degree training.

Total agricultural research expenditures in Laos followed a steep downward trend during 1998–2003 (Figure 1b). Throughout this period, spending fell at 15.8 percent per year, from \$22 to \$14 million (in 2000 international dollars). In 1999, the year in which NAFRI was established, the institute's expenditures were higher (\$23 million) than those of the institute's predecessors the year before (\$20 million). Nevertheless, spending levels followed a declining trend thereafter, more than halving between 1999 and 2003. Increased donor funding during 2004 caused total NAFRI spending to rise again to \$12.6 million that year (see section on *Financing Agricultural R&D* on page 6). As mentioned, Laos endured mass inflation during the late 1990s. The rapid decline in total agricultural R&D expenditures during 1998–2003 is less severe when expenditures are expressed in current Lao kip.

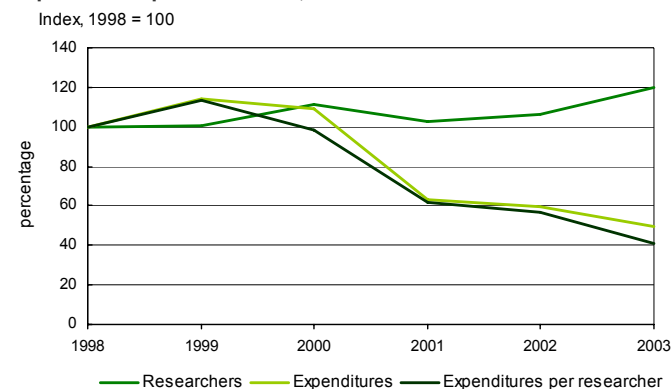
Figure 1—Public agricultural R&D trends, 1998–2003



Source: Compiled by authors from ASTI survey data (IFPRI–NAFRI 2005).  
Notes: See Table 1. Figures in parentheses indicate the number of agencies in each category. Expenditures for the higher-education agencies in our sample are estimates based on average expenditures per researcher at NAFRI. Underlying data are available at the ASTI website ([www.asti.cgiar.org](http://www.asti.cgiar.org)).

Average expenditures per researcher rose following NAFRI's establishment, peaking at \$247,000 in 1999 (Figure 2). This figure fell rapidly in subsequent years, however, reaching \$90,000 in 2003. If Lao agricultural research were not heavily donor supported, average spending would be well below the levels above.

Figure 2—Trends in public expenditures, researchers, and expenditures per researcher, 1998–2003

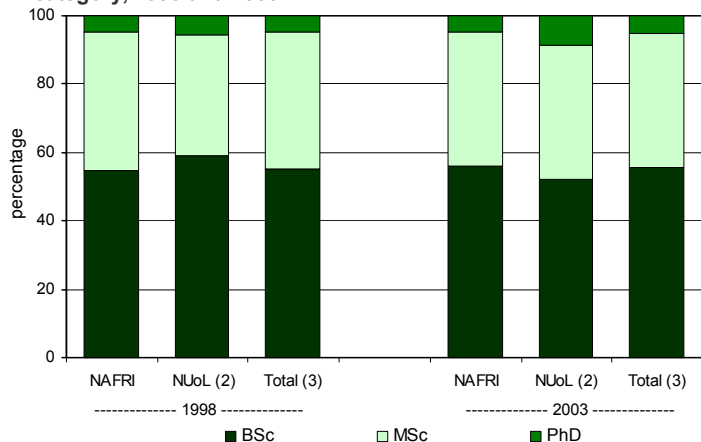


Sources: See Figure 1.  
Notes: See Figure 1.

## Human Resources

In 2003, 45 percent of Lao fte researchers were trained to the postgraduate level, and 5 percent held PhD degrees (Figure 3). The two higher-education agencies reported a slightly higher share of research staff holding PhD degrees than the staff at NAFRI (9 percent compared with 5 percent). The share of agricultural research staff holding PhD degrees in Laos is one of the lowest in the world. In 2004, only 4 researchers at NAFRI held a PhD degree, down from 6 in 2000 due to the transfer of 2 PhD-qualified researchers to other MAF departments.

**Figure 3—Educational attainment of researchers by institutional category, 1998 and 2003**



Source: Compiled by authors from ASTI survey data (IFPRI–NAFRI 2005).  
Note: Figures in parentheses indicate the number of agencies in each category.

Qualifications of research staff at the three Lao public R&D agencies remained unchanged from 1998 to 2003. The share of MSc and PhD research staff as a percentage of total research staff remained constant at 45 percent. The age distribution of NAFRI scientists may be a reason for concern. In 2003, 56 percent of NAFRI's researchers were 40 years or older, 28 percent was between 30 and 40 years old, and 16 percent was younger than 30. Shares were similar at the two NUoL faculties, with about 50 percent of scientists aged over 40, 30 percent aged between 30 and 40, and 20 percent below 30 years old. Given the relatively high share of researchers in the older age bracket, policymakers should begin planning strategies both to replace retiring researchers and train the younger (mostly lower qualified) ones.

The low level of qualified staff seriously constrains NAFRI's ability to achieve its organizational objectives. Very low civil service salaries and benefits make attracting, motivating, and retaining highly qualified research staff extremely difficult, particularly as new job opportunities with international organizations, nongovernmental organizations (NGOs), and private-sector agencies arise. In addition, government policies severely limit the number of new civil service staff that can be recruited. Donor-funded training opportunities are available, but many staff are ineligible for a number of reasons, including a lack of knowledge of English. English language education was virtually nonexistent in Laos until the political and economic reforms in the late 1980s and early 1990s. When the country began to open up its economy, NAFRI stressed the importance of English language training, as

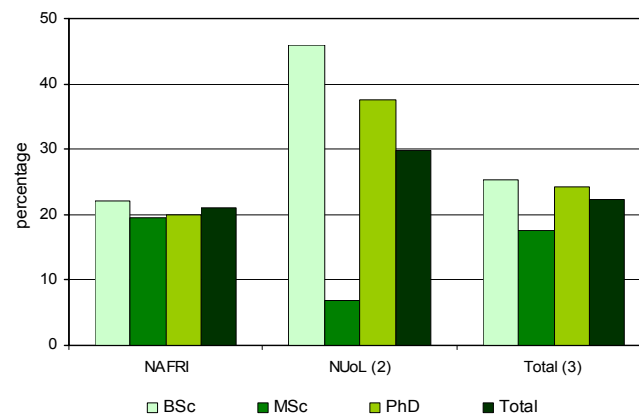
well as upgrading BSc staff to the MSc level; nevertheless, until the mid-1990s, poor English language capacity continued to prevent staff from taking advantage of international training opportunities, and in certain cases it still does (NAFRI 2004).

The fact that NUoL only offers BSc-level training compounds the relatively low qualification levels of Lao scientists, forcing them to go abroad for postgraduate training. Further, Laos' political isolation from the outside world during the 1970s and 1980s seriously hindered such opportunities abroad. The few researchers that were able to receive PhD training went to other socialist countries, such as the Soviet Union and Vietnam. The number of NAFRI research staff eligible for PhD-level training abroad has risen since the late 1990s, given the improved English language skills among certain scientists. Currently, 10 researchers are following PhD programs in the Philippines, Sweden, Thailand, Vietnam, and the United Kingdom. The first of these PhD graduates are due to return to NAFRI this year (2006). An additional 25 scientists are currently undertaking MSc training abroad. Most donor-funded training is long-term; short-term training has been cut significantly in recent years. At certain NAFRI centers, the number of scientists undertaking long-term training seriously limits the institute's capacity to implement ongoing research activities.

NAFRI is not the only agricultural research agency in Laos with low staff qualifications. More than half the research staff at the two NUoL faculties held BSc degrees in 2003. However, NUoL is working toward remedying this situation. More than 15 percent of the university's (agricultural and nonagricultural) scientists are sent abroad for advanced training each year. As of 2006, NUoL is expected to offer MSc-level agricultural training itself, allowing Lao agricultural scientists to undertake MSc training in their own country.

Despite a rise in the number of women pursuing scientific careers worldwide, they still tend to be under-represented in senior scientific and leadership positions (Sheridan 1998). Laos is no exception. In 2003, 22 percent of the fte researchers at NAFRI and the two NUoL faculties were female (Figure 4). Roughly one-quarter of PhD- and BSc-qualified researchers and 18 percent of the MSc-qualified researchers in these agencies were female. The share of female researchers in the higher-education agencies, at 30 percent, is higher than the corresponding share recorded at NAFRI (21 percent).

**Figure 4—Share of female researchers, 2003**

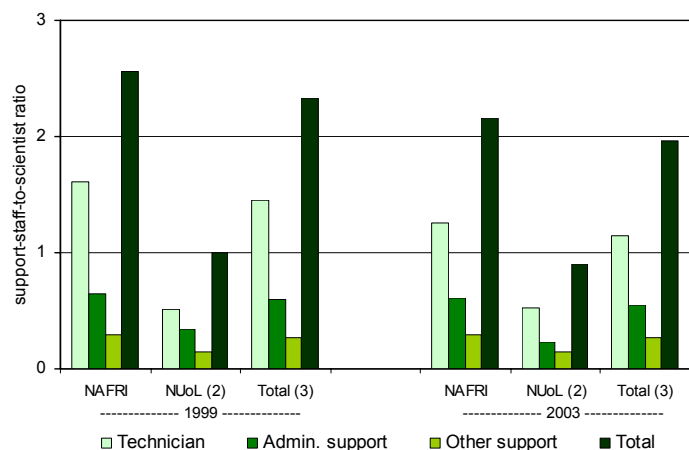


Source: Compiled by authors from ASTI survey data (IFPRI–NAFRI 2005).  
Note: Figures in parentheses indicate the number of agencies in each category.



In 2003, the average number of support staff per scientist in our three-agency sample was 2.0—comprising 1.1 technicians, 0.6 administrative personnel, and 0.3 other support staff, such as laborers, guards, drivers, and so on (Figure 5). Consistent with findings in most developing countries around the world, Laos' 2003 support-staff-per-researcher-ratio for the two higher-education agencies included in our sample (0.9) was much lower than the corresponding ratio for NAFRI (2.2). Four years earlier, the equivalent ratio for the three-agency sample was slightly higher (2.3) as a result of a small decline in technician numbers during 1999–2003. This drop can be explained by previously mentioned upgrades of technicians to the BSc level.

**Figure 5—Support-staff-to-researcher ratios, 1999 and 2003**

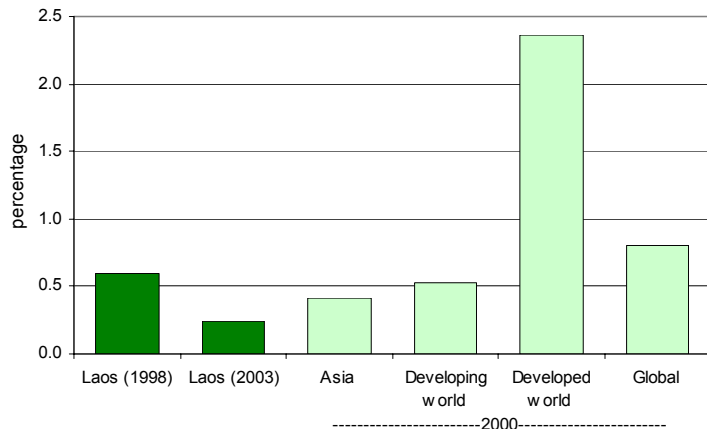


Source: Compiled by authors from ASTI survey data (IFPRI–NAFRI 2005).  
Note: Figures in parentheses indicate the number of agencies in each category.

## Spending

Total public spending as a percentage of agricultural output (AgGDP) is a common research investment indicator that helps to place a country's agricultural R&D spending in an internationally comparable context. In 2003, Laos invested \$0.24 for every \$100 of agricultural output, which was significantly lower than the corresponding ratio in 1998 (0.59) (Figure 6). By way of comparison, the reported 2000 average for Asia was 0.41, and for the developing world as a whole it was 0.53.

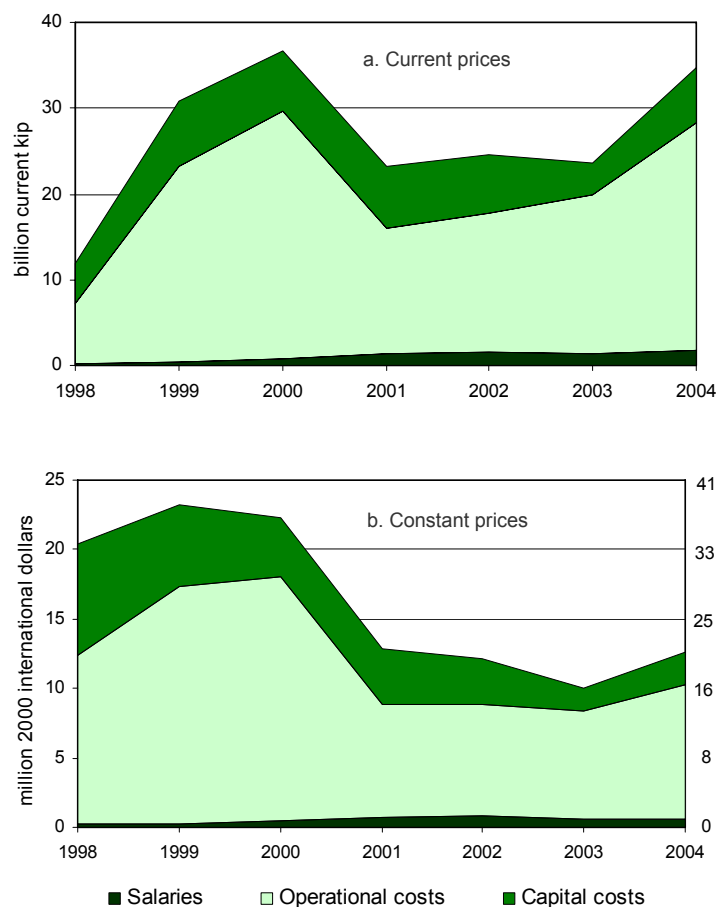
**Figure 6—Laos' public agricultural research intensity compared regionally and globally**



Sources: Laos data are compiled from Figure 2; AgGDP data are from World Bank (2005); all other intensity ratios are from Pardey et al. (2006).

In 2004, operating costs accounted for more than three-quarters of NAFRI's total spending. Around one-fifth was allocated to capital costs, while salaries represented just 5 percent of the total (Figure 7a and 7b). Given the mass inflation of the late 1990s, the Lao kip lost 87 percent of its value between June 1997 and June 1999. Consequently, NAFRI's total spending levels show a completely different trend when expressed in current kip rather than 2000 international dollars. During 1998–2000, NAFRI's spending increased more than threefold when expressed in current kip, but remained relatively stable when expressed in international dollars. Similarly, total 2004 expenditures were comparable to those in 2000 when expressed in current kip, but roughly half when expressed in international dollars.

**Figure 7—Cost-category shares in NAFRI's expenditures, 1998–2004**



Source: Compiled by authors from ASTI survey data (IFPRI–NAFRI 2005).

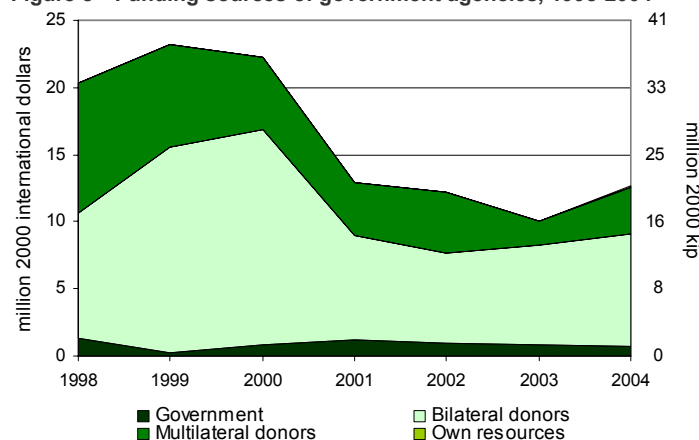
Salary levels are extremely low in Laos and this is reflected in the share of salary spending in NAFRI's total expenditures (just 4 percent on average during 1998–2003).<sup>7</sup> In 2003, monthly research staff salaries ranged from US\$30 to US\$50. This further emphasizes NAFRI's challenge when it comes to attracting, motivating, and retaining qualified research staff. Operating costs rose rapidly from \$12 million in 1998 to \$18 million in 2000; they subsequently fell swiftly to an average of \$8 million during 2001–04. Worldwide, donor-supported agricultural R&D projects typically finance important capital investments. In contrast, most donor-funded projects at NAFRI emphasized field research activities. Large shares of donor

funding were earmarked for maintenance costs; short-term in-country training; field work, materials, and consumables; and meetings, seminars, and conferences, among other activities. NAFRI's capital expenditures decreased gradually during 1998–2004, from \$8 million in 1998 to \$2 million in 2004. In the years immediately following NAFRI's establishment, the institute received sizeable amounts of funding from the Swedish International Development Cooperation Agency (Sida). This funding was allocated to important operating and capital costs as part of the Lao–Swedish Forestry Program (LSFP) (see the section on *Financing Public Agricultural R&D* below).

## FINANCING PUBLIC AGRICULTURAL R&D

Over the past decade, funding for NAFRI's agricultural research came from a number of sources, principally foreign donors, the national government, and internally generated resources. During 1998–2004, more than 60 percent of NAFRI's total funding was contributed by bilateral donors, close to one-third by multilateral donors, 5 percent by the Lao government, and less than 1 percent through internally generated resources (Figure 8). The various shares have shown significant fluctuations over time, but the share of government funding never exceeded 10 percent over this time. In fact, the share of government funding has declined continuously since 2001, mainly due to limited funds in the national budget. NAFRI receives roughly 20 percent of the total annual budget allocated to MAF.

Figure 8—Funding sources of government agencies, 1998–2004



Source: Compiled by authors from ASTI survey data (IFPRI–NAFRI 2005).

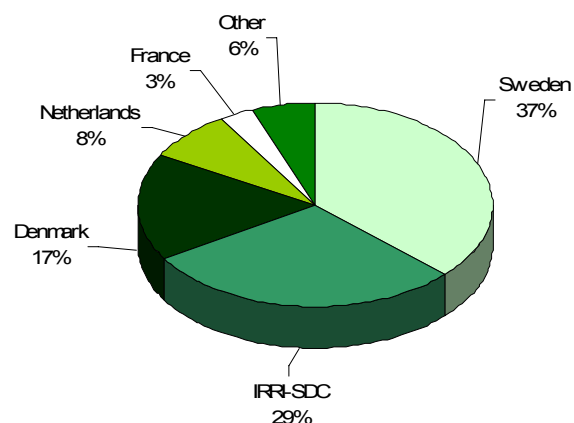
All nine research centers under NAFRI prepare annual work plans for their government-funded R&D activities, based on the plans of individual researchers. These plans and budgets are submitted to NAFRI headquarters, where they are in turn reviewed, consolidated, and approved. The implementation of the work plans takes place through quarterly plans, which form the basis for center-level activities.<sup>8</sup> The same financial procedures apply for NAFRI-managed donor funds. This category of funding mainly consists of a large Sida fund for the Lao–Swedish Upland Agriculture and Forestry Research Program 2001–06 (LSUAFRP) (NAFRI 2004).

The donor community has contributed very generously to agricultural R&D and to NAFRI programs and projects. Most donors focus their activities on field-related research programs

that have a direct impact on poverty and rural livelihoods. Sound coordination of donor activities and projects is an important challenge for NAFRI so as to ensure the use of consistent approaches and adherence to national priorities.

Just three donors were responsible for about three-quarters of NAFRI's funding during 1998–2003: the Swedish International Development Cooperation Agency (Sida), IRRI with co-funding from the Swiss Agency for Development and Cooperation (SDC), and the Danish International Development Agency (Danida) (Figure 9). The first links of development cooperation were established between Laos and Sweden in the 1970s.<sup>9</sup> LSFP began toward the end of the decade and comprised four phases. During the first and second phases, the program focused on logging, forest management, silviculture, and sawmilling; it also contained a strong training program. Throughout the third phase of LSFP, the program was broadened to include sustainable land management, institution building, decentralization, and Lao ownership approaches. The fourth phase, which ran from 1996 to 2001, cost 135 million Swedish krona, the equivalent of about US\$13 million.<sup>10</sup> The goal of this phase was to increase forestry research capacity through human resource development and the dissemination of improved forestry technologies. The program was responsible for the establishment of FRC in 1996, including the center's long-term plan for strategic forestry research. In addition, LSFP financed the establishment of the station currently known as the Agroforestry Research Center in Luang Prabang. This station is mandated to create an adaptive research system that will produce results relevant to improving land use in the upland areas of Laos, particularly shifting cultivation areas. Of the total cost of the LSFP's fourth phase, 17 percent (US\$2.2 million) was disbursed to NAFRI's predecessor, FRC, and the present agroforestry research station at NAFReC.<sup>11</sup> The program was implemented by MAF's Department of Forestry with technical assistance from Sweden.

Figure 9—NAFRI donor funding by donor, 1998–2004



Source: Compiled by authors from NAFRI (2003).

Building on the success of LSFP, Sida launched LSUAFRP in 2001. This program is based at NAFRI and objectives include the development of productive upland technologies and land management recommendations; NAFRI capacity strengthening; and the provision of information, feedback, and methodologies for natural resource planning and policy development. The program aims to promote a demand-driven agricultural R&D

system that works hand-in-hand with farmers and extension workers. LSUAFRP aims to enhance skills and capacities at NAFRI in a number of areas, including research and information management, socioeconomic research, English language, and the technical aspects of research. The project was initially scheduled to run until September 2005 but has been extended until September 2006. The total project cost amounts to US\$8.1 million.

IRRI has been a consistent scientific partner to NAFRI and its predecessors since the late 1960s. It has also financed various projects. The Lao–IRRI Research and Training Project aims to improve and strengthen the country’s rice research capacity. The project initially ran from 1990 to 1993 but was extended several times. It is now scheduled for completion in June 2006. Project costs total roughly US\$15 million, largely derived from IRRI and co-funding from SDC. Many rice researchers received training as part of this project. Training ranged from formal MSc degrees to nondegree and on-the-job training at IRRI (IRRI n.d.). Given the numerous extensions, the project has developed from a basic training program into a functional national rice research program (NRRP) involving more than 120 researchers across all provinces. Phase 4 of the project, from 1999 to 2003, consolidated the NRRP, fostered national leadership, and made research more relevant to farmers through the adoption of a participatory research and development approach. It also emphasized the highly diverse upland production systems.

Danida financed five separate agricultural R&D projects in Laos during 1998–2004 with a combined total cost of nearly US\$6 million. Most of the Danish-financed projects focused on fisheries and aquaculture; projects included the Establishment of the National Aquatic Resources Research Institute, the Sustainable Management of Reservoir Fisheries in the Mekong Basin II, the Assessment of Mekong Fisheries Capture, and the Aquaculture of Indigenous Mekong Fish Species. In addition, Danida funded the Lao PDR Tree Seed Program, which ran from 1998 to 2003. Other NAFRI donors include the Netherlands and France, accounting for 8 and 3 percent of total donor funding, respectively, during 1998–2004.

An often-voiced concern is that the emphasis of donors on field-oriented programs combined with the very limited government investment in structural and human resource infrastructure promotes a situation where new technologies, inputs, and management practices are not available in sufficient quantities to meet the needs of the country’s different production systems. A great, unmet demand exists for new commodity varieties and breeds of animals. Most NAFRI centers lack the basic capacity for key tasks, such as varietal evaluation (in multiple locations), seed multiplication, and animal production to effectively support on-farm research efforts—the core of NAFRI’s applied and adaptive research work (NAFRI 2004). NAFRI foresees the need to reorient its programs to address this situation through institutional cooperation with research institutes in neighboring countries like Vietnam, joint and collaborative research with other (foreign) agencies, and long-term training in fields lacking critical expertise. However, considering the ongoing limitations of government funding and the serious lack of human resource capacity, it will take quite some time to develop the required level of resources.

Very few donor-financed projects at NUoL have a research

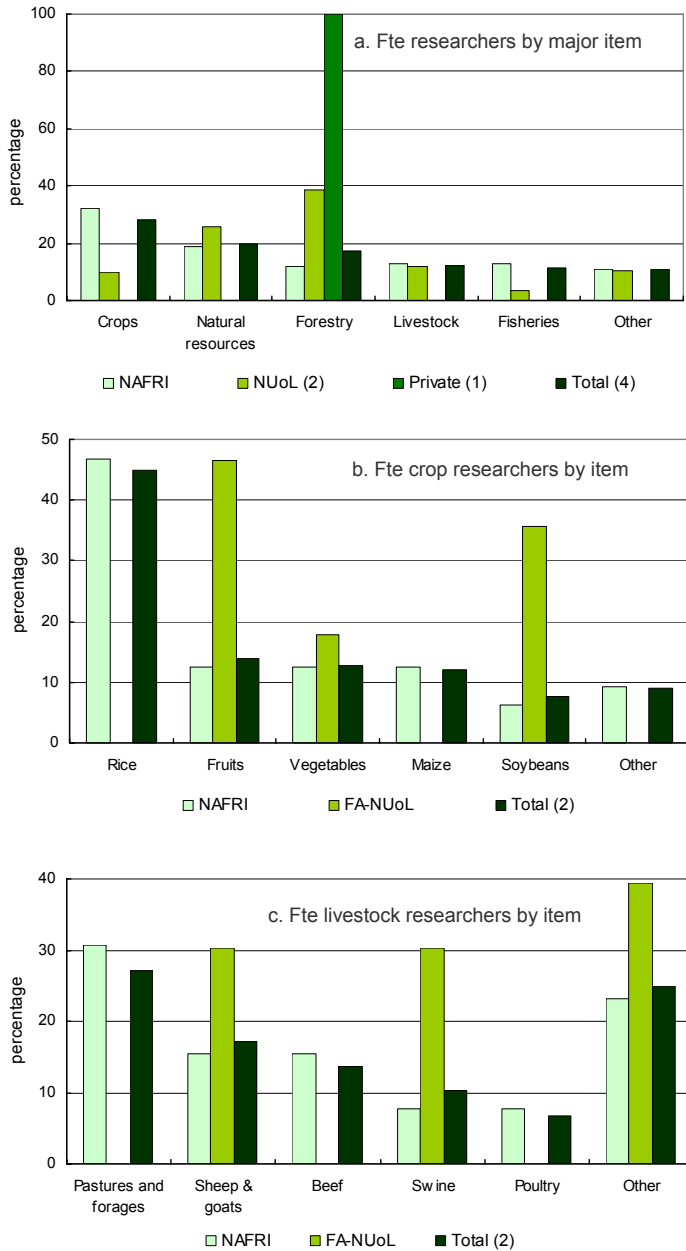
component. GTZ provided a relatively small R&D budget to FoF for forest management and silviculture as part of its model training area program, which ended in 2003. IDRC funded the Community Based Natural Resource Management Research Capacity Building Project at NuoL, which began in November 1999 as an extension of the Nam Ngum Watershed Resource Management Project (1992–96) and concluded in December 2002. The project funded field-based research on problems pertaining to natural resource tenure in three separate villages in the Vientiane area. The project involved 11 scientists from 4 NUoL faculties (FoF, FoA, the Faculty of Economics and Management, and the Faculty of Social Science) and researchers from four foreign agencies (Chiang Mai University [Thailand], the East–West Center [United States], the University of Sydney, and New York University). The project’s objective was to develop research interest in community-based natural resource management and food security issues at NUoL, to strengthen the linkages between NUoL and other Lao institutes and organizations working on natural resource management, to encourage student involvement, and to disseminate findings and develop teaching materials. Communication and collaboration with other national institutes, nevertheless, was rather limited in the end (NUoL and IDRC 2003).

## RESEARCH ORIENTATION

### Commodity Focus

The allocation of resources among various lines of research is a significant policy decision, so detailed information was collected on the number of full-time researchers working in specific commodity and thematic areas. In 2003, close to 30 percent of the country’s 125 agricultural full-time researchers conducted crop research. Natural resources research accounted for one-fifth of the total, forestry research for 17 percent, livestock research for 12 percent, and fisheries research for 11 percent (Figure 10a). Research staff at the government agencies spent relatively more time on crop and fisheries research than their counterparts at the higher-education agencies, who in turn spent a relatively larger share of their research time on forestry and natural resources. This is not surprising given that FoF is the largest NUoL faculty involved in R&D. BGA, the only private company in our sample, conducts forestry research. Rice research accounted for 45 percent of all research on crops in 2003 (Figure 10b). Fruits, vegetables, and maize each accounted for between 10 and 15 percent of total crop research. The higher-education sector’s relatively high focus on fruit and soybeans is noteworthy. Most livestock researchers focused on pastures and **forages** (28 percent) (Figure 10c). Other livestock themes included sheep and goats (17 percent), beef (14 percent), swine (10 percent), and poultry (7 percent). Fodder research accounts for an important share of researchers’ time at NUoL, which explains the higher-education agencies’ high share of “other” livestock research.

Figure 10—Commodity Focus, 2003



Source: Compiled by authors from ASTI survey data (IFPRI–NAFRI 2005).  
 Notes: Figures in parentheses indicate the number of agencies in each category.  
 Figure 10b only includes agencies involved in crop research; Figure 10c only includes agencies involved in livestock research.

## Thematic Focus

The thematic research focus shares once again reveal the excessive donor dependence of agricultural R&D agencies in Laos. As mentioned previously, most donors focus their activities on field-related research programs that have a direct impact on poverty and rural livelihoods. This is reflected in the very high share (45 percent in 2003) of NAFRI researchers focusing on farming systems, mainly as part of LSUAFRP-financed upland technologies. In comparison, scientists in other South East Asian countries such as Vietnam and the Philippines spent 3 and 7 percent of their time on farming systems during the same year, respectively. In addition, 10 percent of NAFRI research staff concentrated on crop genetic improvement, and 10 percent on natural resources. Most other researchers focused on other livestock- and crop-related themes as well as soils (Table 2).

The thematic research focus of the other three agencies (two NUoL units and BGA) looked quite different. In 2003, more than 60 percent of these researchers focused on natural resources, mostly forestry, which is not surprising given the forestry mandates of FoF and BGA. The remaining researchers largely concentrated on a number of crop and livestock themes.

Table 2—Thematic focus, 2003

Category	Numbers of researchers		Shares	
	NAFRI	Other (3)	NAFRI	Other (3)
	<i>(in fte's)</i>		<i>(percent)</i>	
Crop genetic improvement	10.5	1.9	10.0	9.1
Crop pest and disease control	1.1	0.3	1.0	1.6
Other crop	8.4	1.5	8.0	7.1
Livestock genetic improvement	5.3	0.1	5.0	0.3
Livestock pest and disease control	0.0	1.0	0.0	4.9
Other livestock	9.5	2.1	9.0	10.4
Soil	5.3	0.3	5.0	1.6
Water	0.0	0.1	0.0	0.6
Other natural resources	10.5	11.8	10.0	57.8
Postharvest	0.0	0.3	0.0	1.6
Farming systems	47.3	0.3	45.0	1.6
Other	7.3	0.7	7.0	3.2
<b>Total</b>	<b>105.0</b>	<b>20.4</b>	<b>100.0</b>	<b>100.0</b>

Source: Compiled by authors from ASTI survey data (IFPRI–NAFRI 2005).  
 Notes: Figures in parentheses indicate the number of agencies in each category.



## CONCLUSION

Overall, agricultural researcher totals in Laos increased during 1998–2003, while the country’s agricultural R&D expenditures followed a more irregular trend. With the creation of NAFRI in 1999 through the amalgamation of the country’s nine existing research centers, total agricultural research spending grew immediately. It nevertheless dropped sharply in subsequent years and by 2003 had fallen 60 percent below its 1999 level (to \$11 million in 2000 international dollars). This decline was less severe, however, when expressed in current Lao kip.

Government funding for agricultural R&D accounted for an average of just 5 percent of NAFRI’s total funding during 1998–2003, which is extremely low compared with other Southeast Asian countries. However, the lack of government investment in agricultural R&D is offset by extensive donor funding, notably from Sida, IRRI-SDC, and Danida. Most donors focus on field-related research programs that directly affect poverty levels and rural livelihoods. They nevertheless neglect research into new crop varieties and animal species to address farmer needs across Laos’ highly diverse production systems. Consequently, a major concern is that NAFRI’s research agenda is too donor-driven, and that the country’s overall agricultural R&D priorities are not sufficiently addressed.

A severe cut in donor funding or the cessation of current donor projects could seriously impede NAFRI’s ability to function. In this scenario, increased financial support from the national government would have to be forthcoming, or many of the gains made under donor programs could be under threat or be totally eroded. Another factor compounding efficient agricultural R&D in Laos is the lack of qualified, experienced, and motivated scientists in specific priority areas. Ten NAFRI researchers are currently pursuing PhD-level training abroad, which will have a positive impact on NAFRI’s future capacity. However, NAFRI’s extremely low salary levels could very likely be a disincentive for these newly trained researchers to continue their employment at NAFRI, especially given the lure of opportunities at international agencies or NGOs, or in the private sector, where salaries are considerably higher.

Despite all this, agricultural R&D in Laos has actually made quite some progress in recent years, considering the fact that Laos is one of Asia’s poorest countries and one with a recent socialist and violent past. The last couple of years have seen the establishment of NAFRI, a move towards demand-driven and participatory research, a strong focus on poverty alleviation and rural livelihoods, and efforts to develop researcher qualifications under constrained financial and recruitment conditions.

## NOTES

1. The authors thank staff of NAFRI’s Socioeconomic Research Unit, numerous colleagues in Laos for their time and assistance in data collection, and Liliane Ndong for her data-entry assistance. They also thank Nienke Beintema, Bounthong Bouahom, Sitha Khemmarath, and Somsy Ngophansay for useful comments on drafts of this brief.
2. The four-agency sample consisted of:
  - One government agency: the National Agriculture and Forestry Research Institute (NAFRI);
  - Two higher-education agencies: the Faculty of Forestry (FoF) and the Faculty of Agriculture (FoA), both under the National University of Laos (NUoL); and
  - One private enterprise: BGA Lao Plantation Forestry Ltd. (BGA).
3. Unless otherwise stated, all data on research expenditures are reported in 2000 international dollars or 2000 Lao kip.
4. Historical information on the development of Laos’ agricultural R&D institutions was not available.
5. NGPES is the strategic framework under which all of the government’s future growth and poverty eradication programs will be developed and implemented. NGPES is the result of a process that began in 1996, when the sixth Party Congress defined the country’s long-term development objective as raising it out “least-developed country” status by 2020. NGPES focuses particularly on alleviating poverty in the country’s poorest districts (UNDP 2003).
6. Plans are in place to upgrade CRC to a regional, multicommodity and system-oriented center, based on the NAFReC model (NAFRI 2004). It is anticipated that NAFRI’s next five-year plan for 2006–10 will address this.
7. These figures reflect the contract salaries of support staff under donor-funded projects that are financially managed by NAFRI. Contract staff under donor-funded projects that are financially managed by the donor are included in operating costs. For this reason, total salary costs should in fact be slightly higher, while operational costs should be slightly lower.
8. The nine centers submit monthly financial reports and quarterly progress reports, allowing NAFRI headquarters to monitor research progress and budget spending. Financial management is the responsibility of the Administration, Personnel, Planning, Finance and Cooperation Division (APPFC) based at headquarters, which disbursed funds to the centers.
9. In the early years, Swedish support was geared toward postwar reconstruction. In 1976–77, Laos became a so-called program country for bilateral Swedish development assistance, and in 1978 an embassy with a Sida office was opened in Vientiane. During the 1980s, forestry and general support for roads and communications dominated Swedish cooperation in Laos.
10. Exact amounts of funding for other phases were unavailable.
11. The remaining 83 percent was allocated to nonresearch activities at the four National Biodiversity Conservation Areas (NBCAs) across the country and the provincial Agriculture and Forestry Offices in Sayabouly, Luang Prabang, Savannakhet, Salavanh, and Champassack.

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## METHODOLOGY

- Most of the data in this brief are taken from unpublished surveys (IFPRI and NAFRI 2005).
- The data were compiled using internationally accepted statistical procedures and definitions developed by the OECD and UNESCO for compiling R&D statistics (OECD 1994; UNESCO 1984). The authors grouped estimates using three major institutional categories—government agencies, higher-education agencies, and business enterprises, the latter comprising the subcategories private enterprises and nonprofit institutions. The researchers defined public agricultural research to include government agencies, higher-education agencies, and nonprofit institutions, thereby excluding private enterprises. Private research includes research performed by private-for-profit enterprises developing pre, on, and postfarm technologies related to agriculture.
- Agricultural research includes crops, livestock, forestry, and fisheries research plus agriculturally related natural resources research, all measured on a performer basis.
- Financial data were converted to 2000 international dollars by deflating current local currency units with a Lao GDP deflator of base year 2000 and then converting to U.S. dollars with a 2000 purchasing power parity (PPP) index, both taken from World Bank (2005). PPP's are synthetic exchange rates used to reflect the purchasing power of currencies, typically comparing prices among a broader range of goods and services than conventional exchange rates.
- Annual growth rates were calculated using the least-squares regression method, which takes into account all observations in a period. This results in growth rates that reflect general trends that are not disproportionately influenced by exceptional values, especially at the end point of the period.

See the ASTI website (<http://www.ASTI.cgiar.org>) for more details on methodology.

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