

# Key trends in public agricultural research capacity and investments in Central America

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*This brief provides an overview of the major investment trends in agricultural research in Central America since the early 1980s, drawing on a new set of data developed through a comprehensive survey by the International Food Policy Research Institute (IFPRI) and the Inter-American Institute for Cooperation on Agriculture (IICA).<sup>1</sup>*

## Capacity Trends

In 2006, the seven Central American countries combined employed 903 full-time equivalent (fte) researchers spread over 63 public agricultural research agencies. Close to half of these researchers worked in the government sector with the higher-education sector accounting for 36 percent and the non-governmental organizations (NGOs) combined for 16 percent (Table 1). However, the institutional composition of total researchers varied considerably among the seven Central American countries. In Costa Rica, Honduras, and Nicaragua, for example, the higher-education sector employed relatively more agricultural researchers than the government sector. The role of the government in Central American agricultural research and development (R&D) has decreased over the years, while the higher education sector has gained prominence.

**Table 1—Institutional composition of public agricultural R&D, 2006**

	Government	NGOs (percentage)	Higher education
Belize	53.9	38.3	7.8
Costa Rica	39.5	19.8	40.6
El Salvador	78.0	8.2	13.8
Guatemala	67.8	16.6	15.6
Honduras	14.6	30.2	55.2
Nicaragua	32.7	0.3	67.0
Panama	74.1	11.8	14.1
<i>Total Central America</i>	<i>48.2</i>	<i>15.9</i>	<i>35.9</i>

*Source:* Stads et al. (2008) based on data from the ASTI database.

*Notes:* NGOs also include producer organizations and foundations.

Costa Rica has the largest public agricultural R&D system in Central America when expressed in fte scientists. In 2006, 283 of Central America's 903 fte researchers worked in Costa Rica (31 percent) (Table 2). With 167 fte's in 2006, Panama had the region's second-largest agricultural R&D system. The systems of Nicaragua, Honduras, and Guatemala had between 100 and 135 fte scientists each. Agricultural R&D staff totals in El Salvador and Belize were much smaller, and accounted for 9 and 2 percent of the regional share in 2006, respectively.

<sup>1</sup> This brief was prepared for the World Bank's Innovation Systems workshop, Managua (Nicaragua), 2 July, 2008. It is based on a longer synthesis report on Central American public agricultural research capacity and investment trends, which will be available shortly at <http://www.asti.cgiar.org>. This brief has not undergone a formal review process. The interpretations and conclusions are those of the author, not necessarily those of IFPRI.

**Table 2—Public agricultural research staff totals, 1981-2006**

	1981	1991	2001	2006
	<i>(full-time equivalents)</i>			
Belize	11.6	13.0	14.2	16.7
Costa Rica	200.1	279.7	273.6	282.9
El Salvador	119.9	116.5	95.4	76.9
Guatemala	129.9	166.4	101.8	102.4
Honduras	113.7	170.4	139.1	123.7
Nicaragua	na	na	na	133.4
Panama	68.4	164.1	141.4	166.7
<i>Total Central America</i>	<i>na</i>	<i>na</i>	<i>na</i>	<i>902.6</i>
<i>Total without Nicaragua</i>	<i>643.7</i>	<i>864.4</i>	<i>765.7</i>	<i>769.2</i>

*Source:* Stads et al. (2008) based on data from the ASTI database.

*Notes:* "na" denotes "not available". Timeseries data for Nicaragua were unavailable.

During the period 1981–2006, total agricultural research staff in Central America (excluding Nicaragua) increased at an overall growth rate of just 0.04 percent per year. This rate is an average and hides substantial differences among subperiods, institutional categories, and countries. During 1981–86 total research staff in Central America showed a rapid increase, but overall capacity growth stalled during the second half of the 1980s and 1990s, reflecting the reduced interest of Central American governments to support staff in government-funded agricultural R&D agencies, following policies of structural adjustment and ideas of leaner government institutions. Total capacity plummeted in 1998, following a severe cut in the total number of scientists employed at *Instituto de Ciencia y Tecnología de Agrícola* (ICTA) in Guatemala. Since 1998, the total number of agricultural research staff in Central America has remained stable at averages around 900 fte's.

## Spending Trends

In 2006, combined spending on public agricultural R&D for the seven Central American countries totaled \$92 million (in 2005 international dollars) (Table 3).<sup>2</sup> Costa Rica (\$30 million) and Nicaragua (\$24 million) accounted for roughly one-third and one-quarter of this total, respectively. Honduras and Panama spent \$11 and \$10 million, respectively. Total agricultural R&D expenditures in Guatemala, El Salvador, and Belize were much lower at \$8, \$6, and \$3 million, respectively. During 1981-2006, total public agricultural research spending in six Central American countries combined (excluding Nicaragua) declined at an average rate of 0.4 percent per year. Once again, these averages mask a substantial degree of institutional and cross-

<sup>2</sup> Financial data in this brief are reported in real values using GDP deflators and purchasing power parity (PPP) indexes taken from the World Bank (2007). 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.

country variation. Agricultural R&D spending by government agencies (excluding Nicaragua) decreased steadily by 1.6 percent per year during 1981-2006, whereas the higher education sector reported gradually rising investment levels. This trend is concerning as government agencies typically conduct research in areas relevant to small-scale farmers. Research at higher education agencies (especially in Costa Rica), on the other hand, tends to focus more on problems faced by large- and medium-scale farmers. NGO spending proved to be somewhat more volatile. Increases in spending by this sector in Costa Rica were offset by declines in Honduras.

**Table 3—Public agricultural research spending, 1981-2006**

	1981	1991	2001	2006
	(in million 2005 international dollars)			
Belize	1.0	2.3	2.3	2.6
Costa Rica	13.4	20.9	26.7	29.9
El Salvador	13.5	10.5	6.0	5.7
Guatemala	21.4	11.4	9.4	8.3
Honduras	8.0	17.4	14.8	11.0
Nicaragua	na	na	na	24.1
Panama	10.1	12.6	10.5	10.0
<i>Total Central America</i>				91.6
<i>Total without Nicaragua</i>	67.5	75.1	69.6	67.5

Source: Stads et al. (2008) based on data from the ASTI database.

Notes: "na" denotes "not available". Timeseries data for Nicaragua were unavailable.

Total public agricultural research spending in Guatemala and El Salvador was severely cut during 1981-2006. In contrast, Costa Rica experienced a period of overall growth during this same period, largely due to increases in expenditures by the country's NGO sector. Spending trends in Honduras proved to be more erratic. Unfortunately, timeseries data were unavailable for Nicaragua. The *Instituto Nicaragüense de Tecnología Agropecuaria* (INTA), the country's main government agency, accounted for close to one-fifth of total agricultural R&D spending in Central America in 2006. Nonetheless, INTA is highly donor-dependent and its total spending levels vary largely from one year to the next as a result.

Total public agricultural R&D spending as a percentage of agricultural output (AgGDP) is a commonly used indicator of a country's research investment levels and a useful means of comparing agricultural R&D spending across countries. In 2006, the seven Central American countries combined invested \$0.31 for every \$100 of agricultural output (Table 4). This average masks significant differences between countries. In 2006, only

**Table 4—Research intensity ratios, 1996 and 2006**

	1996	2006
	(percentage)	
Belize	0.88	0.95
Costa Rica	0.81	0.93
El Salvador	0.26	0.15
Guatemala	0.14	0.06
Honduras	0.45	0.37
Nicaragua	na	0.94
Panama	0.77	0.50
<i>Total Central America</i>	na	0.31
<i>Total without Nicaragua</i>	0.33	0.25

Source: See Table 3. AgGDP data are from World Bank (2008).

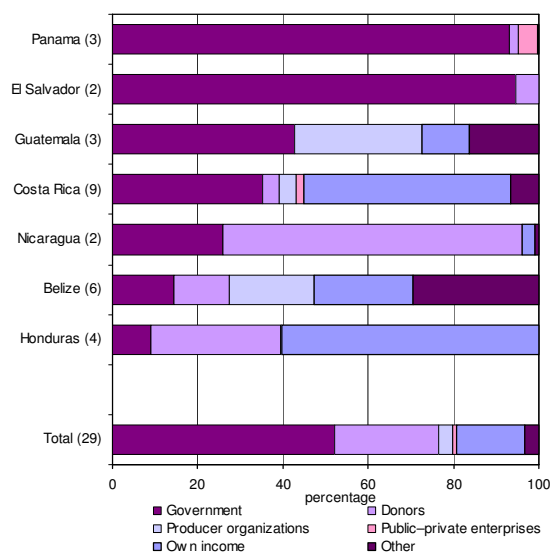
Note: "na" denotes "not available".

one country in Central America (Belize) had agricultural research intensity ratios around 1.0 percent, the widely-recommended preferred minimum level in recent literature. The ratios for Guatemala and El Salvador are among the lowest in the world, at 0.06 and 0.16 percent, respectively. Overall, the Central American region has a much lower research investment intensity level than other parts of Latin America. Countries like Chile, Mexico, and Brazil all spend more than 1 percent of their AgGDP on agricultural research.

### Agricultural Research Funding

In 2006, 52 percent of agricultural research for a sample of 29 Central American government and nonprofit agencies was financed by national governments, 24 percent by foreign donors, and 16 percent through internally generated income. The remainder came from a variety of sources including producer organizations and marketing boards, as well as public and private enterprises (Figure 1). Research in El Salvador and Panama relies almost exclusively on funds provided by the national governments of these two countries. Public agricultural R&D in Nicaragua, on the other hand, has traditionally been very donor-dependent. In 2006, just 26 percent of INTA's budget was financed by the Nicaraguan government and 70 percent came from donors and multilateral development banks. Public agricultural R&D in Costa Rica and Honduras shows a relatively higher reliance on internally generated resources compared to other countries in the region.

**Figure 1—Funding sources of government agencies and NGOs, 2006**



Source: Stads et al. (2008) based on data from the ASTI database.

Note: The number in brackets denotes the number of sample agencies in each country. Combined, the 29 sample agencies accounted for 74 percent of total agricultural R&D spending in Central America in 2006.

### References

- Stads, G. J., F. Hartwich, and D. Rodriguez. 2008. *Agricultural research in Central America: Policy, investments, and institutional profile*. ASTI Report. Washington, D.C and San José, Costa Rica: IFPRI and IICA. (forthcoming)
- World Bank. 2008. *World development indicators 2008*. Washington, D.C. CD-ROM.