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## Estimating Historical CGIAR Research Investments

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## 1. Introduction

CGIAR donors as well as other stakeholders have recognized the importance of credible evidence on the outputs and outcomes associated with CGIAR research, particularly at system level (System Council, 2016). The importance of tracking the research areas towards which investments are directed is less acknowledged, yet this information is essential for prioritizing impact assessments and conducting cost benefit analyses at the system level. Additionally, donors have sought strategic guidance in the past, from advisory bodies such as the ISPC, on how best to prioritize CGIAR investments within the overall research agenda. Such system level approaches require an understanding of current research investment allocations.

Between 1972 and 2005, the CGIAR Secretariat categorized Center investments in several ways: by object of expenditure (personnel, supplies, etc.); geographical region; commodity group and production sector; and output or undertaking (e.g., productivity, environment, policy). The categorized data was used by Technical Advisory Committee (TAC) to describe CGIAR priorities, and reallocate core resources across geographical regions, commodity group and production sector or undertaking (see, for instance Gryseels et al., 1992). Beginning in 2006, the categories changed to object of expenditure, geographical region, and priority areas<sup>1</sup> (genetic improvement, sustaining biodiversity, policies and institutional innovations—comparable to ‘undertaking’). By 2010, classification by priority areas was dropped. Since 2010, investments have only been categorized by Center and by region in the CGIAR financial reports.

This paper presents results of a pilot effort to show past investment data using one consistent set of categories, over the history of the CGIAR. It draws on the CGIAR’s publicly available financial reports<sup>2</sup>. Sections 2 and 3 present data on the allocation of system-level expenditure by research area and research theme. Section 4 describes efforts to construct research expenditure trends for three research areas—livestock, agroforestry, water and irrigation—from the budget of centers known to work in those areas. Section 5 presents system-level trends by region. Section 6 briefly summarizes an effort to categorize expenditure by system-level outcomes in CGIAR’s Strategy and Results Framework (SRF) 2016-2030. Each section also describes the sources of data and assumptions used to construct a consistent series, and identifies trends over the past 40-45 years. The lack of investment information disaggregated by research area beyond 2010 is a serious limitation to documenting trends or doing any type of benefit-cost analysis at system level. Section 7 summarizes key findings and concludes with some possible ways to overcome data limitations.

## 2. Investment<sup>3</sup> by outcomes

### 2.1 Sources of expenditure data and categories

CGIAR financial reports between the years 1972 and 2013 are the source for data used. Many of these financial reports reported total system expenditure<sup>4</sup> by research areas. Though the strategic area categories defined in the financial reports vary over time, all years were re-mapped into the following five—the most commonly reported categories:

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<sup>1</sup> The terms priority areas, research areas, and output areas are used interchangeably.

<sup>2</sup> This activity was initiated under the Strengthening Impact Assessment Program (SIAC) 2013-2017 program – the main objective was to inform the scoping studies on *ex-post* impact assessments of CGIAR’s livestock research, and irrigation and water management research. An estimate of the total investment in those research areas was presented in the reports. This activity aimed to estimate these numbers across all CGIAR research areas and bring the numbers up-to-date.

<sup>3</sup> In this paper, the terms expenditure and investment are used interchangeably. For all years, US\$ values reported are *ex post* i.e., after expenditures were incurred, and are expressed in constant 2015 US\$.

<sup>4</sup> The CGIAR expenditure totals were taken from the CGIAR System financial reports and had been corroborated by ASTI. Since it is difficult to confirm these numbers before 1989 using publicly available CGIAR documents, ASTI data (collected in 2013) is used for the early years in the

1. Increasing productivity
2. Saving biodiversity, *ex situ*<sup>5</sup>
3. Protecting the environment
4. Improving policy
5. Strengthening NARS

In re-mapping categories to make the expenditure data over the years comparable, we had to infer boundaries and definitions. For details on the source of categorical expenditure data and the assumptions made, refer to Annex 1.<sup>6</sup> Expenditures are shown in constant 2015 US dollars (US\$) unless otherwise stated.

## 2.2 Investments by research areas, 1972-2006

The time series for the five main research areas is presented below, in five-year periods (Figure 1). It shows the increase in total expenditures by CGIAR over time, except for 1997-2001, and the broadening of the research agenda beyond crop productivity to include natural resource management (NRM), policy, and capacity development.<sup>7</sup> In one sense, it reflects the evolution and expansion of the CGIAR through new research centers with specific agendas joining the system, and the dissolution of others. However, as noted above, since categories are redefined in the financial reports, it is difficult to be certain that the small shifts observed represent true shifts in the allocation of investments.

*Increasing productivity* declined from 74 percent to 35 percent of total system investment. However, the absolute investment, in constant dollars, in that area increased from US\$ 141 million in 1972-1976 to US\$ 343 million in 1987-1991—a 142 percent increase over the first part of the period. Over the entire period, there was a 32 percent increase—from US\$ 141 million in 1972-1976 to US\$ 187 million in 2002-2006. Investment on *Strengthening National Agricultural Research Systems (NARS)* seems to have slightly declined since early 1990s, both in percentage and absolute terms, but the trend over the entire period suggests an increase i.e., between 1970s and early 2000s.

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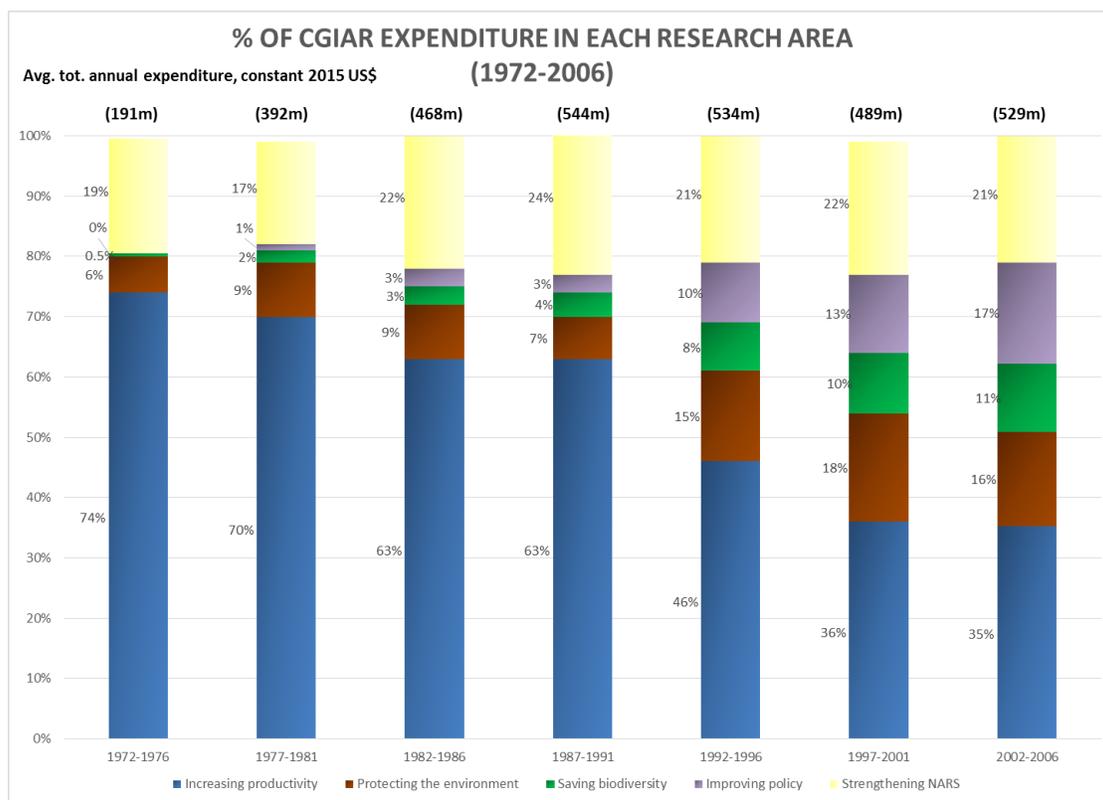
time series. ASTI cites two internal documents as their source for these early numbers: "Statistics on Expenditure by International Agricultural Research Centers 1960-1987, CGIAR Contributions 1972-1982." CGIAR Secretariat, Washington D.C., 1983. Mimeo. Gordon MacNeil: "total CGIAR expenditures", CG Secretariat data files, June 12 1998. The only year for which our figures differ significantly from those quoted by ASTI is 1997. Our data for this year comes from Table V-II in the annex of the 1998 financial report. This number has been used rather than that reported by ASTI since it is a larger figure, and the ASTI data may have excluded some expenditure.

<sup>5</sup> In separating *ex situ* conservation of biodiversity from activities related to environment/natural resources, it is not our suggestion that this distinction be maintained. This simply reflects the predominant categorization used in financial reports, and the categorization/definitions could look substantively different. In the late 1980s, natural resources related research was disaggregated as farming systems and genetic resources (see, for instance, 1987 financial report). By 1990, resource management research was sub-divided into resource management, genetic resources and genebanks; by 1994, the definitions changed again and older data was converted to fit new classification – the five categories listed here.

<sup>6</sup> The full data sets are available from SPIA: <https://ispc.cgiar.org/sites/default/files/files/documents/impact%20assessment/Investments-raw-data-sets.xlsx>

<sup>7</sup> See also Pingali and Kelley (2007) for a discussion of evolution of CGIAR funding and trends.

FIGURE 1: CGIAR EXPENDITURE BY RESEARCH AREAS, 1972-2006<sup>8</sup>



### 2.2.1 Production systems, environment and sustainability

A more detailed classification of research areas is available for the period between 1992 and 2002 ([Figure 2](#)). For those 10 years, *increasing productivity* was split into *germplasm enhancement and breeding* and *production systems and development management*.<sup>9</sup> This illustrates how much of the work to improve productivity was agronomic and production systems research on crops, livestock, trees and fish, and not just genetic improvement. The point that productivity increases arise from more than just germplasm improvement is often made in impact assessments of the Green Revolution era (e.g., Fishman et al., 2017; Gollin, Hansen, & Wingender, 2016). However, many research papers on the contributions of the CGIAR attribute productivity gains to crop varietal improvement alone.

Around 2002 or 2003, it appears that many activities related to *production systems and development management* were reclassified as *sustainability- or NRM-*, rather than *productivity-* related undertakings. [Figure 3a](#) shows Table A3.2 from the 2001 CGIAR financial report, and [Figure 3b](#) shows Table 1 from the 2005 CGIAR financial report: the shift in categorization can be inferred from the data for 2001 ([Figure 3c](#)). As a result, much of what would have been considered agronomy or management of crop, livestock, tree and fish systems in the earlier classification is identified as *sustainable production*, an all-encompassing environment/sustainability category in the later categorization. This goes beyond farms to landscapes and includes land and water resource management as well as conservation.

<sup>8</sup> For 2003-2006, the pre-2002/03 definition of *increasing productivity* related activities is used. More on this in Section 2.3.1.

<sup>9</sup> Further disaggregated as cropping systems, livestock systems, tree systems and fish systems. See, for instance, Table A3.2 in the [2001 CGIAR Financial Report](#).

FIGURE 2: EXPENDITURE BY RESEARCH AREAS, 1992-2002 (INCREASING PRODUCTIVITY SUB-DIVIDED)

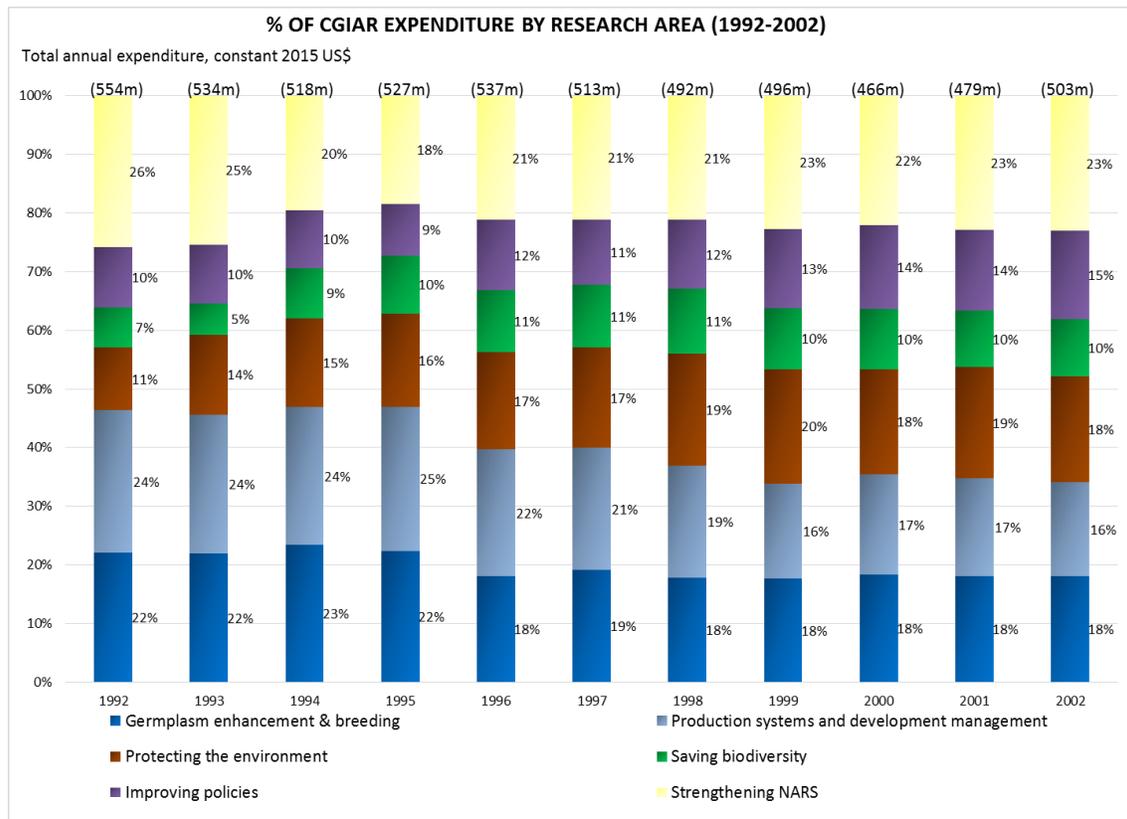


FIGURE 3A: CGIAR EXPENDITURE BY RESEARCH AREAS, 1997-2001 (NOT CONSTANT US\$)

	1997		1998		1999		2000		2001	
	\$	%	\$	%	\$	%	\$	%	\$	%
<b>Increasing Productivity of which:</b>	133.1	40%	124.3	37%	117.3	34%	119.7	36%	123.3	35%
Germplasm enhancement and breeding	63.7	19%	60.0	18%	61.2	18%	61.8	18%	64.1	18%
Production systems development and management	69.4	21%	64.3	19%	56.1	16%	57.9	18%	59.3	17%
Cropping systems	35.1	11%	32.7	10%	29.3	8%	32.1	10%	32.7	9%
Livestock systems	18.7	6%	19.7	6%	15.6	4%	13.8	4%	16.7	5%
Tree systems	14.2	4%	10.4	3%	9.3	3%	8.3	3%	7.9	2%
Fish systems	1.4	0.4%	1.5	0.4%	1.9	0.5%	3.7	1%	1.9	1%
Protecting the environment	57.4	17%	64.5	19%	67.9	20%	60.4	18%	67.2	19%
Saving biodiversity	35.3	11%	37.2	11%	36.2	10%	34.8	10%	34.2	10%
Improving policies	37.3	11%	39.9	12%	46.8	13%	48.0	14%	49.0	14%
Strengthening NARS	70.2	21%	70.9	21%	78.6	23%	74.6	22%	81.1	23%
Training	25.1	8%	27.0	8%	29.8	9%	29.8	9%	31.5	9%
Documentation/publication/information	19.9	6%	20.1	6%	20.7	6%	19.9	6%	21.7	6%
Institution building/advice to NARS	11.5	3%	10.5	3%	12.7	4%	10.2	3%	10.7	3%
Institution building networks	13.7	4%	13.3	4%	15.4	4%	14.7	4%	17.2	5%
<b>TOTAL AGENDA</b>	<b>333</b>	<b>100%</b>	<b>337</b>	<b>100%</b>	<b>347</b>	<b>100%</b>	<b>338</b>	<b>100%</b>	<b>355</b>	<b>100%</b>

Source: 2001 CGIAR financial report, p. 44

FIGURE 3B: CGIAR EXPENDITURE BY RESEARCH AREAS, 2001-2005

	2001	2002	2003	2004	2005
<b>Agenda program expenditure by output</b>					
Germplasm improvement	18%	18%	17%	17%	17%
Germplasm collection	10%	10%	11%	12%	12%
Sustainable production	36%	35%	34%	35%	34%
Policy	14%	15%	16%	16%	18%
Enhancing NARS	22%	22%	22%	20%	20%
<b>Total (millions of US dollars)</b>	<b>355</b>	<b>381</b>	<b>395</b>	<b>425</b>	<b>452</b>

Source: 2005 CGIAR financial report, p. 56

FIGURE 3C: COMPARING HIGHLIGHTED PARTS OF FIGURES 3A AND 3B

1997-2001 report categories	as a % of CGIAR expenditure	2001-05 report categories	as a % of CGIAR expenditure
Increasing productivity	35%		
Germplasm enhancement and breeding	18%	Germplasm improvement	18%
Production systems and development management	17%	Sustainable production	36%
Cropping systems	9%		
Livestock systems	5%		
Tree systems	2%		
Fish systems	1%		
Protecting the environment	19%		
Saving biodiversity	10%	Germplasm collection	10%
Improving policies	14%	Policy	14%
Strengthening NARS	23%	Enhancing NARS	22%
Training	9%		
Documentation/publication/information	6%		
Institution building/advice to NARS	3%		
Institution building networks	5%		

### 3. Expenditure by Research Themes, 1972-2006

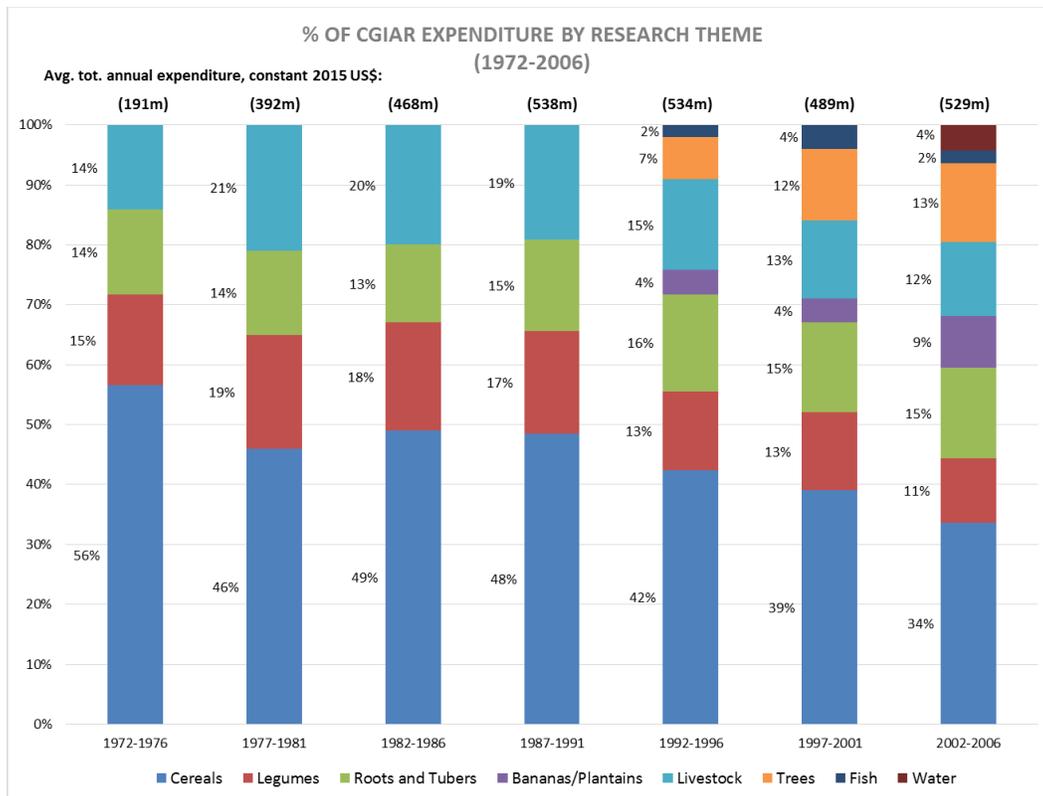
Analyzing by research themes—that are called “commodity sectors” in some CGIAR reports—we first examined the data directly available from the CGIAR Financial Reports. This data is available in five-year intervals starting 1972 through 2006.<sup>10</sup> Note that the sums of expenditures across these research themes do not match the total CGIAR investment shown elsewhere because not all Centers had commodity activities (as stated in footnote 4, system expenditure totals have been extracted from ASTI and financial reports were used for proportions). [Figure 4](#) shows the percentage of expenditures for the following research themes:

- Production sectors

<sup>10</sup> For instance, for 1972-2000 (5-year intervals) in the 2001 financial report, and for other individual years (2002-2006) in subsequent financial reports.

- Cereals<sup>11</sup>
- Legumes
- Roots and tubers
- Bananas/plantains
- Livestock
- Trees
- Fish
- Water

FIGURE 4: CGIAR EXPENDITURE BY RESEARCH THEMES, 1972-2006



### 3.1 Annual research theme expenditure

For a subset of the 1972-2006 period, that is 1992-2002, the investment data for the *increasing productivity* area were further divided as follows<sup>12</sup>:

Research area: Increasing productivity

- Germplasm enhancement and breeding
  - Crops
  - Fish
  - Livestock
  - Trees

<sup>11</sup> The data is further disaggregated as rice, wheat, maize.

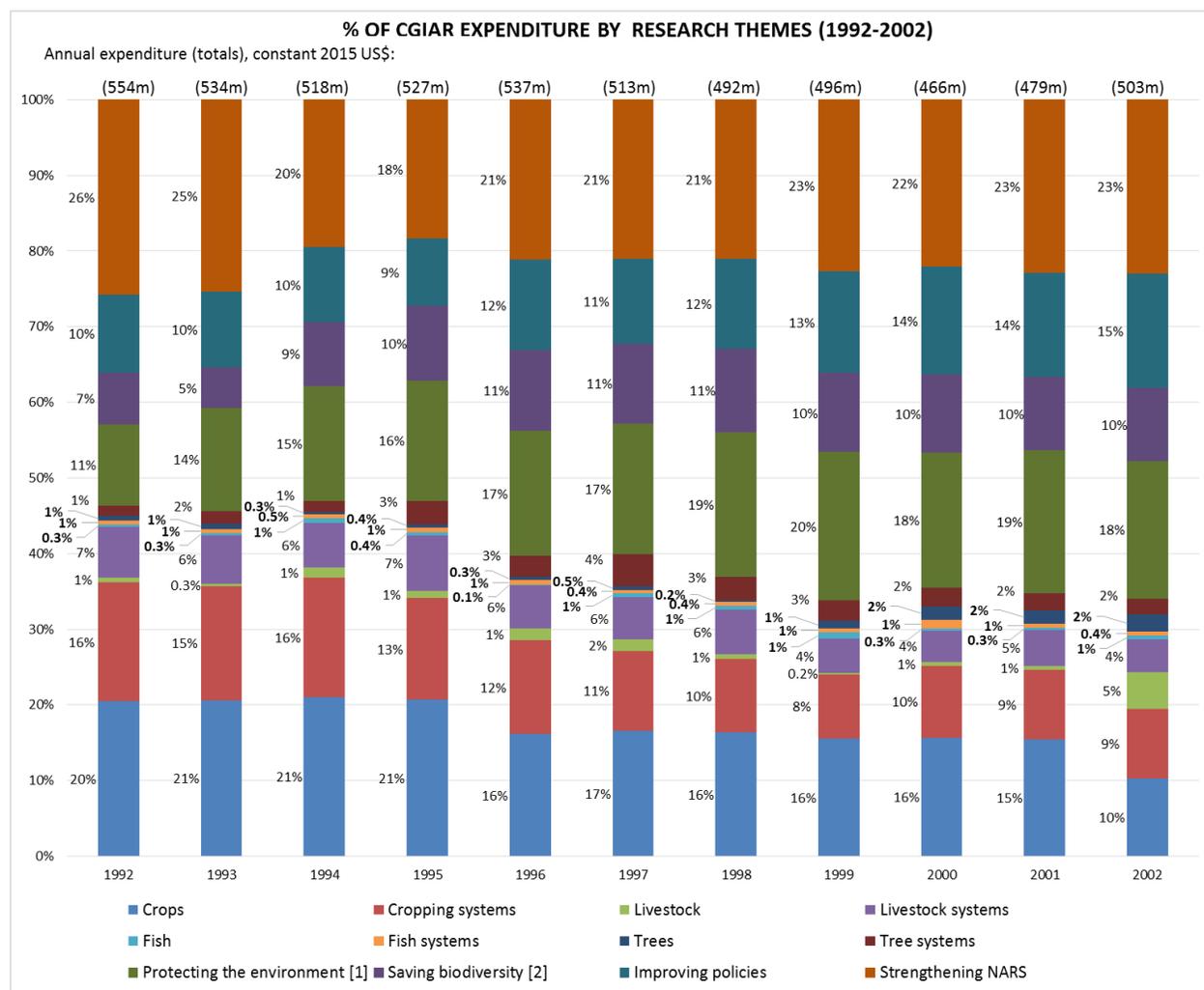
<sup>12</sup> For the years 1992-1997 and 2002, only core expenditure is split into these categories—whereas for 1998-2001, total expenditure is split into these categories. In the graphs, the levels of core expenditure were proportionally scaled up for 1992-1997 and 2002.

- Production systems and development management
  - Crop systems
  - Fish systems
  - Livestock systems
  - Tree systems

[Figure 5](#) shows how much of the *productivity* related research was in breeding, and how much of it was production systems and agronomy related—a point that was made in Section 2.3. As can be seen, for research related to crops, there is close to an even split between *germplasm enhancement and breeding activities* and *production system* related activities. For livestock-related research, *production system* related activities dominate. Figure 5 also suggests a decreased focus on research on cereals between 1992 and 2002, with rice and maize investments declining significantly.

One could also conclude that CGIAR has diversified research areas and themes over the years—the number of categories in 2006 is greater than in 1974. While this reflects Research Centers joining the system and related expansions, it could also indicate definitional changes in reporting. The question, then, is if alternative approaches to disaggregation of research areas and themes of focus exist, which are not subject to definitional consistencies.

FIGURE 5: CGIAR EXPENDITURE BY RESEARCH THEMES, 1992-2002



#### 4. Thematic Expenditure Using Center Reports, 1970-2013

Given that the 1972-2006 reports of Centers classify expenditures by research areas and themes, those data could be used to build a system-wide, disaggregated investment picture. Center data is the most reliable and consistent source of information because: (a) it is available between 1970 and 2006 and continues to be available; and (b) the limitations associated with CGIAR level categories and classifications changing over time are less troublesome at the Center level because assumptions made in Center reports tend to be more explicit. Additionally, even as Center names changed or consolidations occurred over the decades, one could argue that the primary broadly-defined focus of Centers (be it crops, natural resources or policy) has remained constant over time.

To illustrate how it might be done, this section of the paper presents three cases—agroforestry, water and livestock, which were proposed areas for SIAC program impact assessment reviews. For each, expenditure figures were calculated by adding up amounts from the reports of every Center that had research in these areas.

#### 4.1 Agroforestry research

Agroforestry was straightforward because only ICRAF numbers were used—it was judged the only Center specifically conducting research in this area. It is entirely possible that some of the work that CIFOR or IFPRI conduct on governance, policies and institutions is related to trees-on-farms, but the percentage of CIFOR/IFPRI budget that should be allocated is challenging to derive and assign. This is illustrative of the gaps in the Center-related approach. The same assumptions were made as above regarding scaling up the proportions of core expenditure to total.

Though the resources allocated to agroforestry research have been growing in absolute terms ([Figure 6a](#)) since ICRAF (formed in 1978) joined the CGIAR in 1991, they have occupied a relatively stable proportion of the total CGIAR budget since 1997, between 5.5 and 7 percent, as indicated in [Figure 6b](#).

FIGURE 6A: CGIAR EXPENDITURE ON AGROFORESTRY RELATED RESEARCH, 1974-2013

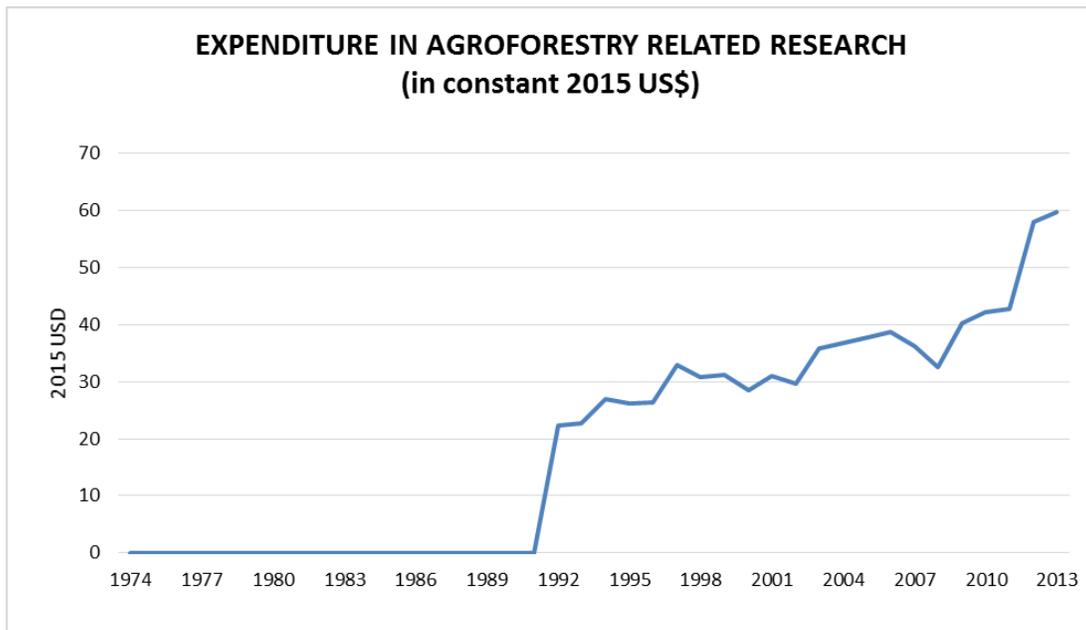
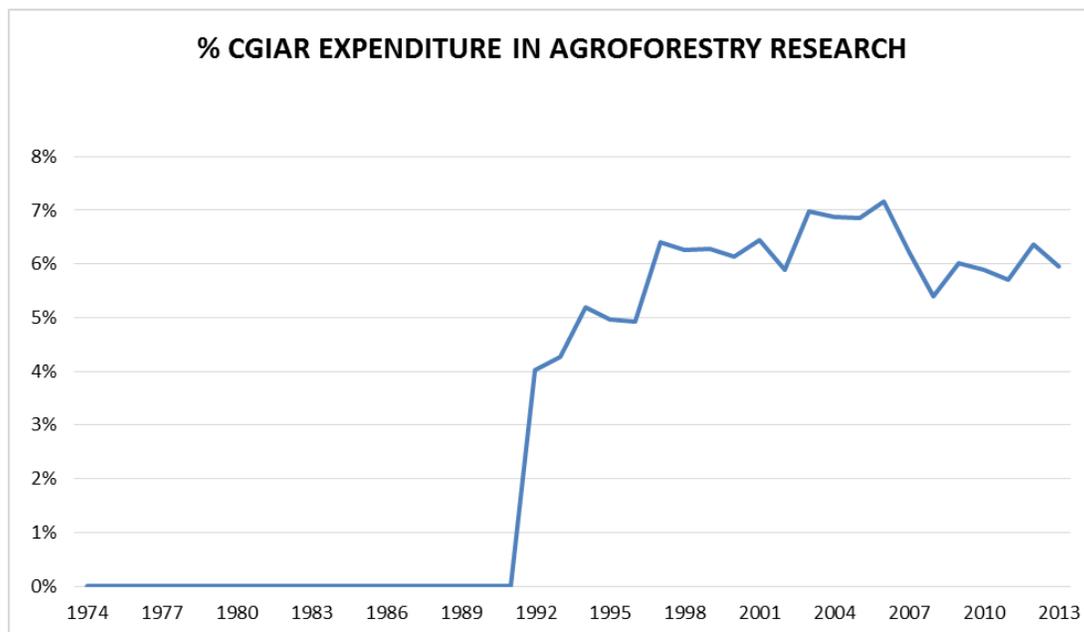


FIGURE 6B: AGROFORESTRY RELATED RESEARCH AS A PERCENTAGE OF CGIAR SPENDING, 1974-2013



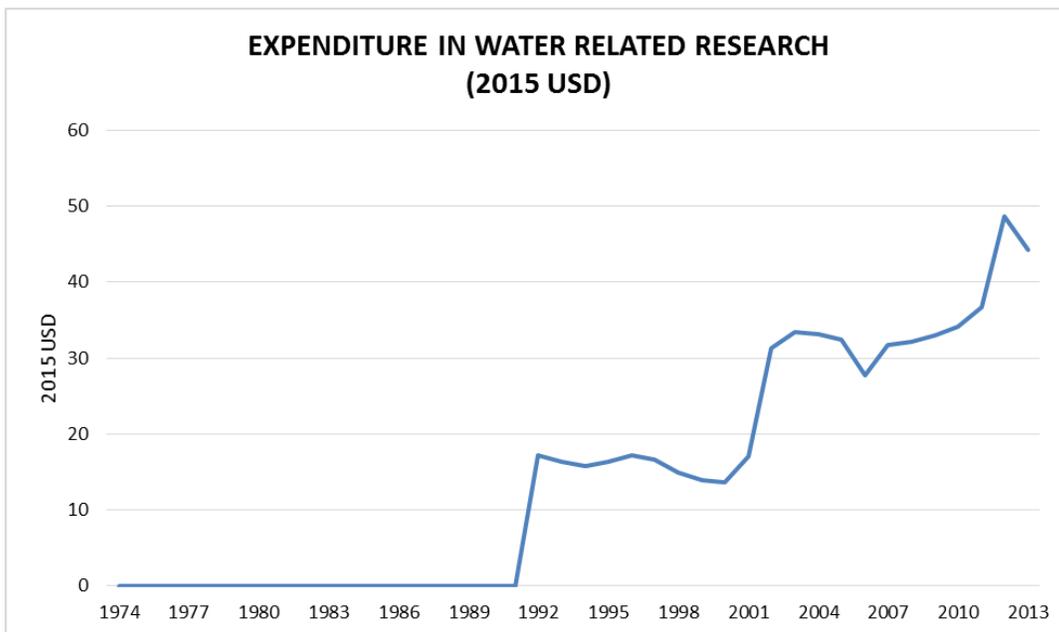
#### 4.2 Irrigation and water management research

ICARDA, ICRISAT, IWMI, and WorldFish (previously ICLARM) were included in this analysis, since each of these Centers allocate at least some of their budget to irrigation and water management issues. IFPRI does significant policy work on water but as was the case with agroforestry, it was challenging to make assumptions on budget allocation for the period under study.

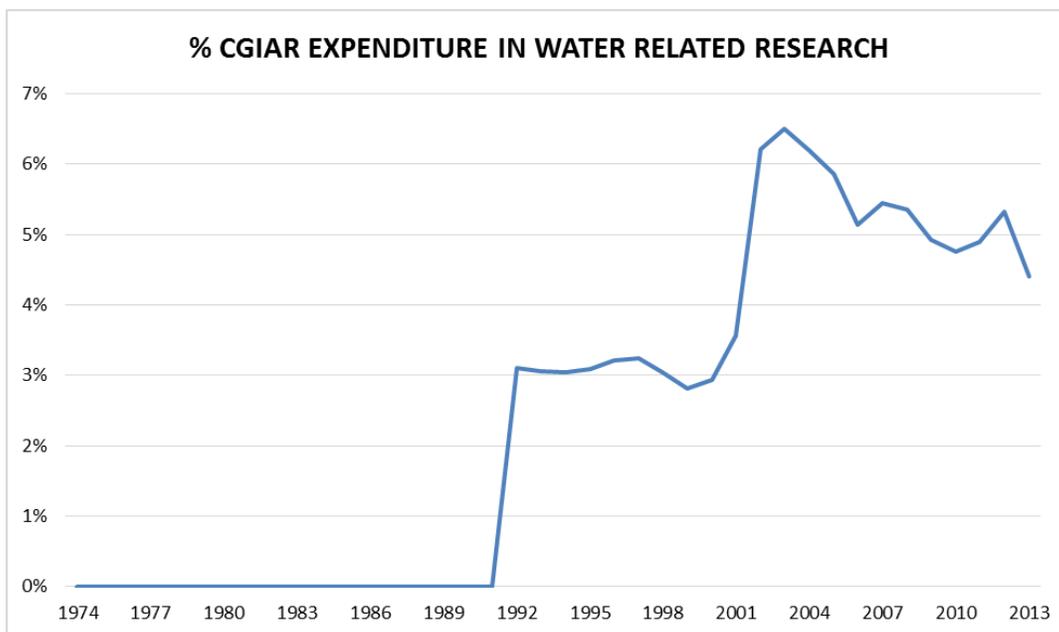
It was assumed that 100 percent of IWMI’s budget falls in the realm of irrigation and water management research, alongside smaller proportions of the other four center budgets. As anticipated, water management expenditure is very difficult to separate out in the other four centers’ numbers—since it is often described in relation to crops or production systems. Furthermore, even where budget for resource management is directly specified, this often includes research related to land management and soils, in addition to irrigation and water management. No details of the relative sizes of these programs are easily available, and where these are integrated in a single program, the exercise becomes even more difficult.

In light of the difficulties, we compared the proportion of the CGIAR budget assigned to IWMI with the proportion assigned to *water research* for the two years in which data were available (i.e., 2005 and 2006). The idea was to determine how much research on water might have been undertaken by Centers other than IWMI. For 2005 and 2006, financial reports state that 6 percent and 5 percent (respectively) of CGIAR expenditure was committed to water research respectively. In these years, IWMI was responsible for 5.3 percent and 4.6 percent of the overall CGIAR expenditure, so IWMI’s expenditure accounted for around 90 percent of the CGIAR water research expenditure for 2005 and 2006. In the graph below, the CGIAR’s expenditure is calculated assuming IWMI’s spending was 90 percent of the total every year. The assumption might well be challenged, especially as the importance of water in the sustainable development and the agricultural research agendas has increased dramatically in recent years—influencing research orientation of other centers, but the point of the exercise was to consider such assumptions and stimulate discussion of the pros and cons of making them, when data is otherwise unavailable.

**FIGURE 7A: CGIAR EXPENDITURE ON IRRIGATION AND WATER RELATED RESEARCH, 1974-2013<sup>13</sup>**



**FIGURE 7B: IRRIGATION AND WATER RELATED RESEARCH AS A PERCENTAGE OF CGIAR SPENDING, 1974-2013**



<sup>13</sup> Figures 7a and 7b assume that IWMI research constitutes 90 percent of the water management related research expenditure in the CGIAR.

### 4.3 Livestock related research

Assuming ILRI (ILRAD and ILCA, pre-1994) spends its entire budget on livestock research and that CIAT spends a proportion of its research budget on forages, the approximate expenditure on livestock-related research in the CGIAR between 1970 and 2013 can (in theory) be derived.

As an illustration, in 1974, the Integrative Report reports US\$ 4.5 million as total CIAT expenditure. The total system expenditure in the 1974 report is US\$ 24 million, whereas the figure as reported by ASTI is US\$ 36.3 million (all in US\$ 1974 values only, not in constant 2015 US\$). The discrepancy between these two figures comes from the exclusion of complementary expenditures in the Integrative Report. Since US\$ 4.5m is 18.8 percent of US\$ 24m, 18.8 percent of US\$ 36.3m was calculated for the final CIAT expenditure (core and complementary) for 1974. This figure is then converted to constant 2015 US\$: i.e. US\$ 32.8 million. The corresponding figure for ILCA and ILRAD in the same year is US\$ 0 since ILCA and ILRAD were only founded in 1975 (and later consolidated into ILRI).

On average, CIAT annual reports for the 1970s and 1980s suggest that 40 percent of CIAT budget was towards forage-related work. Total expenditure on livestock research for 1974 is therefore estimated at 40 percent of US\$ 32.8 million—US\$ 13.12 million in constant 2015 US\$. This was about 8 percent of total system expenditure for that year.

Beyond 1980s, breakdowns are not available in the CGIAR financial, integrative, or annual reports or those of CIAT. Assuming that CIAT allocated a constant proportion of its budget towards forages is unrealistic, and hence these numbers are not presented.

### 4.4 Reflections on using CGIAR Centers' financial reports

Assumptions about centers focusing solely on one area of research over a 40-year period or assigning a fixed proportion of their budget to a particular topic could lead to misleading conclusions. Research foci are rarely so black and white. The degree to which assumptions hold will vary greatly by centers and research areas. On the other hand, in the absence of disaggregated CGIAR-level data, basing an estimated consistent, disaggregated, system-wide time series on center-reported financial data could work in combination with triangulation of CGIAR system financial report assumptions for sub-sets of years. Scaling up proportions of funding assigned to research areas from core to total expenditure may lead to misestimates. This is a problem for all the methods used here since direct breakdowns of the total expenditure figures for the CGIAR are rare.

To conclude, it appears that the data gathered on commodities can only take us part of the way to a reliable time series. Identifying and analyzing documents that break down expenditure by CGIAR Center may allow us to predict these numbers with more accuracy.

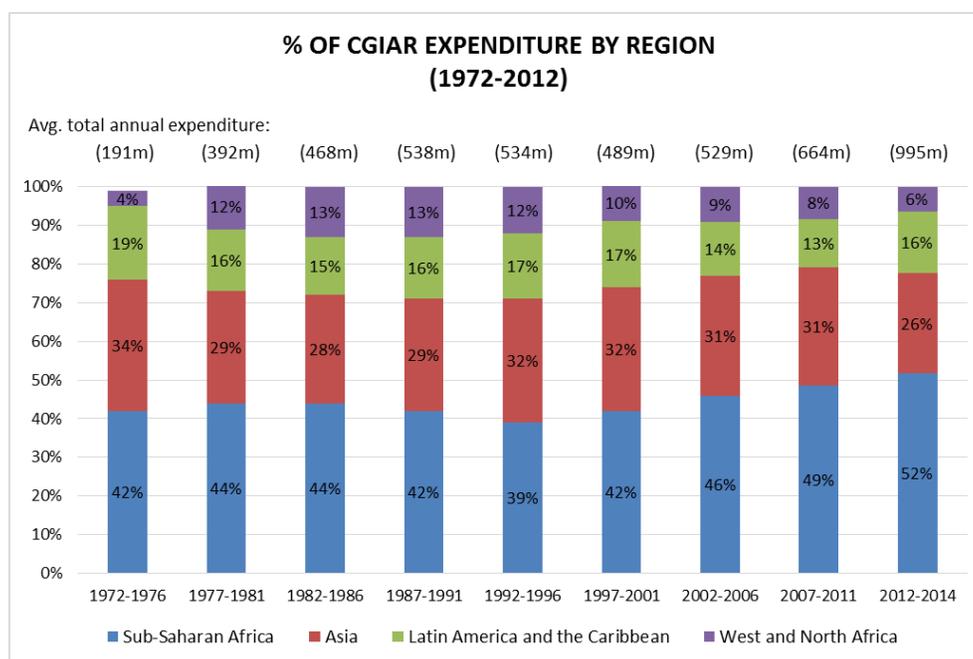
## 5. CGIAR Research Expenditure by Geographic Regions, 1972-2014

Finally, this brief considers the data available on research expenditures by geographic regions. Regional breakdowns were relatively straightforward—these are presented in all CGIAR financial reports for the analysis period. The categories remain constant over the years: namely, Sub-Saharan Africa (SSA), Asia, West and North Africa (WNA), and Latin America and the Caribbean (LAC).

[Figure 8](#) shows the investments by region—two additional periods 2007-11 and 2012-14 are shown because the system-level reports continued to provide regional breakdowns for those periods. Sub-Saharan Africa (SSA) receives the largest proportion in recent periods, but its allocation decreased in late 1980s and early 1990s, then increased steadily from 39 percent of the total in 1992-96 to 52 percent in the most recent period (2012-14). Investment in Asia has been almost constant around 31 percent since

1992-96 up until the most recent period when it fell to 26 percent. The shares to West and North Africa (WNA) and Latin America and the Caribbean (LAC) have also varied over time. The recent drop in share going to the Asian region perhaps was to be expected as Asian economies moved from low-income countries to middle-income countries, national spending on agricultural research increased, and poverty numbers fell (particularly in China). In the context of such macro-economic trends, any exercise to generate a consistent, disaggregated, CGIAR-wide investment time series could differentiate between the various Asian regions (East, South, and South-east Asia).

**FIGURE 8: CGIAR EXPENDITURES BY GEOGRAPHIC REGIONS (FIVE-YEAR INTERVALS), 1972-2014**



## 6. Expenditures by Sub-IDOS and IDOS

The budgetary guidelines for the 2017-2022 CGIAR Research Program (CRP2) proposals<sup>14</sup> required that CRPs submit Performance Indicator Matrix (PIM) tables at the following levels<sup>15</sup>, towards Results Based Management (RBM):

- CRP level: 2022 CGIAR targets mapped to total as well as W1+W2, W3 and bilateral funding windows request
- Flagship level: self-determined 2022 outcomes mapped to total as well as windows of funding request
- Flagship level: sub-IDOs targeted by the Flagship mapped total as well as windows of funding request

In this case as well, there many challenges: sub-IDOs are not always well defined and different CRPs are likely to have interpreted them differently. There are linkages and dependencies between sub-IDOs (and

<sup>14</sup> [Guidance for full proposal](#)

<sup>15</sup> See, for instance, Annex 3 in any of the PIM tables <http://www.cgiar.org/about-us/our-programs/second-call-for-cgiar-research-programs/cgiar-research-programs-and-platforms-revised-full-proposals-submitted-for-review/>

hence IDOs). Hence, if a Flagship targets multiple sub-IDOs, the allocations to each may not be obvious. These and other issues are discussed in the 2015 ISPC paper on prioritization<sup>16</sup>.

## 7. Reflections and Conclusions

Each of the approaches described above for estimating and categorizing expenditures has pros and cons. The assumptions made as well as the approach used influence, significantly in some cases, the way trends in historic CGIAR investments by areas or themes of research are presented and interpreted. At the same time, some general findings and conclusions can be drawn from the exercise:

- Gradual broadening of CGIAR mandate is clear in the financial reports, even when the modifications in categories and definitions are considered.
- Activities related to increasing productivity declined as a proportion of overall budget, but investments increased between 1972 and 2006.
- Almost half of the investments on increasing productivity appears to be in agronomic and production systems research. This has implications for how impact assessment evidence is interpreted, but also underlines the importance of credibly documenting adoption of such agronomic practices related to crops, livestock, trees, fish, and water.
- Absolute investments in strengthening the capacity of NARS through trainings, institution building etc. have declined from the high in 1987-1991. This might be commensurate with strengthened capacity in countries like China and India as well as donors choosing to fund NARS through more direct means. However, it is important to note that the overall CGIAR allocation towards NARS capacity has generally increased in absolute and relative terms from the baseline values in 1970s.
- Investments in the Asian region declined between 1970s and mid-1980s, then increased slightly through the 1990s and 2000s, and then declined from 31 percent to 26 percent of regional investments in the most recent period. Whereas, investments in sub-Saharan Africa increased substantively between 1990s and 2014.

Even in a case where disaggregated investment data is not used for prioritization, its utility in analyzing investment patterns and as input into impact assessments is obvious. As the section on CGIAR's regional investments over time illustrates, such data could be indicative of its responsiveness to the perceived needs in the broader agricultural research for development sector: investments in Asia and LAC have declined, even as SSA investments have increased. Similarly, the increase in overall funding to the CGIAR in the period following the food crisis (2007-2008) is obvious from financial reports: if thematic data had been available, it would have been possible to track where this additional funding was channeled.

The significant number of assumptions that need to be made to get a consistent time series for 'research area' expenditure suggests that a more detailed investigation of Center-level documents might help fill the data gap. A search of the CGIAR library was conducted to see what information could be found in Center-level *Program of Work and Budget (POWB)* documents. Though few of these are available in the CGIAR library<sup>17</sup>, an investigation of CIMMYT POWBs from the 1980s suggests that budget breakdowns by research areas of interest is available. For example, wheat and maize budgets were further divided into specific crops such as bread wheat, durum wheat, barley, triticale, tropical, as well as research programs and management support costs.

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<sup>16</sup> [https://ispc.cgiar.org/sites/default/files/ISPC\\_Prioritization\\_PilotStudy.pdf](https://ispc.cgiar.org/sites/default/files/ISPC_Prioritization_PilotStudy.pdf)

<sup>17</sup> <https://cgspace.cgiar.org/>

If disaggregated data is considered essential in tracking the evolving research focus in the system, an investigation of POWBs for various CGIAR Centers might be an excellent place to go next. Depending on the degree of consistency desired, common definitions/categories may need to be agreed to and donor input on themes could be sought. Alternately, it may be helpful to have this information compiled every year at system-level and make this readily available. What our suggestion does not consider is the extent of effort involved at the center or system-level and feasibility of classifying expenditure by research areas/themes—in the context of much more integrated nature of the CGIAR Research Programs starting 2011, or the reliability in relation to the effort involved.

## Annex 1: Source of Financial Data and Mapping Categories Over the Years

### 1. Category mapping

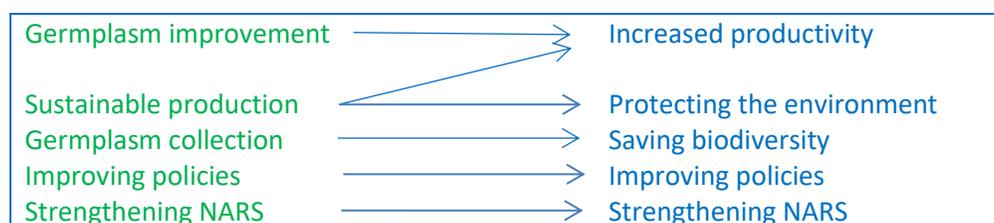
#### 1972-2002

Between 1972 and 2002, expenditure figures are split between the five principle research areas mentioned in Section 2:

1. Increasing productivity
2. Saving biodiversity (*ex situ*)<sup>18</sup>
3. Protecting the environment
4. Improving policy
5. Strengthening NARS

#### 2003-2006

From 2003 onwards, the five categories changed. The new disaggregation was mapped onto the five 1972-2002 categories as demonstrated below. 'Improving policies' and 'strengthening NARS' are unchanged categories, and it would seem that the new category 'germplasm collection' can be mapped to 'saving biodiversity'. 'Germplasm improvement' is mapped entirely to 'increased productivity'. 'Sustainable production' is split more or less equally between 'increased productivity' and 'protecting the environment'<sup>19</sup>.



### 2. Sources of information

#### Data on Percentage Breakdowns

The **percentage** of expenditure allocated to each of the five principle research areas in Section 2 was extracted from the 2001 CGIAR Financial Report (Table A5.1) for the years 1972-2001 and from the 2002 Financial Report (Table A3.2) for 2002. Percentage breakdowns between 2003 and 2006 were extracted from the financial reports for each of these years (Table 3.3).

<sup>18</sup> In separating *ex situ* conservation of biodiversity from activities related to environment/natural resources, it is not our suggestion that this distinction be maintained. This simply reflects the predominant categorization used in financial reports, and the categorization/definitions could look substantively different. In the late 1980s, natural resources related research was disaggregated as farming systems and genetic resources (see, for instance, 1987 financial report). By 1990, resource management research was sub-divided into resource management, genetic resources and genebanks; by 1994, the definitions changed again and older data was converted to fit new classification – the five categories listed here.

<sup>19</sup> The logic for this split was the following. In the financial reports between 1992 and 2002, spending on *increased productivity* is disaggregated as *germplasm enhancement and breeding* and *production systems and development management*. It seemed that the half of the *increased productivity* funds that would have come under *production systems and development management* were those assigned to *sustainable production* between 2003 and 2006. We, therefore, moved a percentage consistent with *production systems and development management* expenditure from this category to *increased productivity*, and renamed the remaining funds *protecting the environment*. Continuity was maintained in the database in the following way: 18% was transferred from *sustainable production* to *germplasm improvement*. Newly reduced *sustainable production* was thus renamed *protecting the environment*. *Germplasm improvement* was re-labelled *increased productivity*. The category *saving biodiversity* rather than *germplasm collection* was retained.

### **Data on Dollar Expenditure**

In order to calculate the dollar values of expenditure per research area and for the CGIAR as a whole, we consulted additional sources.

#### **1987-1991**

Dollar expenditure for the years 1987-1990 was calculated by extracting operational expenditure from the 1990 and 1991 financial reports (Tables II-I, III-2A and III-3A respectively) and summing capital expenditure figures for these years (from the 1990 report for 1987-1990 and from the 1993 report (Table 1) for 1991). The total arrived at was divided into the proportions assigned to each research area to yield dollar expenditure by research area. This calculation was necessary since non-research expenditures were not broken down into the various program areas.

#### **1992-2002**

The dollar operational expenditure figures for the years 1992 and 1993 were taken from the 1993 report (Table III). Capital expenditure data were extracted from Table VI of the 1993 report and summed to this to arrive at total expenditure. As with the 1987-1991 data, the total was divided into the proportions for each research area to yield total expenditure for each of these.

Tables III-4 and 5 in the 1995 report provide the expenditure figures for 1994 and 1995. Non-agenda expenditure is included to reach the correct total (1995, Table III-1) and this was split into research area proportions, as above.

Table III-2 of annual reports for the years starting 1996 provides the expenditure figures between 1996 and 2000. For 1996 and 1997, non-agenda expenditure needs to be added back to research area breakdowns to reach total expenditure. Total expenditure figures were taken from Table 5-2 in 1997, and non-agenda was calculated by subtracting the total agenda funding from this.

#### **2003-2006**

Between 2003 and 2006, the proportions and the totals come from Table 3.3 in the financial report for each of those years.

## **Annex 2: Source of Financial Data for Commodity – Research Themes**

**1971-1976:** Disaggregation between 1971 and 1976 was taken from the 1977 Integrative Report. The breakdown provided in this integrative report (and indeed in most of the sources used) divide only research expenditure into area of research. The percentage of research rather than total expenditure is therefore what is shown in the graphs above.

**1977-1978:** The breakdowns provided in the 1980 Integrative Report contain the most disaggregation of categories by research expenditure. Some of the categories are difficult to reconcile with those used in other reports (cereals, livestock, legumes, roots and tubers, policy and resource management). We fitted those we could into the categories used frequently in other years, leaving out categories that could not be classified (such as biochemistry and statistics). The percentages assigned to the most common research areas were then scaled up so that they summed to one. Since this method is flawed, we only use this data for 1977 and 1978 where we have no other breakdowns. Comparing the data on 1984-86 and 1989 from the 1980 report to data from other years, this method seems to slightly overestimate cereal and livestock expenditure and to underestimate legume and resource management spending.

**1979-1980:** The years 1979-1980 are broken down only into the broad areas of research (cereals, livestock, legumes, roots and tubers, policy). Though 1979 is available in more detail in the 1980 report, we use the figures from the 1982 report for the reasons stated above.

**1981-1983:** Only the broad categories are available for these years too. Though the categories included are the same as those in the 1982 report (figures for 1979 and 1980), percentages jump for a few of the research areas just as a result of changing the source document. We can see that this is the case since both reports have data for 1981. This could be a result of changing definitions or measurement techniques or the smoothing of '*other spending*' from the 1982 report over the remaining categories in 1985. Smoothing '*other*' over the remaining categories makes for a more consistent time series.

**1984-1985:** Data for 1984 and 1985 were taken from the 1987 financial report.

**1986:** 1986 data is extracted from the 1990 financial report rather than the 1987 report because of the more disaggregated nature of the data. The fact that breakdowns per research area for one single year always seem to vary between Financial Reports makes the composition of a reliable time series difficult. Furthermore, between 1984 and 1986, only core expenditure is divided up whereas from 1987-1990 and 2003-2006 core and complementary expenditure are broken down. If core and complementary expenditure are split in different proportions across research areas between 1984-1986, the usefulness of the data for these years could be called into question.

**1987-1990:** Data for 1987-1990 were taken from the 1991 financial report.

**1992-2001:** Individual years were not available for this period, though five-year averages were found for the periods 1992-1996 and 1997-2001 in the 2001 financial report.

**2000-2002:** Data for 2000-2004 were taken from the 2004 financial report. The categories trees, water and fish begin to show non-zero values in these years (only in 2005 for water). Policy research is no longer reported. The gap in data between 1992 and 2001 makes analysis of a trend difficult.

**2003-2006:** Data for 2003-2006 were taken from the 2006 financial report. This data seems to follow on well from that of the 2004 report.

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