



CGIAR SYSTEM
ANNUAL PERFORMANCE
REPORT 2018

FULL REPORT



Cover image: Sewagegn, a local smallholder farmer, and Gebeyaw, a data collector, set up Sewagegn's solar powered pump to irrigate her backyard garden in Danghesta, Amhara region of Ethiopia. Photo: Mulugeta Ayene/WLE.

CGIAR SYSTEM
ANNUAL PERFORMANCE
REPORT 2018

FULL REPORT

CONTENTS

LIST OF TABLES.....	6
LIST OF FIGURES.....	6
ACRONYMS	7
EXECUTIVE SUMMARY	10
Progress towards Strategy and Results Framework Outcomes: Evidence from 2018....	10
Integrating Gender and Equity into CGIAR Research for Development.....	11
Working Together to Improve Performance.....	11
Oversight and Advice from the System Advisory Functions.....	12
System-wide Reporting Approach	12
CGIAR RESEARCH PORTFOLIO	13
CENTER PARTICIPATION IN RESEARCH PROGRAMS AND PLATFORMS.....	14
PREFACE	15
I. INTRODUCTION	17
II. CGIAR PORTFOLIO – PROGRESS REPORTED IN 2018	18
Progress towards the Sustainable Development Goals and CGIAR System Level Outcomes.....	18
Progress towards Research Outputs and Outcomes.....	21
Innovations.....	26
Publications	31
People Trained by CGIAR.....	33
External Partnerships	33
Contributions to International and National Policies, Legal Instruments and Investments.....	36
Capacity Development.....	38
Open Data and Open Access	40
III. INTEGRATING GENDER AND EQUITY INTO CGIAR RESEARCH	42
Gender	42
Youth and other Aspects of Equity: “Leaving No-one Behind”	44
IV. WORKING TOGETHER TO IMPROVE PERFORMANCE	47
Progress on Results Reporting	47
Milestone Achievement in 2018.....	47
System-level RBM	49
CGIAR Platforms.....	49
The Genebank Platform	49

The Platform for Big Data in Agriculture	50
The Excellence in Breeding Platform	51
Collaboration across CGIAR	51
Use of Pooled Funding (W1/2)	52
Improving Efficiency.....	54
Program Monitoring, Evaluation, Learning and Impact Assessment (MELIA).....	54
Oversight and Advice from System Governing bodies.....	55
Key 2018 developments.....	55
Functioning of the System Council	56
Functioning of the System Management Board	56
Three-year Business Plan 2019-2021.....	56
System Advisory Functions.....	57
Independent Science and Partnership Council (ISPC)	57
Standing Panel on Impact Assessment (SPIA).....	57
Independent Evaluation Arrangement (IEA).....	57
Forward-looking operational principles for System Council advisory bodies	58
System Council Intellectual Property Group (SC IP Group)	58
CGIAR System Internal Audit Function.....	59
V. FINANCIAL HIGHLIGHTS FROM 2018	60
Funding Channels	60
VI. FUNDERS	63
CGIAR Trust Fund Contributors	63
Bilateral Contributors	63
VII. ANNEXES	64
Data Annexes	64
VIII. REFERENCES – CGIAR ANNUAL REPORTS	65
IX. CGIAR CENTERS	66
APPENDIX A: METHODS AND DATA SOURCES	67

LIST OF TABLES

Table 1: Examples of high-level impact of CGIAR varieties, technologies and innovations reported in 2018.....	18
Table 2: OICRs by level of maturity in 2018.....	23
Table 3: Selected OICRs for 2018.....	24
Table 4: Common Results Reporting Indicators for 2018.....	25
Table 5: CGIAR innovations reported by stage of research and type of innovation in 2018.....	26
Table 6: Examples of innovations at stages 3 and 4.....	28
Table 7: Number of peer-reviewed publications and open access percentages since 2014.....	31
Table 8: CGIAR publications in 2018 with the high altmetric scores.....	32
Table 9: Number of people trained by CGIAR in 2018.....	33
Table 10: Top 25 research institutes co-publishing peer-reviewed articles with CRPs and Platforms in 2018.....	34
Table 11: CGIAR contributions to international and national policies, legislation and significant investments reported in 2018.....	36
Table 12: Number of PhDs supported in 2018.....	38
Table 13: Achievement of planned research for development milestones in 2018.....	48
Table 14: Germplasm numbers delivered by CGIAR to developing countries and users for 2017 and 2018.....	50
Table 15: Examples of W1/2 use in 2018.....	52

LIST OF FIGURES

Figure 1: Spheres of control, influence and interest for performance management of agricultural research for development.....	22
Figure 2: Main areas of external partnerships in 2018.....	33
Figure 3: CGIAR's spheres of performance framework, reporting indicators and evidence studies and the typical timeframes for reporting.....	47
Figure 4: Germplasm samples distributed by each Center to users outside CGIAR and the geographical region of recipients in 2018.....	50
Figure 5: Number of reported collaborations among CRPs and Platforms for 2018.....	53
Figure 6: CGIAR Revenue by source of funding, 2018 and 2017.....	60
Figure 7: CGIAR System revenue by source of funding.....	61
Figure 8: Expenses by main category.....	61
Figure 9: Funding to CGIAR Research Programs and Platforms by funding channel.....	62

ACRONYMS

A4NH	CGIAR Research Program on Agriculture for Nutrition and Health
AFS	Agri-food System
AgroFIMS	Agronomy Field Information Management System
ANH Academy	Agriculture, Nutrition and Health Academy
AR4D	Agricultural Research for Development
ASEAN	Association of Southeast Asian Nations
BIG DATA	CGIAR Big Data in Agriculture Platform
BMZ	German Federal Ministry for Economic Cooperation and Development
BrAPI	Breeding Application Programming Interface
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CIAT	International Center for Tropical Agriculture
CIFOR	Center for International Forestry Research
CIMMYT	International Maize and Wheat Improvement Center
CIP	International Potato Center
CIRAD	French Agricultural Research Center for International Development
CLARISA	CGIAR Level Agricultural Results Interoperable System Architecture
CoP	Community of Practice
CR4D	Climate Research for Development
CRP	CGIAR Research Program
CRR1	Common Results Reporting Indicator
CSA	Climate Smart Agriculture
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSV	Climate Smart Village
CtEH	Crops to End Hunger Initiative
DRC	Democratic Republic of Congo
DSR	Direct Seeded Rice
DSRC	Direct Seeded Rice Consortium
DTMA	Drought Tolerant Maize Varieties
EiB	CGIAR Excellence in Breeding Platform
EU	European Union
FAIR	Findable, Accessible, Interoperable and Reusable
FAO	Food and Agriculture Organization of the United Nations
FAQ	Frequently Asked Question
FARD	Department of Fisheries and Animal Resources Development
FISH	CGIAR Research Program on Fish
FTA	CGIAR Research Program on Forests, Trees and Agroforestry
G7	Group of 7
GARDIAN	Global Agricultural Research Data Innovation Acceleration Network
GDP	Gross Domestic Product
GEE	Gender Equity and Empowerment
GENEBANK	CGIAR Genebank Platform
GFDRR	Global Facility for Disaster Reduction and Recovery
GHU	Germplasm Health Unit
GIFT	Genetically Improved Farmed Tilapia
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GLDC	CGIAR Research Program on Grain Legumes and Dryland Cereals
GP Tanks	Gram Panchayat Tanks
GRIT	CGIAR Gender Research and Integrated Training
HPRC	Hybrid Parents Research Consortium
IA	Impact Assessment
IA Principles	CGIAR Principles on the Management of Intellectual Assets
ICARDA	International Center for Agricultural Research in the Dry Areas
ICRAF	World Agroforestry

ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDO	Intermediate Development Outcome
IEA	Independent Evaluation Arrangement
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IRRI	International Rice Research Institute
ISI	International Scientific Indexing
ISPC	Independent Science and Partnership Council
IV	Improved Varieties
IWMI	International Water Management Institute
IWWIP	International Winter Wheat Improvement Program
IYCF	Infant and Young Child Feeding
KARLO	Kenya Agricultural and Livestock Research Organization
LIVESTOCK	CGIAR Research Program on Livestock
LTAC	Local Technical Agroclimatic Committees
MAIZE	CGIAR Research Program on Maize
MARLO	Managing Agricultural Research for Learning and Outcomes Program
MEL	Monitoring, Evaluation and Learning Platform
MELCOP	CGIAR Monitoring, Evaluation and Learning Community of Practice
MIS	Management Information Systems
MOOC	Massive Online Open Course
NARO	National Agricultural Research Organization
NASA	National Aeronautics and Space Administration
NDC	Nationally Determined Contribution
NGO	Non-governmental Organization
NRM	Natural Resource Management
NSAF	Nepal Seed and Fertilizer Project
OA-OD	Open Access and Open Data
OFSP	Orange-fleshed Sweet Potato
OICR	Outcome Impact Case Report
PICSA	Participatory Integrated Climate Services for Agriculture
PIM	CGIAR Research Program on Policies, Institutions and Markets
PMHPRC	Pearl Millet Hybrid Parents Research Consortium
POWB	Plan of Work and Budget
PR&DW	Department of Panchayati Raj and Drinking Water
PRIR	Philippines' Rice Industry Roadmap
Pro-WEAI	Project-level Women's Empowerment in Agriculture Index
QA	Quality Assurance
QMS	Quality Management Systems
QoR4D	Quality of Research for Development
RBE	Reach Benefit Empower
RBM	Results Based Management
RECOFTC	Center for People and Forests
RICE	CGIAR Research Program on Rice
RTB	CGIAR Research Program on Roots, Tubers and Bananas
RWS	Remote Weather Stations
SBC	Social and Behavior Communication
SC IP Group	System Council Intellectual Property Group
SDG	Sustainable Development Goal
SGSV	Svalbard Global Seed Vault
SIAC	Strengthening Impact Assessment in the CGIAR Project

SLO	System Level Outcome
SLRT	Sustainable Landscapes Rating Tool
SMB	System Management Board
SNP	Single Nucleotide Polymorphism
SPIA	Standing Panel on Impact Assessment
SRF	CGIAR Strategy and Results Framework
SUSTAIN	Scaling up Sweet Potato through Agriculture and Nutrition
TiLV	Tilapia Lake Virus
USD	United States Dollar
W1	Funding Window 1
W2	Funding Window 2
W3	Funding Window 3
WABEF	Western Africa Bio-wastes for Energy and Fertilizer
WELI	Women's Empowerment in Livestock Index
WHEAT	CGIAR Research Program on Wheat
WHO	World Health Organization
WLE	CGIAR Research Program on Water, Land and Ecosystems
YPARD	Young Professionals for Agricultural Development

EXECUTIVE SUMMARY

In 2018 the CGIAR Research Programs (CRPs) and Platforms, which deliver the shared work of the CGIAR System, continued their efforts to advance agricultural science and innovation to reduce rural poverty, increase food security, improve human health and nutrition, and ensure more sustainable management of natural resources in the face of climate change and other challenges.

Progress towards Strategy and Results Framework Outcomes: Evidence from 2018

The CRPs and Platforms presented rigorous evidence on the long-term, at-scale impact of CGIAR innovations against the 10 aspirational System Level Outcome Targets of CGIAR in 2018. Examples include:

- The impact of drought tolerant maize varieties (DTMA) in **Nigeria** showed a **6% reduction in the incidence of poverty** in the communities studied (MAIZE, 2019).
- **4.5 million farming households** were reached with biofortified planting material in 2018, bringing the total number of farming households growing and consuming biofortified crops globally to 7.6 million (A4NH, 2019).
- **23,000 new households** benefited from access to aquaculture improvements across five countries: **Egypt, India** (with women on carp-based polyculture improvements), **Myanmar, Sierra Leone** and **Timor Leste**. In addition, **12,300 households** are benefiting from improvements in management of fish refuges in **Cambodia** (FISH, 2019).
- Commercialization of four varieties of the perennial pasture grass *Urochloa* with a private sector partner, Papalotla, increased the area under improved pasture by **130,000 hectares** in 2018, bringing the global total to over **950,000 hectares** in >30 countries (LIVESTOCK, 2019).

The report also presents data and evidence on CRP and Platform progress towards research outputs and outcomes, using Common Results Reporting Indicators (CRRIs) introduced in 2017. A numerical summary of the CRRIs for 2018 includes:

- **938 innovations**, 407 of which were available for uptake and 91 of which had been taken up by next users.
- **1,888 peer reviewed publications**, with 59% open access and 82% internationally scientifically indexed (ISI).
- **105 policies, legal instruments and investments** modified in their design or implementation, informed by CGIAR research.
- **1,016,814 people trained by CGIAR**, with 3,842 (39% women) in long-term courses, including **545 PhD students** (45% women) and 1,012,972 (48% women) in short-term courses.
- CGIAR Programs worked with over **1,000 external partners**, 37% of them were related to research

Of note is the remarkable number of genetic innovations, including 417 improved varieties that were made available for use with a 10% uptake by next users in 2018. MAIZE reported the release of 81 elite maize varieties; RICE reported 108 Green Super Rice varieties; RTB claimed 90 improved advanced clones of potato; WHEAT reported 58 improved bread wheat and durum wheat varieties; GLDC claimed 58 innovative varieties, including groundnut (28), sorghum (8) and pearl millet (10); and A4NH reported 22 bio-fortified varieties of bean, pearl millet, wheat and maize (MAIZE, 2019; RICE, 2019; RTB, 2019; WHEAT, 2019; A4NH, 2019).

The CGIAR Platforms also reported significant results in 2018.

By the end of 2018, CGIAR's 11 genebanks were managing 773,112 accessions, including 25,576 in vitro accessions and 32,212 accessions held as plants or trees in screenhouses or fields. Approximately 80% of total accessions are available immediately for international distribution.

In 2018, a total of 96,566 germplasm samples (66,930 accessions) were distributed by CGIAR genebanks to users. Of these, 56,393 (58%) were distributed to recipients outside CGIAR in 87 countries and 40,173 samples (42%) were provided to CRPs and Centers. For the second

year in a row, germplasm distribution outside CGIAR exceeded that inside CGIAR.

In 2018, BIG DATA launched the Global Agricultural Data Innovation and Acceleration Network, [GARDIAN](#), which has made datasets, publications, and crop varieties across all CGIAR Centers and genebanks organized, easily accessible and FAIR (Findable, Accessible, Interoperable and Reusable) for the first time.

A key contribution of EiB in 2018 was the Platform's co-development and positioning to support the Crops to End Hunger initiative (CtEH).

Integrating Gender and Equity into CGIAR Research for Development

Gender equality was more strongly integrated into the research agendas of the CRPs during 2018. Some highlights included:

- The publication of the [Reach Benefit Empower \(RBE\)](#) framework by A4NH's Gender Equity and Empowerment (GEE) unit and the launch of the pilot version of the project-level Women's Empowerment in Agriculture Index ([Pro-WEAI](#)).
- A second set of collaborative studies on the [feminization of agriculture](#) by the collaborative platform on gender research that forms part of PIM
- The establishment of a new [Women's Empowerment in Livestock Index \(WELI\)](#) to assess the empowerment of women in production systems in which livestock are important.
- The release of a [special issue](#) in the *Journal for Agriculture, Gender and Food Security* on the interlinkages between gender norms, agency and local innovation processes in agriculture and natural resource management, and the publication of [17 tools or guidance notes](#) as part of the [GENNOVATE](#) program.

Youth also moved up the agenda of CRPs during 2018. In 2018 the first [MAIZE-Asia Youth Innovators Awards](#), a MAIZE initiative in collaboration with the Young Professionals for Agricultural Development (YPARD) Asia, was held, which aimed to promote youth participation in maize-based agri-food systems. BIG DATA created a [Youth in Data](#) initiative, and engaged a group of young digital innovators from Africa

and provided them with training on social media and journalistic data reporting.

PIM [research](#) on social protection for agriculture and resilience included studies on the impact of social protection programs in ten countries (Bangladesh, China, Egypt, Ethiopia, India, Mali, Pakistan, Peru, Uganda and Yemen) on a variety of gender and age differentiated outcomes, including income, empowerment, labor and nutrition and has contributed to programs designed specifically to enhance equity.

Also in 2018, IWMI focused on assessing youth in fish agri-food systems in eight FISH focal countries: Egypt, Nigeria, Tanzania, Zambia, Bangladesh, Cambodia, Myanmar and the Solomon Islands.

Working Together to Improve Performance

2018 saw the first reporting from CRPs and Platforms under the CGIAR results framework introduced in late 2017. In 2019 there is expected to be the first demonstration of a new results dashboard with quality assessed 2018 results. The management information systems (MISs), the Managing Agricultural Research for Learning and Outcomes (MARLO) program and the Monitoring, Evaluation and Learning (MEL) platform were officially adopted by all CRPs and Platforms in 2018, and 2018 was the first year that these two systems were integrated via CLARISA (CGIAR Level Agricultural Research Interoperability System Architecture) to feed the online results dashboard to be launched in late 2019.

Also in 2018, new [Program Management Performance Standards](#) for CGIAR were introduced and assessment criteria were [approved](#) in December 2018. These standards will be piloted in 2019, and assessed in 2020.

This report also presents the use of pooled funding (CGIAR Trust Fund Window 1 and 2) for 2018 and presents a list of activities funded.

A number of new partnerships were initiated in 2018, paving the way for greater collaboration in the future, with the all Platforms proving to be valuable partners for the CRPs. A total of 240 specific instances of collaboration between CRPs and Platforms were reported for 2018.

This report also summarizes reported activities on monitoring, evaluation, adoption and impact assessment carried out across CGIAR.

Oversight and Advice from the System Advisory Functions

The System Management Board (SMB) oversaw the design of a new business planning cycle, culminating in the approval of a 2019–2021 three-year business plan to the System Council in November 2018.

The business plan sets out 10 action points. These include successful implementation of CGIAR’s research portfolio, greater cooperation between Centers, a step change on gender both in the workforce and in research programs, stabilized funding and development of a 2030 Plan that will outline new governance, funding, programming and impact delivery arrangements for 2022–2030.

In 2018 multiple publications by the Independent Science and Partnership Council (ISPC) and the Standing Panel on Impact Assessment (SPIA) focused on ex-post impact assessment of CGIAR research and produced five major synthesis studies during 2018. The Independent Evaluation Arrangement (IEA) completed a compilation and review of all evaluative studies in CGIAR over the past 10 years, and conducted a study of over 200 impact assessment studies completed in the past 10 years.

On the management of intellectual assets, the System Council Intellectual Property Group (SC IP Group) found that, in 2018, the Centers have overall, complied with the [CGIAR Principles on the Management of Intellectual Assets](#) (IA Principles) and that the justifications provided in the Centers’ reports were adequate. In 2018, the Centers reported one provisional patent application, five plant variety protection applications, five Restricted Use Agreements, and 73 Limited Exclusivity Agreements.

In 2018, in its first year of operation, the CGIAR System Internal Audit Function provided support to the SMB, Centers and the System Council, to further collective efforts to oversee and manage risks and opportunities in the subject areas of procurement, anti-harassment and whistle-blowing policies; shared ICT Systems; and opportunities to assure external auditor objectivity, thereby providing valuable information upon which to make improvements across CGIAR.

System-wide Reporting Approach

This is the second CGIAR Annual Performance Report to use System-wide results reporting systems.

These reporting systems involve the CRPs and Platforms submitting annual reports using a common template that comprises sections related to evidence on progress towards CGIAR’s System Level Outcomes (SLOs) and [10 aspirational System Level Outcome Targets](#) that feed into the United Nations Sustainable Development Goals (SDGs), evidence of progress towards research outcomes, and how they have integrated gender and equity into their research agendas.

The report’s primary focus is on results and impact, and as part of the reporting process, a thorough quality assurance procedure was implemented this year to assess the claims made by the CRPs and Platforms. Data are summarized and presented throughout the report, and a list of annexes provide comprehensive sets of data on this year’s reporting.

Performance at the CRP and Platform level, as well as the CGIAR System level, is also reported, however this is framed as a way in which to support the achievement of results and impact, rather than a goal in itself. The report also discusses how CGIAR worked to improve its performance in 2018 and funding and finance for CGIAR in 2018.

CGIAR RESEARCH PORTFOLIO

Transforming global agriculture and food systems



In 2017 CGIAR embarked on a new program of innovative research programs and platforms, with a renewed emphasis on nutrition and health, climate change, soils and degraded land, food systems waste, food safety and the global stewardship of genetic resources. The portfolio is designed to contribute significantly to the achievement of the Sustainable Development Goals through CGIAR's 2030 targets: 150 million fewer hungry people, 100 million fewer poor people – at least 50% of whom are women – and 190 million hectares less degraded land by 2030. The portfolio is structured around three groups of challenge-led research:

Agri-Food Systems CGIAR Research Programs

The first of these is the innovation in Agri-Food Systems which involves adopting an integrated, agricultural systems approach to advancing productivity, sustainability, nutrition and resilience outcomes at scale.



CGIAR Research Program on Fish



CGIAR Research Program on Forests, Trees and Agroforestry



CGIAR Research Program on Grain Legumes and Dryland Cereals



CGIAR Research Program on Livestock



CGIAR Research Program on Maize



CGIAR Research Program on Rice



CGIAR Research Program on Roots, Tubers and Bananas



CGIAR Research Program on Wheat

Global Integrating Programs

The second cluster consists of four cross-cutting Global Integrating Programs framed to work closely with the Agri-Food Systems Programs within relevant agro-ecological systems.



CGIAR Research Program on Agriculture for Nutrition and Health



CGIAR Research Program on Climate Change, Agriculture and Food Security



CGIAR Research Program on Policies, Institutions, and Markets



CGIAR Research Program on Water, Land and Ecosystems

Research Support Platforms

Three research support Platforms underpin the research of the whole system.



CGIAR Platform for Big Data in Agriculture

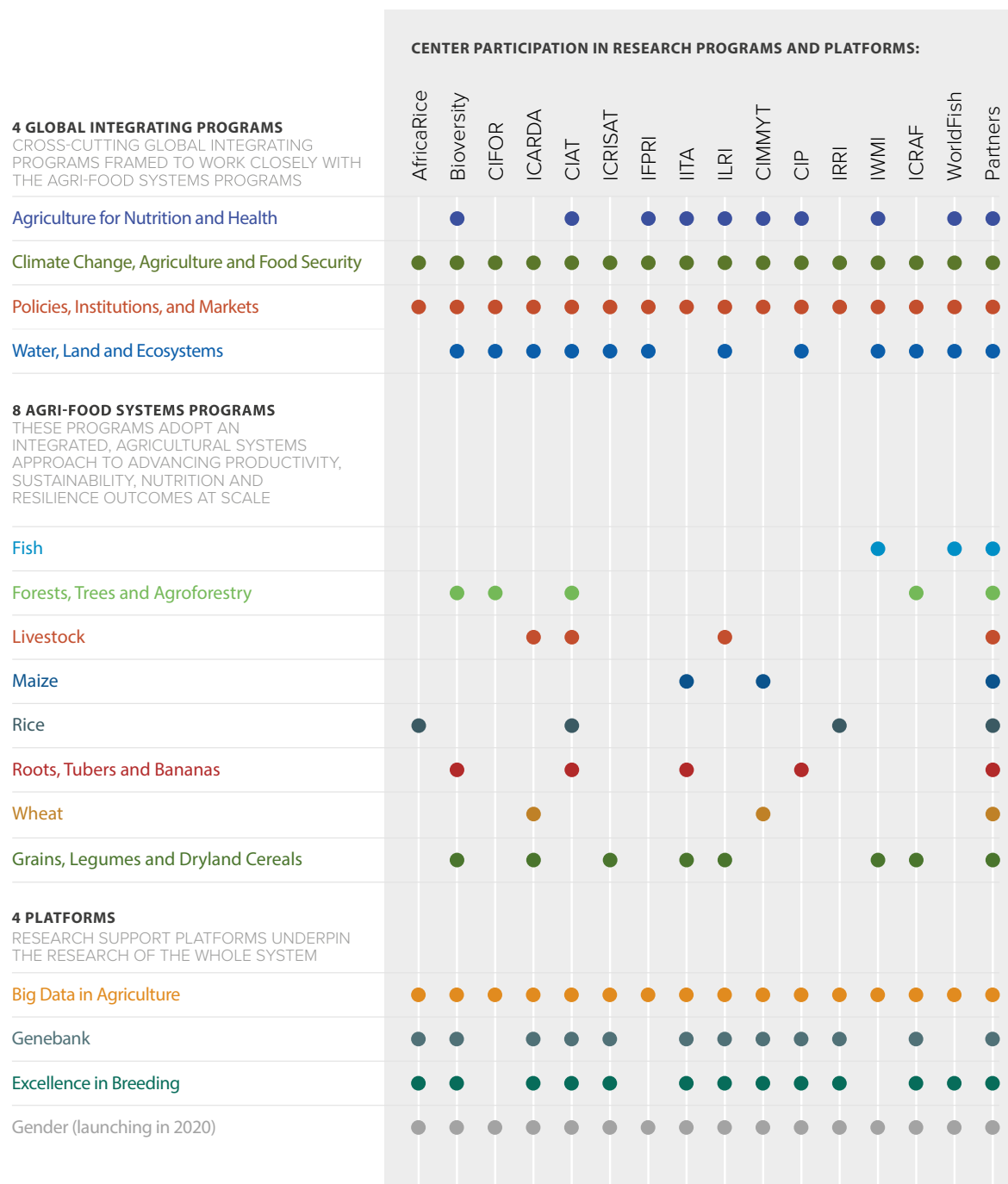


CGIAR Excellence in Breeding Platform



CGIAR Genebank Platform

CENTER PARTICIPATION IN RESEARCH PROGRAMS AND PLATFORMS



PREFACE

Agriculture is at the heart of both the problems and solutions that link nutrition to climatic and environmental change. These immense challenges demand novel solutions, putting research for development at the center of shared agendas for action and transformation.

Weather records were broken across the world in 2018 as tropical and temperate countries alike experienced unprecedented floods, heat and wildfires. Meanwhile, evidence mounted that the world is not doing enough to manage global environmental change. The Intergovernmental Panel on Climate Change (IPCC) [1.5°C Report](#) gave stark notice of the need for rapid action to avert a deep climate crisis. Related reports from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) on [land degradation and biodiversity](#) amplified messages of crisis and urgency.

As these existential environmental threats captured policy attention, both hunger and food shortages were again on the rise. 2018 marked the third year of the reversal of the multi-decade global progress on food security, with Latin America suffering an upturn in hunger alongside Africa and Asia; climate variability and extremes were identified as key drivers globally. The [2018 Global Report on Food Crises](#) found that climate disasters were responsible for a third of households in distress over the past year.

CGIAR, active in a global network of partners for agricultural research and development, made critical research contributions to supporting broad-based food security in the face of rapid environmental change during 2018. Drawing on its key assets – scientific skills, unique infrastructure including genebanks, and a worldwide reach – CGIAR worked with partners to generate nearly 1,000 scientific innovations and approximately 1,900 peer-reviewed publications over the year.

The primary value of this science is its contribution to positive impact on people's welfare. 2018 saw the publication of a compilation of 25 rigorous impact assessment studies of CGIAR work from the prior five years.

Demonstrated impacts of CGIAR research included a long-run reduction in infant mortality, at 3-5 million infant deaths averted per year, as well as sustained increases in both gross domestic product (GDP) and farmer incomes across multiple countries. Additional impact studies published in 2018 showed, for example, clear impacts of drought-tolerant maize varieties on household incomes and food consumption in Africa's most populous countries, Nigeria and Ethiopia.

Major headway was achieved in 2018 through the approval of the Crops to End Hunger Initiative (CtEH), established and funded to modernize plant breeding across all relevant CGIAR Research Centers, using a common set of diagnostic, planning and priority-setting tools. The System-wide role of gender equality research was also reinforced with strong support from Funders. Other advances included new strategies on biofortification, and exploration of new strategic areas for cross-Center collaboration, such as anti-microbial resistance and rapid response to emerging pests and diseases.

Managerial innovation at the System level was a hallmark of 2018. Among the significant achievements was the development of a process for three-yearly business planning cycles across the CGIAR System. This led in turn to the approval of the 2019-2021 CGIAR Business Plan, which outlines ten priority areas of action. Among other priorities, the Business Plan set in motion the genesis of a 2030 Plan – an opportunity to achieve greater focus and coherence across CGIAR's research portfolio, delivery mechanisms and institutional arrangements. The Plan will be in place for the 2022-2030 business cycles, to align with the world's serious collective efforts to deliver on the Sustainable Development Goals (SDGs).

With regard to funding, flows into Window 1 and 2 stabilized in 2018, in tandem with a heightened sense of shared purpose between Funders and CGIAR. Members of the System Council and the System Management Board came together towards the end of the year to initiate a collaborative System Reference Group dedicated to the design of the 2030 Plan. In

addition, the System Council agreed a set of principles to improve the connections between CGIAR and its scientific and advisory services in terms of efficiency, mutual communications, links between science and development, and ownership of advice.

Special effort was made over the year to improve the consistency and quality of learning across the System. For the first time the full set of shared research, funded through the pooled funds (Windows 1, 2 and 3) and associated bilateral grants, was planned and reported via a common online software system using standard definitions and criteria, with quality assurance at System level. These tools provide

the means for a more accurate System-wide view by Funders and other observers, plus, equally valuable, enhanced communication and shared learning among CGIAR Research Programs (CRPs) and Platforms.

Moving from 2018 into the new business cycle, CGIAR remains dedicated to research and partnerships that reduce poverty, enhance food and nutrition security, and improve natural resources. Innovation and ingenuity in how CGIAR works and what it produces will be at the heart of playing a meaningful role in the global push to reach the SDGs in a climate-challenged world.



A vegetable vendor in Lizulu Market in Lilongwe, Malawi. Photo: Melissa Cooperman/IPPRI

I. INTRODUCTION

In 2018 the CGIAR Research Programs (CRP) and Platforms, which deliver the shared work of the CGIAR System, continued their efforts to advance agricultural science and innovation to reduce rural poverty, increase food security, improve human health and nutrition, and ensure more sustainable management of natural resources in the face of climate change and other challenges.

This report is the second CGIAR System Annual Performance Report that uses new System-wide results reporting systems. The report's primary focus is on results and impact, and as part of the reporting process, a thorough quality assurance process was implemented this year to assess the claims made by the CRPs and Platforms.

This year there is extensive evidence presented towards achieving CGIAR's System Level (SLOs).

This report also presents the results of reporting on the new Common Results Reporting Indicators (CRRIs) introduced in 2017, including data on CGIAR "innovations" (significant products and findings); contributions to national and international policies and investments; the number of people trained by CGIAR; CGIAR partnerships; and peer-reviewed publications.

It also provides information on how CGIAR is working to improve its performance, including achievement of planned milestones; collaboration across CGIAR; the use of funding during the year; and updates on the progress of the three CGIAR Platforms and the activities of the System's advisory bodies. However, this is framed as a way in which to support the achievement of results and impact, rather than a goal in itself.



A data collector carries a tool to measure soil moisture in the Koga Irrigation Scheme in the Amhara region of Ethiopia.

Photo: Mulugeta Ayene/WLE

II. CGIAR PORTFOLIO – PROGRESS REPORTED IN 2018

Progress towards the Sustainable Development Goals and CGIAR System Level Outcomes


With an aim to ensure that research contributes to development outcomes, the CGIAR System as a whole reports its progress against the CGIAR [Strategy and Results Framework](#) (SRF), comprising the three SLOs: to reduce poverty, to improve food and nutrition security, and to improve natural resources and ecosystem services. The SRF also sets out [10 aspirational System Level Outcome Targets](#) for progress to 2022 and 2030, which relate to the international targets established for the Sustainable Development Goals (SDGs).


In 2018, an example of impact was reported by WHEAT, where the CGIAR global wheat breeding program continues to [deliver high-yielding germplasm](#) adapted to diverse growing regions worldwide, particularly for low-yielding environments (WHEAT, 2018).




In its annual report, RTB described the adoption of [improved cassava varieties](#) in Tanzania, the Democratic Republic of Congo (DRC), Sierra Leone and Zambia which decreased the rate, depth and severity of food insecurity. Adoption yielded a 10.1% gain in overall average daily consumption per capita. Had it not been for the adoption of cassava technology, the rate of food insecurity would have been about 90%, suggesting that adoption of cassava technology led to approximately a 14-percentage point reduction in food insecurity. Adoption resulted in cutting the calorie deficit by 110 kilocalories per capita among the food insecure group of households. It was also found that adoption had a higher food insecurity-reducing impact among female-headed households than among male-headed households (RTB, 2018).

More examples of high-level impact of CGIAR varieties, technologies and other innovations reported in 2018 are shown in Table 1.

Table 1. Examples of high-level impact of CGIAR varieties, technologies and innovations reported in 2018

	A4NH	4.5 million farming households were reached with biofortified planting material in 2018, bringing the total number of farming households growing and consuming biofortified crops globally to 7.6 million (the HarvestPlus global households reached projection model is described in the related links).	Link A4NH 1 Link A4NH 2
	A4NH	60,000 farmers treated more than 63,000 hectares with Aflasafe in 2018, allowing production of maize and groundnut with safe aflatoxin levels. Large-scale use of Aflasafe contributed to improved food safety in most of the areas where crops were treated. The large majority of the treated crops contained aflatoxin-compliant concentrations even for the most stringent markets (i.e. less than 4 parts per billion total aflatoxins). In Nigeria, use of Aflasafe increased the income of smallholder maize farmers on average, 11.5% more than regular maize.	Link A4NH 3 Link A4NH 4
	RTB	Release and adoption of potato improved varieties (IVs) were studied in Bangladesh, China, India, Indonesia, Nepal, Pakistan and Vietnam. In terms of area, International Potato Center (CIP)-related varieties were planted on 1.4 million hectares, which is about 19% of the total area. China accounts for most (87%) of the total area cultivated with CIP-related varieties. About 2.8 million households are using CIP-related material, particularly in China (2.5 million), India (0.2 million) and Nepal (0.1 million).	Link RTB 1
	RTB	Adoption estimates of cassava varieties in nine countries (in South and Southeast Asia) indicate that out of 4.1 million hectares of cassava production, 2.7 million hectares (65% of the total area) are grown using the International Center for Tropical Agriculture (CIAT)-related varieties.	Link RTB 2

	RTB	Release and adoption of sweet potato IVs were studied in Bangladesh, China, India, Indonesia, Nepal, Papua New Guinea, the Philippines and Vietnam. About 88% of the 3.6 million-hectare area is planted with IVs. In terms of area, CIP-related varieties are planted in about 164,000 hectares , which is about 5% of the total area. China accounts for most (71%) of the total area cultivated with CIP-related varieties. However, this only represents 4% of the total area in China. The country with the highest figure is Vietnam, where 20% of the total area is planted with CIP-related varieties.	Link RTB 3
	FISH	23,000 new households benefited from access to aquaculture improvements across five countries: Egypt (1,680), Sierra Leone (170) and Odisha India (17,680 – where women were involved in carp-based polyculture improvements). In Myanmar, 3,149 small-scale aquaculture households and in Timor Leste, 427 small-scale aquaculture households adopted Genetically Improved Farmed Tilapia (GIFT). 12,300 households are benefiting from improvements in the management of fish refuges in Cambodia.	Link FISH 1 Link FISH 2 Link FISH 3 Link FISH 4
	LIVESTOCK	Commercialization of four Urochloa hybrids (Mulato II, Cayman, Cobra, Camello) and two synthetic mixtures (Mestizo blend, Camello blend) through a private sector partner, Papalotla. Urochloa hybrids had been scaled on >950,000 hectares in >30 countries by 2018. Information from Papalotla indicates that an additional 130,000 hectares were reached in 2018 (the 100,000+ hectares per year are cumulative).	Link to be shared soon
SLO target 1.2 30 million people, of whom 50% are women, assisted to exit poverty	GLDC	In three states of India, pearl millet hybrids derived through HPRC (Hybrid Parents Research Consortium, based on based on the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)-bred germplasm) were adopted in 60% of the area on average and resulted in estimated “social benefits” of USD 74 per hectare, or a total of USD 133 million per year for the entire area, shared between farmers, consumers and others.	Link GLDC 1
	MAIZE	Farm- and market-level impacts of multiple technology adoption choices were estimated in Ethiopia using household survey data. Current adoption rates were about 50% for hybrid varieties (some of which were CGIAR derived). When IVs varieties, fertilizer and other technologies were combined, this gave an average estimated 26% cost reduction per kilogram of maize output. If adopted over the whole maize area, this could increase producer and consumer surpluses by USD 140 and USD 105 million and reduce the number of poor people by an estimated 788,000 per year.	Link MAIZE 1
	MAIZE	Over 80% of Nigerian farming households are smallholders (World Bank, 2017) and they produce an estimated 70% of total maize production (Agra, IITA). The impact of drought tolerant maize varieties (DTMA) in Nigeria showed a 6% reduction in the likelihood of poverty incidence in the communities studied.	Link MAIZE 2 Link MAIZE 3
	MAIZE	In a national survey in Ethiopia , adoption of improved maize varieties (some with CGIAR germplasm) was estimated to increase per capita food consumption by 3.3% , the probability of a smallholder being in food surplus by 1.8 percentage points, and decrease food insecurity by 2.5%.	Link MAIZE 4
	RTB	Adoption of cassava varieties tracked using data from DNA-fingerprinting in 2015-16 showed that two thirds of cassava growers in Nigeria were using improved varieties. Economic analysis demonstrated that adoption of improved varieties has allowed about 1.6 million individuals to escape poverty (using a poverty line of USD 1.9 per person per day).	Link RTB 1

<p>SLO target 2.1 Improve the rate of yield increase for major food staples from the current <1% to 1.2-1.5% per year</p> 	GLDC	An estimated 20% increase in pearl millet grain and fodder yields in an estimated 1.92 million farms covering about 1.84 million hectares of farmers' fields in three states of India through the Hybrid Parents Research Consortium.	Link GLDC 1
	FISH	In Bangladesh, 4,350 households were associated with improvements in hilsa management and reported productivity gains in fisheries (Ecofish FY 2017-2018 Report, 2018).	Link FISH 1
	WHEAT	In addition to the gain in wheat production (doubled yield between 1982 and 2014) from Chinese germplasm-derived varieties alone, the estimated average additional increase in annual production reached 10.4 million metric tons from the use of exotic germplasm in the past three decades. The accumulated contributions of exotic germplasm from CGIAR and other foreign sources to wheat production in China represent about 343 million metric tons (1982 to 2014), about 10% of total production.	Link WHEAT 1
	WHEAT	The annual genetic gain for grain yield of the internationally distributed Semi-Arid Wheat Yield Trials (2002-2003 to 2013-2014) under the International Wheat Improvement Network (IWIN) was assessed in 740 locations across 66 countries in low- and medium-yielding environments. The rate of Grain Yield Increase ranged from 1.8% (38.13 kilograms per hectare per year) to 1.4% (57.71 kilograms per hectare per year) higher than the average annual global yield growth rates.	Link WHEAT 2
<p>SLO target 2.3 150 million more people, of whom 50% are women, without micronutrient deficiencies</p> 	A4NH	22.5 million people (4.5 million farming households) were reached with biofortified planting material in 2018, bringing the total number of farming households growing and thought to be consuming (awaiting studies) biofortified crops globally to 7.6 million (38 million people, based on the HarvestPlus global households reached projection model).	Link A4NH 1
	RTB	Release and adoption of potato IVs were studied in China, India and Nepal . In terms of area, CIP-related varieties are planted in about 1.4 million hectares which is about 19% of the total area. China accounts for most (87%) of the total area cultivated with CIP-related varieties. About 2.8 million households are using CIP-related material, particularly in China (2.5 million), India (0.2 million) and Nepal (0.1 million).	Link RTB 1
<p>SLO target 3.1 5% increase in water and nutrient (inorganic, biological) use efficiency in agro-ecosystems, including through recycling and reuse.</p> 	FISH	In Bangladesh, 59,151 hectares of new riverine and coastal areas were brought under improved natural resource management in the Padma and Tetulia rivers during 2018, further extending the habitat now under improved co-management measures in the country.	Link FISH 1
	MAIZE	Adoption of improved water-management practices in rural Pakistan improved wheat and rice yields, household income and food security levels, and reduced poverty levels. Higher food security levels for adopting households, in the range of 3–12%, higher yields and higher household income levels, in the range of Pakistani Rupees 2,573-4,926 and 2-7% lower poverty levels.	Link MAIZE 1

Source: CRP 2018 annual reports.

Table 1 (above) presents quantitative evidence of significant progress against the 10 aspirational System Level Outcome Targets of the SRF. It lists the targets, shows how they link to the relevant SDGs, and provides evidence based on available adoption and ex-post impact studies published in 2018 on the contribution of CGIAR to each target. Given that the timeframe for research to impact is typically 5-25 years for agricultural research, much of the evidence presented relates to earlier CGIAR research.

The evidence for progress towards the SLOs has been assessed to ensure that statements made reflect the evidence presented, reflect evidence published in 2018, and are clear and comprehensible.

Progress towards Research Outputs and Outcomes

CGIAR's performance management system is structured around a conceptual framework that comprises three spheres that determine the extent to which there is control over research results and the contribution to development impact. This conceptual framework is presented in Figure 1, and further explained in Table 2.

The section "Progress towards the Sustainable Development Goals and CGIAR System Level Outcomes" of this report (before) presents evidence linked to the sphere of interest.

This section focuses primarily on the spheres of control (outputs) and influence

Pearl millet hybrid contributes to economic benefits in India GLDC 2018 annual report

Pearl millet is one of the most important food crops grown across the drylands of Africa and Asia, predominantly in low-rainfall environments with infertile soils. In India, while the area under production marginally declined, productivity has increased. The development and wider use of hybrids has primarily been responsible for the phenomenal yield increases achieved.

A third-party evaluation of the on-farm impact of pearl millet hybrids was carried out in 2015 and published in 2018. These hybrids had been developed under ICRISAT Pearl Millet Hybrid Parents Research Consortium (PMHPRC) between 2000 and 2010 (based directly or indirectly on ICRISAT breeding lines) in India.

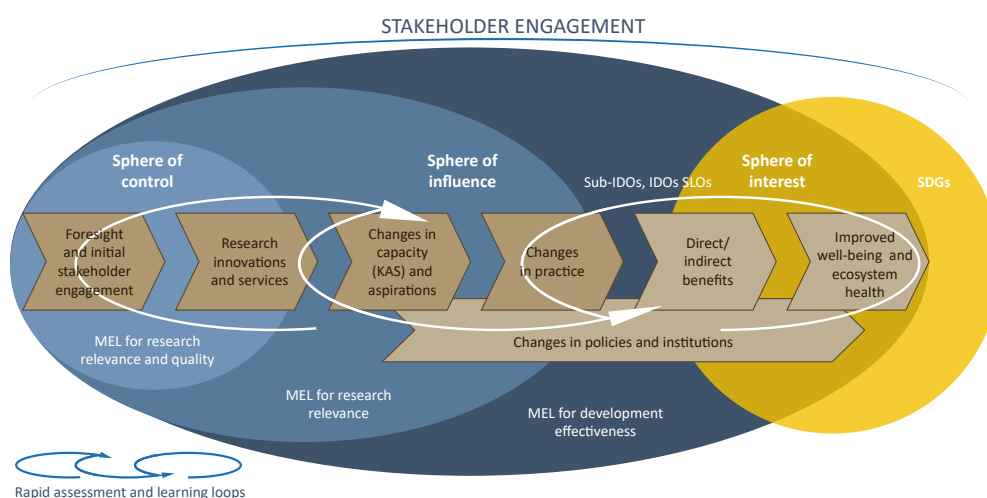
The study, covering 563 pearl millet growers spanning 57 villages and 25 mandals in three states (Rajasthan, Gujarat and Uttar Pradesh) in India, revealed that PMHPRC hybrids covered about 60% of the pearl millet hybrid area

during 2013-14. These hybrids provided at least 20% higher grain and fodder than the varieties or other hybrids they replaced.

Income and expenditure data from this study indicate that the sampled farmers are able to save money after meeting their livelihood expenses. This margin was quite small in the Rajasthan sample, moderate in Gujarat and substantial in Uttar Pradesh.

The total benefits that accrued due to these hybrids in the three states totaled USD 133.7 million per year. The overall benefits at the country level could surpass USD 150 million per year if contributions of HPRC hybrids are accounted for in other states of India as well. Considering the average landholding of less than 2 hectares per farm family, the number of households planting improved varieties would be 1.5 million farm families, assuredly reaching 8 million people.

Figure 1: Spheres of control, influence and interest for performance management of agricultural research for development



Source: CGIAR, 2016.

of the performance management system, presenting evidence of progress towards research outcomes related to research use and effectiveness. Innovations, publications, training and partnerships refer to the sphere of control, and influences on policy and legal changes and investments and alternative metric (altmetric) scores relate to the sphere of influence.

Progress towards research outcomes are reported by the CRPs and Platforms in a narrative annual report (based on a common template) and with Common Results Reporting Indicators (CRRIs). These indicators were introduced in 2017 and include:

- The number of CGIAR innovations. Innovations are categorized in four stages:
 - Stage 1: discovery/proof of concept
 - Stage 2: successful piloting
 - Stage 3: available or ready for uptake
 - Stage 4: uptake by next user
- The number of peer-reviewed publications authored or co-authored by CGIAR researchers.

- The number of people trained by CGIAR.
- The number of CGIAR partnerships.
- The number of policies, legal instruments, investments and similar modified in their design or implementation, informed by CGIAR research.
- Altmetric scores for publications.

Annexes 1, 2, 3, 4, 5 and 6 list the available data for the CRRIs for 2018. The numbers are summarized in Table 4.

For the first time in 2018, CRPs and Platforms are reporting their progress towards research outcomes using Outcome Impact Case Reports (OICRs). Table 2 presents the number of Outcome Impact Case Reports (OICRs) submitted in 2018 by CRPs and Platforms by level of maturity. It shows that 18% of OICRs were at a “level 3” stage of maturity in 2018; 34% of OICRs were at a “level 2” stage of maturity; and most OICRs in 2018 were at a “level 1” stage of maturity.

Table 2. OICRs by level of maturity in 2018

	LEVELS OF MATURITY			TOTAL
	LEVEL 1(*)	LEVEL 2 (**)	LEVEL 3 (***)	
NUMBER OF OICRS	46	41	8	95
%	48%	43%	8%	100%

Source: CRP and Platform annual reports.

- (*) Level 1: (sphere of influence) CGIAR research (and related activities) that has contributed to changed discourse and/or behavior among next users (related to the theory of change). Examples of evidence: outcome mapping study, media analysis or e-mail correspondence.
- (**) Level 2: (sphere of influence) CGIAR research (and related activities) that has contributed to documented policy change and/or a change in practice by end users. This may include changes such as income and nutrient intake in the sphere of influence – usually this will be a development project involved in the “delivery”/scaling up of an innovation. Example of evidence: a study of adoption and effects, commissioned at project level.
- (***) Level 3: (sphere of interest) Policy and/or practice changes influenced by CGIAR research (and related activities) that have led to adoption or impacts at scale or beyond the direct CGIAR sphere of influence (for example, not in a development project). Examples of evidence: an at-scale adoption study or ex-post impact assessment.

Table 3 presents 15 selected examples of OICRs for 2018 at maturity levels 1, 2 and 3. A full list of OICRs is available in Annex 1. An example of a level 2 OICR is the [water planning data platform, “Agua de Honduras”](#), piloted and adopted by the Government of Honduras, which provides data on hydrology, vegetative cover, soil properties, along with future climate scenarios (WLE, 2018). At level 3, an OICR reported by RTB documented a study on the release and adoption of improved

[sweet potato varieties in eight major producing countries in Southeast, South and East Asia](#). Data on varietal release showed that over a total of 434 varieties released, 195 (45%) had been adopted and cultivated, and that 45 of the 434 were CIP-related varieties. In 2015, the sweet potato cultivated area was 3.6 million hectares and 88% of this area was planted with improved varieties. 5% (164,000 hectares) of this area was planted with CIP-related varieties (RTB, 2018).



ICRAF laboratory assistant Agnes Were performs seed extraction from ‘Adansonia digitata’ fruits. Photo: Michael Major/Crop Trust

Table 3: Selected OICRs for 2018

CRP	TITLE OF OUTCOME IMPACT CASE REPORT (OICR)	LEVEL OF MATURITY
A4NH	<u>"Reach, Benefit, Empower"</u> framework of indicators for monitoring programs and policies incorporated into trainings conducted by partners	Level 1
WHEAT	Heat and drought-resistant wheat varieties in Pakistan help farmers combat climate change stress and is success of <u>physiological breeding approach</u>	Level 2
Livestock	RHOMIS: A rapid, standardized and cost-effective tool for tracking agricultural performance has reached over <u>21,000 households in 27 countries</u>	Level 1
CCAFS	CGIAR Climate change West Africa Program informs the adoption of a <u>public-private partnership business model for climate information services in Ghana</u>	Level 1
FISH	Myanmar Government approved the Agricultural Development Strategy and the 'Naypyidaw Agreement' that enables the spread of nutritious and profitable <u>rice-fish farming practices</u>	Level 1
FTA	The Cocoa of Excellence Programme has facilitated connection between producers and other stakeholders, providing an international platform, visibility, and tools to improve <u>fermenting and roasting techniques</u>	Level 1
RICE	Adoption of Alternate wetting and drying in Asia to save water and reduce methane emissions	Level 2
A4NH	Busia County Biodiversity Policy (Kenya) recognizes importance of native species for nutrition and food security and allocates resources for the conservation of <u>regional food biodiversity</u>	Level 2
MAIZE	Fast-tracking maize varietal replacement in Ethiopia	Level 2
WLE	Water planning system "Agua de Honduras" used to improve Honduran investment decisions (WLE-CIAT)	Level 2
WLE	Soil-plant spectral technology guiding soil fertility investments in Africa (WLE-ICRAF)	Level 2
PIM	Improved targeting for the largest safety net program for ultra-poor women in rural Bangladesh, reaching 750,000 women and their 3.5 million family members	Level 2
PIM	Improving returns to public investments in China's agricultural sector	Level 2
GLDC	Impact of ICRIASAT Pearl Millet Hybrid Parents Research Consortium (PMHPRC) on the Livelihoods of Farmers in India	Level 3
RTB	In Southeast and South-Asia, CIP-related varieties cover 5% (<u>164,000 hectares</u>) of the of the total area planted to sweet potato (<u>3.6 million hectares</u>)	Level 3

Source: CRP and Platform 2018 annual reports.

Table 4: Common Results Reporting Indicators for 2018

COMMON REPORTING INDICATORS	TOTALS FOR 2018	HIGHLIGHTS
Number of CGIAR innovations	In 2018: 938 innovations were reported, of which: 270 were at Stage 1 (29%): end of research 170 were at Stage 2 (18%): end of piloting 407 were at Stage 3 (43%): available for uptake 91 were at Stage 4 (10%): uptake by next users A full list of innovations is available in Annex 2	Details on Stage 3 innovations (Available for uptake n = 407): 50 (12%) represented research and communication methodologies and tools 37 (9%) were production systems and management practices 294 (72%) were genetic innovations (varieties/breeds) 22 (5%) were significant social science findings and evidence 4 (1%) were related to biophysical research (e.g. computational biology, decision support tools, geospatial analysis)
Number of peer-reviewed publications authored/co-authored by CGIAR researchers	1,888 publications were reported in 2018 A full list of peer-reviewed publications is available in Annex 3	1,110 (59%) were open access (OA) 1,556 (82%) were published in international scientifically indexed (ISI) journals
People trained by CGIAR in 2018	1,016,814 people trained and 48% of women (488,323)	Long term (degree or other long courses): 3,842 (39% women) Short term: 1,012,972 (48% women)
CGIAR partnerships	1,003 partnerships reported in 2018 Information on external partners is available in Annex 4	368 (37%) on research 164 (16%) on delivery 188 (19%) on policy 231 (23%) on capacity development 52 (5%) on another topic
Number of policies, legal instruments, investments and similar modified in their design or implementation in 2018, informed by CGIAR research	81 policies/strategies 7 legal instruments 12 budget or investments 7 curricula Total: 105 A full list of contributions to policies, legal instruments and investments is available in Annex 5	Among those reported for 2018 were contributions to the design or redesign of: 17 global policies/legal instruments 8 regional policies/legal instruments 62 national policies/legal instruments
Altmetric scores (mentions in media and on social media of CGIAR peer-reviewed publications).	For 2018, 4 CRPs (A4NH, MAIZE, LIVESTOCK, PIM) and 1 Platform (BIG DATA) provided altmetric information on 664 peer-reviewed publications out of 1,888	Highlights of altmetric scores for the top 10 publications are available in Table 7 3 articles received altmetric scores over 1000, and 4 received scores over 300

Source: CRP and Platform 2018 annual reports.

Innovations

In 2018, 10% of innovations were at stage 4 – “uptake by next user”; 43% were at stage 3 – “available for use”; 18% were at stage 2 – “piloting”; and 29% were at stage 1 – “discovery of proof of concept”. The majority (66%) of innovations were the result of genetics research including new improved varieties with increased genetic gain and they represent 74% of total stage 3 innovations. Unique tagging of innovations was introduced into the reporting system in 2018, which will improve the ability to track – and manage – innovations through the innovation pipeline in future years. Table 5 presents a summary of the stages and types of innovations reported.

Of note is the remarkable number of genetic innovations (619), including 417 improved varieties of which 10% have been taken up by next users in 2018, an uptake level that is comparable with private sector patented varieties. MAIZE reported the release of 81 elite maize varieties, RICE 108 Green Super Rice varieties, RTB 90 improved advanced clones of potato, WHEAT 58 improved bread wheat and durum wheat varieties, GLDC 58 innovative varieties including, groundnut (28), sorghum (8), pearl millet (10), and A4NH 22 bio-fortified varieties of bean, pearl millet, wheat and maize (MAIZE, 2018; RICE, 2018; RTB, 2018; WHEAT, 2018; GLDC, 2018; A4NH, 2018).

RICE (108):

Green Super Rice varieties are defined as rice cultivars (inbreds, hybrids) that can produce high and stable yield under less input, with 95 in stage 3 in Asia (the Philippines, Bangladesh, Vietnam, India and Indonesia) and Africa

(Tanzania and Mozambique); and 13 at stage 4, having already been taken up by next users in Pakistan and the Philippines (RICE, 2018).

RTB (90):

Seventy varieties (506 advanced clones) of potato with resistance to late-blight and viruses and high productivity were released. Ten Late-Blight Heat Tolerant clones showed high marketable tuber yield and a glycoalkaloid content under the safe level in tubers. Eight clones with low glycoalkaloid content and high marketable tuber weight were selected to be used to develop new varieties suitable for high heat stress or as suitable parents in breeding programs aimed at improving heat tolerance with minimum risk of glycoalkaloid accumulation under high temperature stress. Two high-yielding, consumer-acceptable apple banana hybrids (Musa species, AAB genome group) with resistance to *Fusarium oxysporum f. sp. cubense race 1* were also released (RTB, 2018).

MAIZE (81):

Unique CGIAR-derived maize varieties have been released across Africa, Asia and Latin America. Fourteen varieties were hybrid combinations, showing that regional or multinational seed companies use MAIZE-improved germplasm to develop and release improved maize hybrids. These include abiotic stress (such as drought, heat or N use efficiency) and biotic stress (such as maize lethal necrosis, rust, ear rot or striga). Twenty of the released varieties are nutritionally enriched (with Provitamin A, Quality Protein Maize and High Zinc) as result of the MAIZE partnership with A4NH and HarvestPlus (MAIZE, 2018).

Table 5: CGIAR innovations reported by stage of research and type of innovation in 2018

STAGE OF INNOVATION	RESEARCH AND COMMUNICATION METHODOLOGIES AND TOOLS	PRODUCTION SYSTEMS AND MANAGEMENT PRACTICES	GENETICS	SOCIAL SCIENCE	BIOPHYSICAL RESEARCH	TOTAL
1- Research/proof of concept	30	27	185	21	7	270
2- Piloting	28	31	94	14	3	170
3- Available for use	50	37	294	22	4	407
4- Take up by “next users”	10	19	46	13	3	91
Total	118	114	619	70	17	938

Source: CRP 2018 annual reports.

WHEAT (58):

Ten new wheat varieties have been multiplied in collaboration with seed producers located in strategic growing areas of Mexico. WHEAT also reported nine bread wheat winter varieties, 22 bread wheat spring varieties, 16 durum wheat spring varieties and one triticale (WHEAT, 2018).

GLDC (58):

New varieties were released for groundnut (28), sorghum (8), pearl millet (10), lentil (3), chickpea (2), pigeon-pea (3), cowpea (2) and soybean (1) (GLDC, 2018).

Managing innovations toward scaling RTB 2018 annual report

RTB is contributing to rethinking scaling in research for development interventions.

Under the leadership of Wageningen University, CIP and the International Institute of Tropical Agriculture (IITA), RTB is advancing a “Scaling Readiness” approach. This approach has been developed to facilitate the rigorous assessment of innovation readiness for going to scale and to support, through a stepwise approach, the design, implementation and monitoring of scaling strategies. It is a project management and innovation portfolio management system to support investment decisions related to the scaling of innovations at project, Center and CGIAR level.

Scaling Readiness seeks to achieve three objectives:

1. At the project level: enhance the scaling performance of CGIAR research and delivery projects by supporting the design, implementation and monitoring of cost-efficient and realistic scaling strategies;
2. At the CGIAR Center and System levels: support innovation portfolio management by providing a dashboard for monitoring the scaling readiness of, for example, all CGIAR innovations.
3. At the CGIAR Center and System levels: support fundraising for CGIAR and CGIAR Centers, as Scaling Readiness provides evidence of which innovations have been proven to work to achieve certain

livelihood outcomes (SDGs) in specific locations.

The Scaling Readiness project was conceived in response to a lack of rigorous, evidence-based approaches to the [scaling of innovation](#). It examines CGIAR innovations as packages of technologies, new policies, market mechanisms and partnerships, and assesses the readiness for scaling along a [9-level ladder that is also being used by the National Aeronautics and Space Administration \(NASA\)](#) and the European Union (EU).

The readiness assessment reveals which of the elements in an innovation package form critical bottlenecks for scaling (for example, access to finance, absence of a regulatory framework or seed systems). This assessment enables the design of site-specific scaling strategies to overcome these bottlenecks, and supports scaling partner selection.

A draft [Scaling Readiness Quick Guide](#) has been developed and RTB is currently finalizing an Implementation Manual and web-platform where all relevant materials will be available. The approach is being used by [multiple projects](#) inside and beyond RTB to develop and implement their scaling strategies, and RTB is in the process of systematically documenting the outcomes of the project.

Source: RTB, AR 2018.

Table 6 shows a further list of innovations at stages 3 and 4. A complete list of innovations is available in Annex 2.

Table 6: Examples of innovations at stages 3 and 4

CRP OR PLATFORM	INNOVATION	TYPE OF INNOVATION	STAGE
A4NH	Aflasafe, a biocontrol product used for maize and groundnut, was approved in Ghana, Tanzania and Zambia, and is now available for commercial use	Production systems and management practices	Stage 4: uptake by next user
A4NH	Impact evaluation of a nutrition sensitive intervention that was scaled up through preschools	Social science	Stage 4: uptake by next user
BIG DATA	The Global Agricultural Data Innovation and Acceleration Network (GARDIAN)	Research and communication methodologies and tools	Stage 3: available or ready for uptake
CCAFS	Analytical approach for predicting potential areas of agroforestry expansion	Biophysical research	Stage 3: available or ready for uptake
CCAFS	Food security, drought monitoring and an early warning tool that considers local vulnerabilities	Research and communication methodologies and tools	Stage 4: uptake by next user
FISH	Design of a tilapia single nucleotide polymorphisms (SNP) chip	Genetic (varieties and breeds)	Stage 3: available or ready for uptake
FISH	The use of water storage ponds and homestead irrigation channels for fish production in Myanmar	Production systems and management practices	Stage 3: available or ready for uptake
FTA	Ecophysiological model of coffee response to climate change	Biophysical research	Stage 4: uptake by next user
FTA	A sustainable landscapes rating tool (SLRT)	Research and communication methodologies and tools	Stage 4: uptake by next user
GLDC	Introgression of high oleic trait in groundnut	Genetic (varieties and breeds)	Stage 3: available or ready for uptake
LIVESTOCK	RHoMIS – a rural household multiple indicator survey tool	Research and communication methodologies and tools	Stage 4: uptake by next user
LIVESTOCK	CLEANED-R (Comprehensive Livestock Environmental Assessment for Improved Nutrition, a Secured Environment and Sustainable Development along Livestock and Fish Value Chains) tool	Production systems and management practices	Stage 3: available or ready for uptake
MAIZE	Five hybrids of high yield potential for the seed sector of Mexico	Genetic (varieties and breeds)	Stage 3: available or ready for uptake
MAIZE	Scaling conservation agriculture-based sustainable intensification systems in Ethiopia	Production systems and management practices	Stage 4: uptake by next user
PIM	Poverty sensitive scorecard tool: combining risk scoring with poverty scoring to help lenders and policymakers prioritize development projects	Social science	Stage 3: available or ready for uptake
PIM	A rural investment and policy analysis model	Social science	Stage 4: uptake by next user

RICE	Alternate wetting and drying (AWD) taken up by users in Asia	Production systems and management practices	Stage 4: uptake by next user
RICE	Satellite-based rice monitoring system in India and the Philippines	Production systems and management practices	Stage 4: uptake by next user
RTB	Potato varieties biofortified with iron and zinc, resistant to late blight and potato virus Y adapted for tropical highland and mid-elevation ecologies	Genetic (varieties and breeds)	Stage 4: uptake by next user
RTB	High quality cassava peel for animal feed	Production systems and management practices	Stage 3: available or ready for uptake
WHEAT	Ten new wheat varieties multiplied in collaboration with seed producers located in strategic growing areas of Mexico	Genetic (varieties and breeds)	Stage 3: available or ready for uptake
WHEAT	Foresight into changing consumption patterns and implications for research	Social science	Stage 3: available or ready for uptake
WLE	WABEF (Western Africa Bio-wastes for Energy and Fertilizer), a toolkit to promote anaerobic digestion of bio-wastes in West Africa	Production systems and management practices	Stage 3: available or ready for uptake
WLE	An approach developed to convert torrential flood to productive use	Production systems and management practices	Stage 3: available or ready for uptake

Source: CRP and Platform 2018 annual reports.

*Note: This is not a list of top 24 innovations, but a selection of 2018 innovations at Stage 3 or Stage 4, chosen to demonstrate range.

Participatory approaches to disaster risk management in Latin America CCAFS 2018 annual report

Latin America is engaging in a bottom-up approach in relation to the implementation of the [Regional Strategy for Disaster Risk Management in the Agriculture Sector and Food and Nutrition Security in Latin America and the Caribbean](#), through the promotion of CCAFS' Local Technical Agroclimatic Committee (LTAC) approach. The LTAC approach aims to strengthen local capacities to deal with climate variability and seeks to help close the gap between climate information and farmers' decision-making processes. The LTAC's basic premise is that knowledge-intensive practices require learning through interaction and shared understandings, rather than through one-way direct knowledge transfer.

Source: CCAFS, AR 2018.

In 2018, Chile was added to the group of Latin American countries that have adopted the LTAC approach, and Peru, Bolivia, Paraguay and Ecuador are incorporating the approach into their disaster risk management plans according to their context-specific needs and capacities, supported by collaborative work between the Food and Agriculture Organization of the United Nations (FAO) and CCAFS. The recently developed LTAC manual, which provides a step-by-step guide to implement the approach, will be used by countries to determine LTAC approaches that take into consideration context specific conditions.

Development of winter wheat varieties WHEAT 2018 annual report

The International Winter Wheat Improvement Program (IWWIP) has developed, characterized, published and offered synthetic germplasm for use. IWWIP is a joint program between the Government of Turkey's Ministry of Food, Agriculture and Livestock, the International Maize and Wheat Improvement Center (CIMMYT) and the International Center for Agricultural Research in the Dry Areas (ICARDA). The program's main objective is to develop winter/facultative wheat germplasm for Central and West Asia. Advanced breeding lines are distributed annually to over 100 partners in more than 50 countries. In addition, interested breeding programs submit their material to IWWIP for inclusion into international testing. IWWIP also facilitates

Source: WHEAT, AR 2018.

winter wheat germplasm exchanges for the global breeding community.

The seeds from new winter and facultative wheat varieties developed by IWWIP for irrigated and semi-arid environments have been deposited in the CIMMYT genebank and shared with several breeding and research programs.

New synthetic winter wheat varieties were developed using winter durum wheat germplasm from Ukraine and Romania and *aegilops tauschii*. These varieties contain important sources of resistance to certain diseases and demonstrate strong grain mineral content and drought tolerance. The new varieties are now available through the IWWIP nursery.

Protecting the contribution of fish to food and nutrition security FISH 2018 annual report

Recent results highlight the extent to which fish are a key dietary component of the poor and the challenges faced in maintaining this supply.

CGIAR research on small-scale fisheries provided new knowledge of global human dependence on marine ecosystems, indicating high dependency of 775 million people on marine fisheries, and providing the basis for targeted management and policy for vulnerable small-scale fishing communities.

Further, new studies which chart consumption rather than catch reporting suggest that freshwater catches are, on average, likely to be approximately 65% higher than those officially reported by national governments to FAO. These "hidden harvests" are particularly concentrated in low income, riparian countries or countries having extensive wetlands such as Bangladesh, Cambodia, Myanmar and Ghana. This is a significant finding because long-term underreporting of inland fisheries has masked

their critical role in feeding the world's poor and confounds efforts to evaluate the impact of overharvest and ecosystem degradation adequately. FISH is working with FAO to gauge the full extent of this underreporting globally by 2020.

Using foresight modelling, FISH, with the International Food Policy Research Institute (IFPRI), provided new understanding of future fish supply-demand trends in Africa, with an article published in *Global Food Security* laying an important foundation for strategic planning and the investments in aquaculture and capture fisheries that will be required. An analysis of the Zambian fish sector presents a picture of national fish demand outstripping supply. Unless further investments are made in small-scale fisheries management and in aquaculture (with the opportunity to capitalize on the technological and industry growth seen in Asia), fish consumption in the continent will have to be heavily underwritten by

imports by 2030. FISH research continues to produce and disseminate a suite of research innovations for sustainable development of aquaculture and fisheries across Africa, Asia and the Pacific.

Innovations include three fish genetics research platforms for aquaculture, providing new improved generations of tilapia in Malaysia and Egypt, and three on key carp species in Bangladesh. Research in these platforms identified several new traits for future genetic selection using genomics tools, including feed efficiency and disease resistance, all critical traits for sustainable intensification under climate change. The

Source: FISH, AR 2018.

growth in global tilapia aquaculture was one of the successes derived from CGIAR research. Here too, protecting gains is critical.

Fish disease and biosecurity research provided new surveillance and diagnostic techniques and tools for addressing the global challenge from the emerging tilapia lake virus (TiLV). Assistance with application of these tools was provided to several countries to improve policies for health management, notably in Bangladesh, Egypt and Zambia. New partnerships established with the private sector at global and national levels are providing new avenues for future scaling of innovations from FISH and CGIAR research.

Publications

In 2018 a total of 1,888 publications were produced by CRPs and Platforms. 59% of these were open access (1,109) and 82% (1,556) were published in international scientifically indexed (ISI) journals. Compared to 2014, there was a 35% increase in 2018. Table 7 shows the number of peer-reviewed publications per year.

In 2018, three articles received altmetric scores over 1,000: “Options for keeping the food system within environmental limits” (PIM/CCAFS, with a score of 2,080); “The 2018

report of the Lancet Countdown on health and climate change: shaping the health of nations for centuries to come” (A4NH, with a score of 1,786); and “The genome of cultivated sweet potato contains Agrobacterium T-DNAs with expressed genes: An example of a naturally transgenic food crop” (RTB, with a score of 1,236).

Table 8 presents a list of publications with the highest altmetric scores. A complete list of peer-reviewed publications is available in Annex 3.

Table 7: Number of peer-reviewed publications and open access percentages since 2014

	2014	2015	2016	2017	2018
Number of peer-reviewed publications (% open access)	1,604	1,860	1,808	1,988 (61% OA)	1,888 (59% OA)

Source: CRP 2014-18 annual reports.

Table 8: CGIAR publications in 2018 with the high altmetric scores

CRP	JOURNAL TITLE	ISI	OPEN ACCESS	AUTHORS	TITLE	DOI	ALTMETRIC SCORE	MENDELEY READERS	URL
PIM/CCAFS	Nature	yes	no	Marco Springmann et al.	Options for keeping the food system within environmental limits	http://dx.doi.org/10.1038/s41586-018-0594-0	2,080	750	https://www.altmetric.com/details/49477107
A4NH	The Lancet	yes	yes	Nick Watts et al.	The 2018 report of the Lancet Countdown on health and climate change: shaping the health of nations for centuries to come	http://dx.doi.org/10.1016/s0140-6736(18)32594-7	1,786	228	https://www.altmetric.com/details/51888253
RTB	Proceedings of the National Academy of Sciences of the United States of America	yes	yes	Tina Kyndt et al.	The genome of cultivated sweet potato contains Agrobacterium T-DNAs with expressed genes: An example of a naturally transgenic food crop	https://doi.org/10.1073/pnas.1419685112	1,236	618	https://www.altmetric.com/details/3925112
RICE	Nature	yes	yes	Wensheng Wang et al.	Genomic variation in 3,010 diverse accessions of Asian cultivated rice	https://doi.org/10.1038/s41586-018-0063-9	427	218	https://www.altmetric.com/details/39302980
LIVESTOCK	Nature Sustainability	yes	no	Jules Pretty et al.	Global assessment of agricultural system redesign for sustainable intensification	http://dx.doi.org/10.1038/s41893-018-0114-0	345	182	https://www.altmetric.com/details/46527722
GLDC	Nature	yes	yes	Rajeev Varshney et al.	Pearl millet genome sequence provides a resource to improve agronomic traits in arid environments	http://dx.doi.org/10.1038/nbt.3943	338	160	https://www.altmetric.com/details/26196583
FISH	Nature Climate Change	yes	yes	Joshua E. Cinner et al. (W. Neil Adger, Edward H. Allison, Michele L. Barnes, Katrina Brown, Philippa J. Cohen, Stefan Gelcich, Christina C. Hicks, Terry P. Hughes, Jacqueline Lau, Nadine A. Marshall and Tiffany H. Morrison)	Building adaptive capacity to climate change in tropical coastal communities	https://doi.org/10.1038/s41558-017-0065-x	282	312	https://www.altmetric.com/details/32356413
WHEAT	Communications Biology	yes	yes	Clare M. Lewis, et al.	Potential for re-emergence of wheat stem rust in the United Kingdom	http://dx.doi.org/10.1038/s42003-018-0013-y	197		https://www.altmetric.com/details/32821781
MAIZE	Current Opinion in Plant Biology	yes	yes	Cairns, J.E., Prasanna, B.M.	Developing and deploying climate-resilient maize varieties in the developing world	https://doi.org/10.1016/j.pbi.2018.05.004	61	43	https://www.altmetric.com/details/42162511
MAIZE	Journal title: Agriculture, Ecosystems and Environment	yes	yes	Steward, P. R. Dougill, A. J. Thierfelder, C. Pittelkow, C. M. Stringer, L. C. Kudzala, M. Shackelford, G. E. J. Thierfelder, C. Pittelkow, C. M. Stringer, L. C. Kudzala, M. Shackelford, G. E.	The adaptive capacity of maize-based conservation agriculture systems to climate stress in tropical and subtropical environments : a meta-regression of yields	https://doi.org/10.1016/j.agee.2017.09.019	47	131	https://www.altmetric.com/details/27125879

Source: CRP 2018 annual reports. (*) PlumX metrics.

People Trained by CGIAR

In 2018, a total of 1,016,814 people were trained by the CGIAR, from which 1,012,972 were trained in short-term courses, with 48% of these being women. There were 3,842 people involved in long-term training courses (39% were women), including 545 PhD students. CCAFS reported in their annual report that “in 2018, more than 700,000 participants benefitted from capacity development activities, with a focus on UNFCCC processes.” As an example, CCAFS provided training on nationally determined contributions (NDCs) in Africa (CCAFS, 2018).

Table 9 presents an overview of the number of people trained by CGIAR in 2018.

External Partnerships

Partnerships are central to the outcomes and impact achieved by the CRPs and Platforms. CRPs and Platforms engage in partnerships with a range of organizations and individuals, including academic institutions, policymakers and government agencies at various levels, international agencies, public and private sector companies and non-governmental organizations (NGOs). A database of the full list of CGIAR partnerships is available at the CGIAR

Results Dashboard and information on external partnerships is available in Annex 4.

Taking the CRPs and Platforms as a whole, the main area of external partnerships in 2018 was research, which accounted for 37% of external partnerships. Other partnerships for all CRPs and Platforms related to capacity development (23%), policy (19%), delivery (16%) and other (5%).

For the agri-food system (AFS) CRPs, 40% of partnerships were related to research, 22% were related to capacity development, 21% were related to policy, 14% were related to delivery and 3% of partnerships were designated as “other”.

The integrating CRPs’ partnerships were also mostly linked to research (34%). Following this, 26% were related to capacity development, 19% were associated with delivery, 15% were related to policy, and the remaining 6% were designated as “other”.

For Platforms, the main area of partnership in 2018 was delivery, which constituted 37% of their total external partnerships.

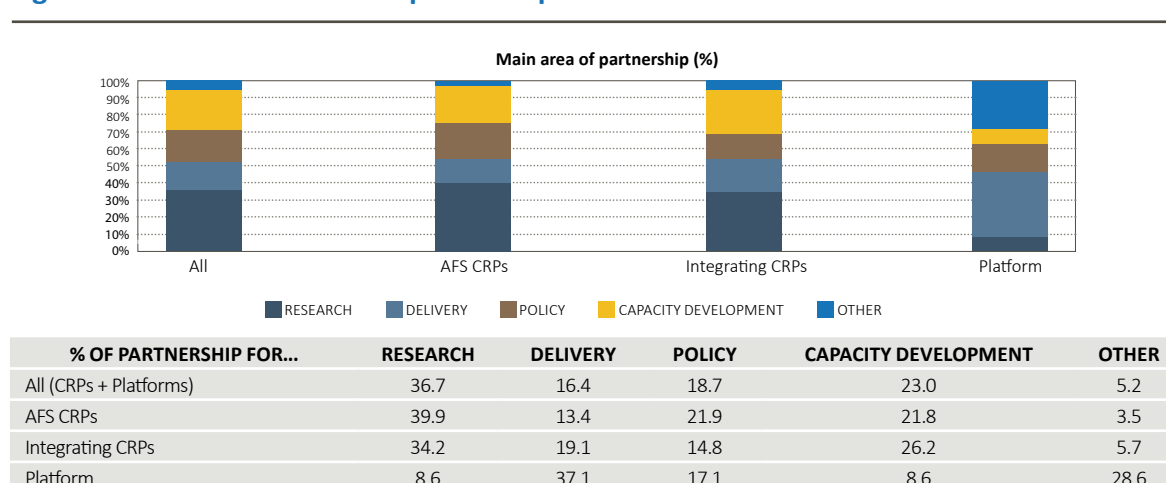
Figure 2 presents the main areas of external partnerships.

Table 9: Number of people trained by CGIAR in 2018

NUMBER OF TRAINEES IN SHORT-TERM PROGRAMS		NUMBER OF TRAINEES IN LONG-TERM PROGRAMS		TOTAL
1,012,972		3,842		1,016,814
FEMALE	MALE	FEMALE	MALE	
486,807 (48%)	526,165 (52%)	1,516 (39%)	2,326 (61%)	

Source: CRP and Platform 2018 annual reports.

Figure 2: Main areas of external partnerships in 2018

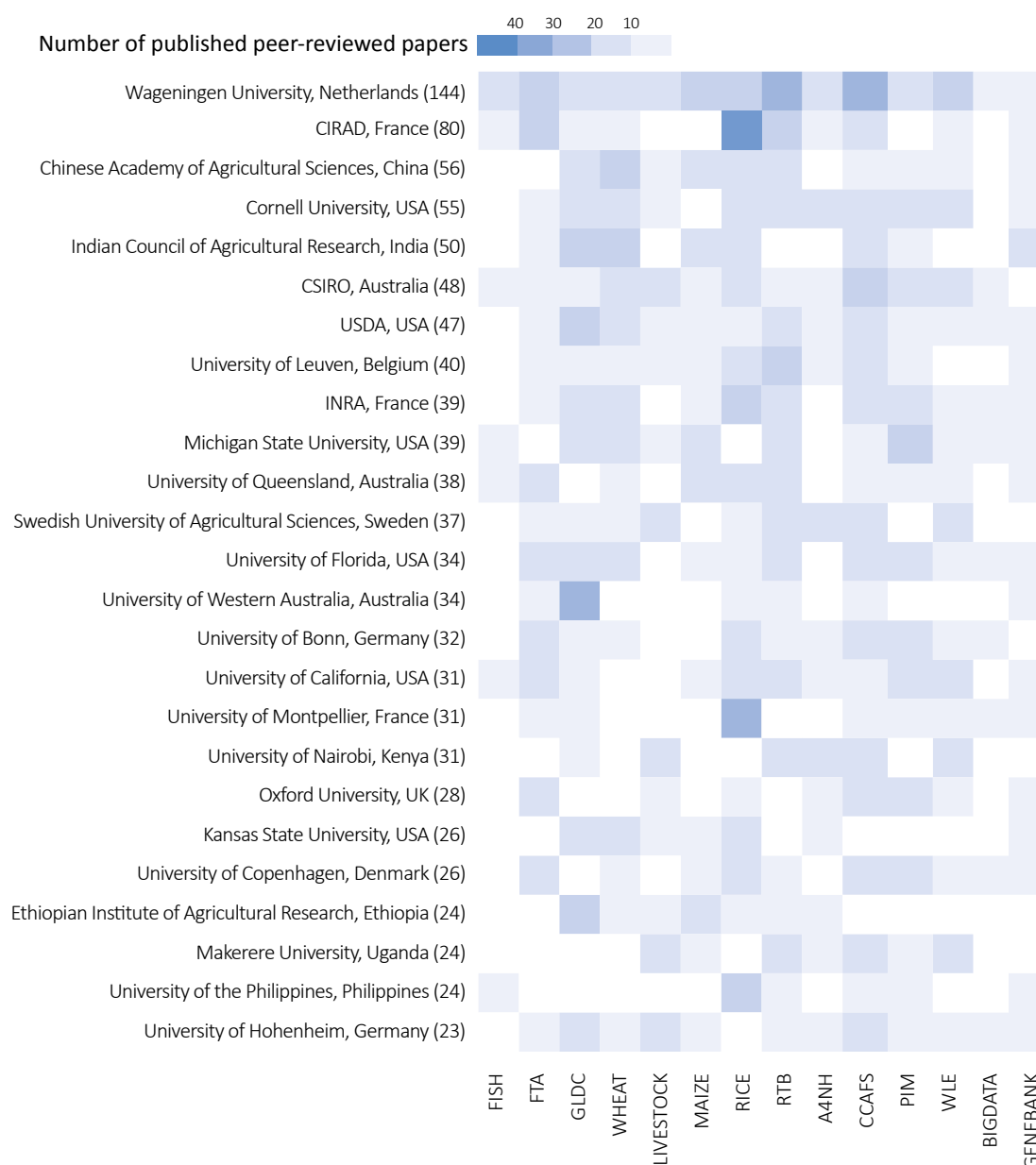


Source: CRP and Platform 2018 annual reports.

Table 10 highlights the external partnerships related to research collaboration. It shows the top 25 research institutes that co-published peer-reviewed articles with CRPs and Platforms in 2018. The top three institutes were Wageningen University in the Netherlands, which collaborated on 144 publications; the French Agricultural Research Center for International Development (CIRAD), which co-authored 80 publications; and the Chinese Academy of Agricultural Sciences, China, which co-published 56 publications with CRPs or Platforms.

Partnerships which led to large numbers of publications were between CIRAD and RICE, the University of Montpellier and RICE, SupAgro and GLDC, and Wageningen University and CCAFS. The figures in this table demonstrate the importance of well-designed strategies for engagement with CGIAR, as, for example, the Netherlands' engagement strategy is evident in the level of Wageningen University's collaboration with CRPs.

Table 10: Top 25 research institutes co-publishing peer-reviewed articles with CRPs and Platforms in 2018



Source: CRP and Platform 2018 annual reports.

Public-private partnership established to improve rice production systems in Asia RICE 2018 annual report

The lead center for RICE, the International Rice Research Institute (IRRI), established the [Direct Seeded Rice Consortium \(DSRC\)](#) – a public-private multi-stakeholder research for development platform with the overall goal of improving the environmental and economic sustainability of rice production systems in Asia.

The DSRC seeks to develop, refine and catalyze widespread adoption of improved mechanized and precise direct seeding practices. Private companies that have partnered with IRRI in the DSRC include [Bayer](#) and [BASF](#). The DSRC aims to make direct seeded rice (DSR) accessible

Source: RICE, AR 2018.

and widely available to rice farmers in Asia, thus enhancing the economic and ecological sustainability of rice production.

DSR has been widely practiced in many Asian countries such as Malaysia, Sri Lanka, Vietnam, Thailand, Cambodia and the Philippines, and many other countries including those in South Asia are going through the transition from manual transplanting to mechanized DSR. DSR has emerged as an efficient and economically viable alternative to manual puddled transplanted rice as it saves scarce and expensive resources such as labor and water, and reduces greenhouse gas emissions.

Engaging with regional governance to impact national and regional agroforestry policies FTA 2018 annual report

Scientists from FTA working on landscape dynamics, productivity and resilience partnered with the Association of Southeast Asian Nations (ASEAN) to help deliver advances on agroforestry policies throughout the region. The 10 member states that make up ASEAN, with a combined population of more than 650 million people, are fast-tracking the adoption of agroforestry practices as part of efforts to mitigate, and adapt to, climate change.

The ASEAN Working Group on Social Forestry, together with FTA's partner, World Agroforestry (ICRAF), FTA's lead center, the Center for International Forestry Research (CIFOR), FAO, national governments, the Center for People and Forests (RECOFTC), the Non-Timber Forest Products Exchange Programme, the Southeast Asian Center for Graduate Study and Research in Agriculture and the Mekong Expert Group on

Source: FTA, AR 2018.

Agroforestry developed [guidelines](#) to provide a broad framework and set of principles for member states to adopt as appropriate for their national and local contexts.

At the 40th ASEAN Ministers on Agriculture and Forestry meeting, held in Hanoi, Vietnam on 11 October 2018, the ministers formally endorsed the [ASEAN Guidelines for Agroforestry Development](#).

The guidelines have prompted Cambodia and Myanmar to embark on “road maps” for [agroforestry development](#). In parallel, developments have been inspired by the wider discussion about agroforestry. Vietnam has established a national working group on agroforestry and the Philippines has called for a national agroforestry policy or similar guiding document.

Contributions to International and National Policies, Legal Instruments and Investments

CGIAR contributions to international and national policies, legislation and significant investments in 2018 were spread over global, regional, multi-country, national and sub-national contributions. The majority were contributions at the national level, which accounted for 59% of contributions. The range of contribution types included policies or strategies, budgets or investments, curricula, legal instruments and others. The majority were policy and strategy contributions, which accounted for 77% of contributions. Ten contributions had gender as a principal objective, and 35 had gender as a significant objective.

Examples at the global level in 2018 included contributions to the [World Health Organization \(WHO\)](#) on nutrition, WHO's Animal department on zoonotic disease, [Codex Alimentarius](#), the International Fund for Agricultural Development (IFAD) on biofortification, the CGIAR Antimicrobial Resistance Hub strategy, and the Group of 7 (G7) on empowering women.

Regional or multi-country contributions were made to the regional plan for [Cassava Mosaic disease in Southeast Asia](#), the [African Development Bank's multi-sectoral nutrition action](#), the [Climate Research for Development \(CR4D\) Africa 2018-2022 Strategic Plan](#) and [intra-regional Fish Trade in sub-Saharan Africa](#).

Examples of national policy contributions reported in 2018 included the [National Fisheries Strategy for Timor Leste](#), the [Scientific Fish Farming in Gram Panchayat Tanks by Women Self Help Groups](#) policy in Odisha, [China's Rural Revitalization Strategy](#), the [Direct Seed Marketing Program in Ethiopia](#), and the [Rwanda Livestock Master Plan](#). A private-sector policy contribution was also made in 2018, with [Mbale coffee management](#).

Major investments influenced by CGIAR in 2018 included the [Indian government](#) rolling out national solar irrigation investment, the [Bill & Melinda Gates Foundation's](#) first investment in aquaculture in Bangladesh and Nigeria, and [World Bank investments](#) in greenhouse gas emission reduction.

The number of contributions is summarized in Table 11. A full list is available in Annex 5.

Table 11: CGIAR contributions to international and national policies, legislation and significant investments reported in 2018

	GLOBAL	REGIONAL	MULTI-COUNTRY	NATIONAL	SUB-NATIONAL	TOTAL
Policy or strategy	16	7	1	46	11	81
Budget or investment	1	1	2	7	1	12
Curriculum	-	-	-	3	2	5
Legal instrument	-	-	-	6	1	7
Others	-	-	-	-	-	-
Total	17	8	3	62	15	105

Source: CRP 2018 annual reports.



A seminar discussing the findings of *The 2017–2018 Annual Trends and Outlook Report: Boosting Growth to End Hunger by 2025—The Role of Social Protection*, a publication that takes an in-depth look at the state of social protection in Africa. Photo: Jamed Falik/IFPRI

Seeds without Borders agreement expands to Bhutan RICE 2018 annual report

The [Seeds without Borders](#) agreement was initiated by IRRI and first signed between Bangladesh and India in 2013. Originally applying to rice seeds, the agreement allows for any given rice variety that has been tested, approved, and released in one country to be released in other countries that are part of the agreement without undergoing further testing and evaluation, as long as they are grown under similar agroclimatic conditions. The seed agreement has since expanded to cover a number of rice-based crops such as maize, wheat, vegetables, pulses and others, with the possibility to include many more in future.

Source: RICE, AR 2018.

Cambodia, Myanmar, Nepal and Sri Lanka are now also members of the network agreement, with Bhutan's agriculture secretary, Dasho Rinzin Dorji, formally signing the agreement on June 13 2018.

The agreement is a rare opportunity for like-minded countries to share commercial crop varieties to enhance crop production and food and nutrition security. The vision ultimately is to have countries freely share their improved crop varieties of seeds with each other for the benefit of farmers, producers and consumers, and especially the disadvantaged population.

Examples of policies, legal instruments, investments and similar to which CGIAR contributed in 2018

- In order to increase fish production, reduce malnutrition and increase the income of women in Odisha, India, the Department of Panchayati Raj and Drinking Water (PR&DW), in consultation with the Department of Fisheries and Animal Resources Development (FARD) and WorldFish, formulated a policy corrigendum for long-term leasing (3-5 years) of approximately [65,000 village public water bodies](#) called Gram Panchayat Tanks (GP tanks) spread over 50,000 hectares. Previously, these GP tanks had been underutilized or not used for fish production. The revised policy enables these tanks to be leased to women self-help groups for fish production on a priority basis (FISH, 2018).
- Research outputs from a collaborative project of IRRI and PhilRice – Benchmarking the Philippine Rice Economy Relative to Major Rice Producing Countries in Asia – were drawn on for the formulation of [the Philippines' Rice Industry Roadmap \(PRIR\) 2030](#) (RICE, 2018).
- PIM research using computable general equilibrium modeling informed the [development of the National Agricultural Investment Plans of Malawi and Rwanda](#). These strategic documents provide a country-wide framework to coordinate and prioritize investments by government agencies, development partners and other actors in the agricultural sector (PIM, 2018).
- LIVESTOCK researchers and partners used their modelling expertise to provide [a guide for public and private investments in Ethiopia](#), with the objective of reducing poverty; achieving food and nutritional security; contributing to economic growth, exports and foreign exchange earnings; and contributing to climate mitigation and adaptation. This roadmap, or master plan, was then

used by various actors including the World Bank to shape their investments, which will ultimately impact more than 2.3 million of Ethiopia’s 11 million livestock-keeping households (LIVESTOCK, 2018).

- CCAFS is supporting a five-year (2018-2022) [pan-African climate research for development](#) (CR4D) strategy that links climate research to agriculture

for food security and resilience. CCAFS contributed to CR4D’s initial agenda and launch, and its 2018-2022 Strategic Plan, which sets priorities and strategy to catalyze climate research that is responsive to development stakeholder needs at local, national and regional levels (CCAFS, 2018)

See more examples and details in Annex 5.

Source: CRP 2018 annual reports.

*Note: This is not a list of top examples, but a selection to demonstrate range.

Capacity Development

In 2018, capacity building initiatives across the CRPs and Platforms continued to play a crucial role in a range of activities. These encompassed training programs for a range of stakeholders; the production and dissemination of tools and manuals; guidance on, and support for institutional and organizational changes and improvements; and support for improved practices and methods.

An increased mix of digital approaches to capacity development was evident, with blended learning and digital and online

resources and tools important components of capacity development initiatives. Engagement with governments, NGOs and the private sector was also included in numerous capacity development programs, as well as support and mentorship for young people.

Support for PhD students was also integral to capacity development activities. Table 12 presents an overview of the number of PhD students supported as part of CGIAR capacity development efforts, as an example of support for the next generation of research leaders in agricultural research and science.

Table 12: Number of PhDs supported in 2018

FEMALE	MALE	TOTAL
244	301	545

Source: CRP and Platform 2018 annual reports.

Education on nutrition improves the diets of young children RTB 2018 annual report

A large community-level [agriculture-nutrition intervention](#), led by CIP, implemented the program [Scaling up Sweet Potato through Agriculture and Nutrition](#) (SUSTAIN), used a combination of nutrition education and social and behavior communication (SBC) strategies to improve infant and young child feeding (IYCF) practices among different categories of women in western Kenya.

Nutrition education activities comprised nutrition messaging, counselling, cooking demonstrations in health facilities, mother-

to-mother clubs, public awareness campaigns and SBC. These approaches were used to promote the incorporation of biofortified orange-fleshed sweet potato (OFSP) into the diets of children 6-23 months of age. The SBC focused on addressing cultural and psychosocial factors that hinder or facilitate the adoption of recommended IYCF practices.

A study on the impact of the intervention on the behavior of caregivers showed that early breastfeeding initiation was largely adopted (75%). Adoption of other practices included

the provision of diverse diets (21%), and the incorporation of OFSP roots (21%) and OFSP leaves (11%) into the diets of young children.

The findings indicate that using a combination of nutrition education strategies has a positive

Source: RTB, AR 2018.

effect on improving the use of recommended YCF practices, but long-lasting efforts are needed to influence behaviors at scale.

Knowledge dissemination through online tools PIM 2018 annual report

In 2018, the global program, [Soil Protection and Rehabilitation for Food Security](#), implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) for the German Federal Ministry for Economic Cooperation and Development (BMZ), launched a free Massive Online Open Course (MOOC) in cooperation with the University of Leeds'

Source: PIM, AR 2018.

School of Earth and Environment and PIM partner, ICRISAT. The online [course](#), titled "Land Matters! Integrating Soil Degradation Concerns and Solutions into Policy Processes" was attended by 1,600 participants. The course sought to help participants understand how to influence policymaking to foster sustainable soil protection and rehabilitation.

Fostering a global community of researchers on agriculture, nutrition and health A4NH 2018 annual report

In 2018, the [Agriculture, Nutrition and Health Academy \(ANH Academy\) Week](#) was held in Accra, Ghana. ANH Academy Week helps convene a global community of researchers and research users working on agriculture, nutrition and health challenges. Since 2016, A4NH has co-organized this annual event with the London School of Hygiene and Tropical Medicine.

These events enhanced individual capacity of early-career researchers from low- and middle-income countries and filled a gap in networking

Source: A4NH, AR 2018.

opportunities around agriculture, nutrition and health.

The 2018 ANH Academy Week attracted 343 participants from 49 countries, who attended 17 learning labs and heard results from nearly 200 scientific presentations. A4NH researchers led learning labs on metrics for diets, women's empowerment, food safety, and child growth; research communication strategies; and co-led a session with the Global Alliance for Improved Nutrition on public-private collaboration.

Business mentoring supports seed businesses in Nepal MAIZE 2018 annual report

MAIZE partner, CIMMYT's [Nepal Seed and Fertilizer Project \(NSAF\)](#), is engaging more than 100 Nepalese seed companies and service providers in a business mentoring process to equip them with the required skills to run viable and competitive seed businesses.

Nepal's agriculture is mostly small-scale and subsistence-oriented, characterized by a mix of crop and livestock farming. The agriculture sector represents approximately one-third of the country's GDP and employs 75% of the labor force.

Source: MAIZE, AR 2018.

The NSAF project facilitates sustainable increases in Nepal's national crop productivity, income and household-level food and nutrition security across 20 districts, including five earthquake-affected districts. The project promotes the use of improved seeds and integrated soil fertility management technologies along with effective and efficient extension, including the use of digital and information and communications technologies.

Open Data and Open Access

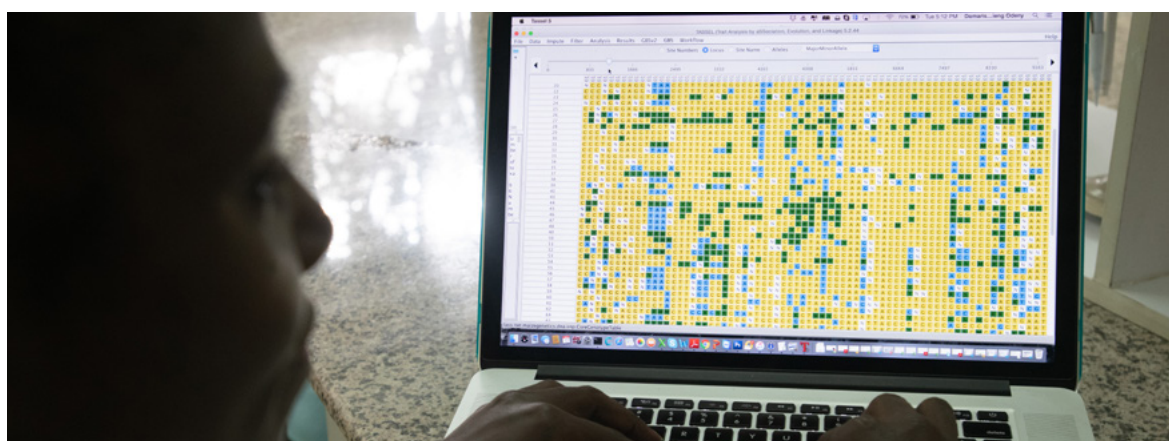
CGIAR is committed to the widespread dissemination of the results of its research and activities. CGIAR has made a strong commitment to open access and open data (OA-OD), and all Centers have signed CGIAR's 2013 [Open Access and Data Management Policy](#). The rationale behind OA-OD is to achieve the maximum impact to advantage the poor, especially smallholder farmers in developing countries.

OA-OD enhances the visibility, accessibility and impact of research and development activities, and improves the speed, efficiency and efficacy of research. It enables interdisciplinary research; assists novel computation of the research literature; and allows the global public to benefit from CGIAR research.

It also ensures that the results of research and activities can more easily and collectively build the infrastructure necessary for CGIAR to be at the forefront of the OA-OD for agriculture movement.

To further support CGIAR's open access objectives, BIG DATA was launched May 2017. It aims to mobilize CGIAR data to accelerate research and spur new data-driven innovations, build data collaboration internally and externally, and leverage CGIAR expertise while claiming a unique leadership voice in digital agriculture. It also supports and promotes open data.

In 2018, BIG DATA created new data-driven capabilities, built new digital partnerships and alliances, and developed digital innovations.



ICRISAT's Damaris Odeny analyzes SNPs (single nucleotide polymorphism) to detect differences in the DNA of finger millet.
Photo: Michael Major/Crop Trust

OA-AD and initiatives of the Big Data Platform BIG DATA 2018 annual report

In 2018, BIG DATA launched the [Global Agricultural Research Data Innovation Acceleration Network](#) (GARDIAN), a pan-CGIAR data search and discoverability portal. For the first time, datasets, publications and crop traits became discoverable and easily accessible in one portal, regardless of where they were archived across CGIAR's 15 Research Centers and 11 genebanks.

A number of data ontologies were developed that enable the cross-domain data querying and exploration necessary to form and address

Source: BIG DATA, AR 2018.

complex research questions across CGIAR. These included:

- An agronomy ontology developed by Bioversity International and IFPRI, which was incorporated into the [Agronomy Field Information Management System](#) (AgroFIMS).
- A mature crop ontology with new species and trait classes, which was released through a collaboration led by Bioversity International.

Making data more efficient and accessible GLDC 2018 annual report

For GLDC, implementation of strong data management and analytical research support tools has greatly benefited crop breeding activities.

GLDC data management systems and tools include the [Breeding Management System](#), the genomic data management system [Genomic Open-Source Breeding Informatics Initiative](#) and public data sharing portals such as [Dataverse](#) and the [Comprehensive Knowledge Archive Network](#).

Such databases render crop breeding highly efficient through access to pedigrees, electronic field books and in-field auto data validation. In addition, automated workflows

Source: GLDC, AR 2018.

to generate barcodes, tools for auto-generation of field books with updated records of pedigree data and quick exploratory statistical analysis aid efficiency and the timely flow of communication.

As an example, electronic field books have eliminated the need to key in data and enabled the data in the database to be available immediately after recording. This reduces the time for breeding decisions and incorporates greater rigor by integrating high quality statistical data analysis. As each plot – or plant in some cases – is barcoded, researchers can perform genomic selection in routine breeding by linking barcodes from phenotypic databases to genomic databases.

III. INTEGRATING GENDER AND EQUITY INTO CGIAR RESEARCH

Gender

Gender was more strongly integrated into the research agendas of the CRPs during 2018. A4NH in particular made substantial advances regarding its gender research and activities, with their Gender Equity and Empowerment (GEE) unit publishing the [Reach Benefit Empower \(RBE\)](#) framework and launching the pilot version of the project-level Women's Empowerment in Agriculture Index ([Pro-WEAI](#)). Pro-WEAI is a survey-based index for measuring empowerment, agency and inclusion of women in the agriculture sector.

Capacity building workshops and technical support provided by the [WEAI Resource Center](#) keep the attention on the critical role gender has in agricultural research and increase the volume and quality of evidence. In response to recommendations from a 2017 review, A4NH commissioned a set of studies on equity in agriculture, nutrition and health in 2018, with results from these studies expected to help shape their overall equity research strategy (A4NH, 2018).

WLE is transitioning from women-inclusive to gender transformational approaches – where the focus will increasingly be on enabling structural changes to unequal gender relations and addressing institutional and systemic barriers to change at scale (WLE, 2018). This is because gender equality interventions often result in reinforcing women's burdens, rather than resolving them. An important lesson is that research on gender will not translate into transformational change if key institutional actors and implementers are not motivated, or incentivized, to change (WLE, 2018).

CCAFS research found that a lack of gender-

disaggregated data constrains prioritization and vulnerability studies (CCAFS, 2018). Research in Tanzania and Uganda found that while gender is increasingly being mainstreamed into climate change-related policy, there are often resource and knowledge constraints when it comes to implementation. However, collaboration with policymakers can produce positive results (CCAFS, 2018).

The PIM hosted flagship-level CGIAR collaborative platform for gender research supported a second set of collaborative studies on the [feminization of agriculture](#), with co-investment from PIM, CCAFS, FTA, LIVESTOCK, MAIZE, RTB, WHEAT and WLE in 2018 (PIM, 2018). RTB leads the [Gender and Breeding Initiative](#), which created new tools for the design of gender-responsive product profiles linked to the stage-gates proposed by EiB to leverage gender considerations. This resulted in 2018 with the publication of three working papers on gender and social targeting in plant breeding; a framework to capture and respond to demand through breeding; and case studies on gender in breeding (RTB, 2018).

CGIAR research in 2018 demonstrated that substantial negative social, environmental and economic impacts can result from a failure to pay attention to [gender inequalities](#). As gender considerations become more integrated across the work of the CRPs, the workload of gender specialists is increasing. In November 2018, CGIAR's Funders endorsed the SMB's proposal for an elevated 'Gender Equality in Food Systems Research Platform'. The design of the new platform will take place in 2019 and will commence in 2020.

Gender research impacts investments and approaches to irrigation infrastructure management in Tajikistan

WLE 2018 annual report

USAID reoriented its investment based on a WLE/International Water Management Institute (IWMI) [evaluation of an irrigation training program in Tajikistan](#) which found that only male farmers were targeted for training. This risked irrigation performance, as women are increasingly taking over irrigation infrastructure management due to male out-migration.

Source: WLE, AR 2018.

USAID adopted the recommendation to train female farmers in order to sustain the irrigation systems and improve home garden productivity. The recommendations informed USAID's [Feed the Future's global learning agenda](#).

The GENNOVATE program releases research findings and tools

WHEAT 2018 annual report

In 2018, the CIMMYT-led gender 11-CRP [GENNOVATE](#) program came to a close, with the release of a [special issue](#) in the *Journal for Agriculture, Gender and Food Security* and [17 tools or guidance notes](#) that non-gender specialist researchers within and outside CGIAR are using. Though proper tracking of the use of tools remains to be established, there is evidence, for example, of [gender awareness and gender-sensitive approaches spreading into Ethiopian agricultural research, extension and policy](#).

One [GENNOVATE article](#) published in 2018 based on 25 case studies investigated young rural women's and men's occupational aspirations and trajectories in India, Mali,

Source: WHEAT, AR 2018.

Malawi, Morocco, Mexico, Nigeria and the Philippines. The findings of this study demonstrate that opening pathways for young women in agriculture will require addressing the intersecting inequalities they face on the basis of age and gender. Transformation is required, as current gender norms render the contributions of young women to agriculture and other productive activities invisible.

One of the approaches adopted is the use of community videos to generate intergenerational discussion and the opportunity to influence policymakers. A guide for gender responsive participatory videos was published and used with communities in Uganda and Vietnam.

An index for women's empowerment in livestock LIVESTOCK 2018 annual report

In 2018, a team of scientists at the International Livestock Research Institute (ILRI), a partner of LIVESTOCK, in collaboration with Emory University, developed the Women's Empowerment in Livestock Index (WELI), a new index to assess the empowerment of women in production systems in which livestock are important.

The WELI was tested in two countries and is gaining ground as a way for projects to

Source: LIVESTOCK, AR 2018

understand how livestock is empowering women. The pilot findings of WELI were published in *Social Indicators Research* in 2018. This article focuses on six dimensions of empowerment, including women's decisions about agricultural production; decisions related to nutrition; access to and control over resources; control and use of income; access to and control of opportunities; and workload and control over their own time.

Uptake of the gender-transformative approach beyond CGIAR FISH 2018 annual report

The uptake of the gender-transformative approach, which was pioneered in CGIAR, progressed during 2018. The European Commission is drawing on approaches that measure gender-transformative change; the CGIAR Gender Research and Integrated Training

Source: FISH, AR 2018.

(GRIT) program incorporated FISH insights and case examples in a bespoke module, supported by FISH staff; and the Zambian NGO Caritas incorporated the FISH gender-transformative model into their microcredit program.

Youth and other Aspects of Equity: "Leaving No-one Behind"

Youth moved up the agenda of CRPs during 2018. Following the lead of IITA and its programs of "agripreneurs", multiple CRPs enhanced their analysis and planning to incorporate youth and other aspects of equity into their research and pathways to impact.

Current work includes research, policy guidance and capacity development, often in the form of education opportunities. New research to define entry points and activities for youth covered such topics as employment opportunities and choices, livelihood impacts and migration behavior.

Both gender-disaggregated data and age-disaggregated data are rare in agriculture – a problem that CGIAR is actively trying to resolve. The BIG DATA reported that its repository, GARDIAN, provides access to a total of 1,399

publications which address youth issues, but only three CGIAR datasets. To promote the inclusion of youth-related standards in data uploaded to CGIAR repositories, the Platform integrated youth-related indicators in 2018 into the 100Q initiative to ensure that future CGIAR surveys adequately address youth and social inclusion in data that are collected (BIG DATA, 2018).

Research demonstrates that "youth" are not a homogenous group and that young people can face a variety of challenges according to culture and context. CRPs and Platforms recognize that intersectionality and links across youth, gender and other forms of social differentiation must be considered. FTA published a manual on intersectionality in 2018, and an FTA webinar on intersectionality hosted by the the PIM flagship-level CGIAR collaborative platform for gender research in 2018 was recorded and is available as a companion to the manual. The

webinar had the highest number of listeners among Platform-hosted webinars in 2018 (FTA, 2018).

MAIZE-Asia Youth Innovators Awards launched MAIZE 2018 annual report

In 2018 the first [MAIZE-Asia Youth Innovators Awards](#), a MAIZE initiative in collaboration with the Young Professionals for Agricultural Development (YPARD) Asia, was held, which aimed to promote youth participation in maize-based agri-food systems. The awards recognized the contributions of young women and men implementing innovations in Asian

maize-based agri-food systems, including research for development, seed systems, agribusiness, and sustainable intensification. With the annual awards program, MAIZE aims to identify young innovators who can inspire other young people to become involved in maize-based agri-food systems.

Source: MAIZE, AR 2018.

Assessing youth in fish agri-food systems FISH 2018 annual report

Research led by IWMI in 2018 focused on assessing the role of youth in fish agri-food systems in eight FISH focal countries: Egypt, Nigeria, Tanzania, Zambia, Bangladesh, Cambodia, Myanmar and the Solomon Islands.

Research provided an understanding of current youth engagement, a framework for analyzing youth inclusion, and identified potential interventions for more youth-inclusive aquaculture and small-scale fisheries. Findings from the eight countries indicate that while engagement in aquaculture and small-scale fisheries is not a first choice for many young people, those looking to engage, or remain engaged, face a number of challenges: gerontocracy; access to land, finances, inputs and other resources; influence in decision-making processes; and limited knowledge and know-how.

In some cases, aquaculture and small-scale fisheries are associated with hard physical

labor, low pay and low social status. Yet opportunities do exist, and hold promise for young people. The fast-growing aquaculture sector in particular is creating employment and entrepreneurship opportunities in fish value chains. Integration of information and communications technologies in aquaculture and small-scale fishery value chains might also provide opportunities to enhance youth participation.

Research findings are being integrated into a brief on youth in fish agri-food systems and a FISH youth strategy due for release in 2019. In addition, actions are being integrated into new youth-focused interventions in the 10-country aquaculture component of the [Technologies for African Agriculture Transformation](#) initiative and youth-oriented capacity development initiative on [aquaculture vocational and entrepreneurship training](#) in Zambia.

Source: FISH, AR 2018.

Engaging youth digital innovators BIG DATA 2018 annual report

BIG DATA created a [Youth in Data](#) initiative, and engaged a group of young digital innovators from Africa and provided them with training on social media and journalistic data reporting. A group of 12 of these digital innovators (half from

Source: BIG DATA, AR 2018.

CGIAR institutions and half from other youth groups in Kenya and Nigeria) then participated in the [Annual Big Data in Agriculture Convention](#) in 2018.

Social protection and marginalized communities PIM 2018 annual report

In 2018, PIM [research](#) on social protection for agriculture and resilience included studies on the impact of social protection programs in ten countries (Bangladesh, China, Egypt, Ethiopia, India, Mali, Pakistan, Peru, Uganda and Yemen) on a variety of outcomes, including poverty, income and assets, nutrition, resilience, gender, education, agricultural investment and labor supply.

Work with FTA in Uganda, [Peru](#) and Indonesia highlighted in a set of briefs the need to [address social differentiation in reforms recognizing collective rights in forestlands](#), and the relevance of [disaggregating results to analyze how formalization processes influence changes in rights for vulnerable groups](#).

Source: PIM, AR 2018.

Additionally, PIM findings were used to modify the design of social protection programs in Bangladesh (the [Vulnerable Group Development Program](#) and the [Improved Maternity and Lactating Mothers Allowance Program](#)), [Egypt](#) (the “Takaful and Karama” program), and [Mali](#) (“Programme de Filets Sociaux du Mali Jigisémèjiri”).

Responding to increasing demand from Funders and the development community, PIM included a new area of work on helping poor people to improve their resilience in fragile settings. This research generated policy-relevant insights on humanitarian aid responses in Mali, on the national cash transfer program in Yemen, and on the economic activities of the forcibly displaced Rohingya populations in Bangladesh.



A young farmer fetching water in front of fields of diverse crops in Bihar, India. Photo: C. Zanzanaini/Bioversity International

IV. WORKING TOGETHER TO IMPROVE PERFORMANCE

Progress on Results Reporting

Agricultural Research for Development (AR4D) is a long-term endeavor, where only a small fraction of innovations will have a large impact and get adopted at scale to make a substantial difference. CGIAR reports different types of data to show progress against System targets over time. The reporting system aims to show progress towards outcomes at all stages, using different types of data (see Figure 3).

2018 saw the first reporting from CRPs and Platforms under the CGIAR Strategy and Results Framework introduced in late 2017. Achievements included:

- The first annual CGIAR System Performance Report based on data from the new reporting systems was published in October 2018. This was the first annual report to be underpinned by supporting evidence, in the form of linked databases.
- The first demonstration of a new results dashboard was presented to CGIAR System governance bodies in November 2018. One feature was a database of OICRs documenting concrete achievements that are attributable to CGIAR innovations, searchable by geographic location or by their contribution to CGIAR’s IDOs (examples drawn from OICRs can be

found throughout this report). The demonstration dashboard also contained databases on CGIAR innovations, publications and partners.

- Management Information Systems (MISs) were officially adopted by all CRPs and Platforms and initial steps were taken to link these “interoperably” to a central data warehouse that will feed an online results dashboard which will be launched in late 2019.

Results based management (RBM) is an essential part of CGIAR’s work. Each of the CRPs and Platforms has defined practical outcomes that it is working to achieve. Each year, the CRPs and Platforms develop an annual Plan of Work and Budget (POWB) against a standard template that sets out key research and development milestones for the year along impact pathways. A milestone can be, for example, the completion of a significant activity, such as completion of a set of trials, or a major survey; the release of a particular technology onto the market; or the production of significant new evidence about the effects of a policy or variety.

Milestone Achievement in 2018

Reported progress in 2018 for each CRP and Platform against planned milestones is shown in Annex 6, together with evidence of

Figure 3: CGIAR’s spheres of performance framework, reporting indicators and evidence studies and the typical timeframes for reporting

Spheres of performance framework: CGIAR reporting indicators and evidence studies	Years from star-up (typical timeline)							
	1-3	4-6	7-9	10-12	13-15	16-18	19-21	Longer
Control: Innovations at Research Stage. Publications, Capdev, Partnerships, Progress against milestones	■	■	■					
Control: Innovations available for use		■	■	■				
Influence: Policy findings, Early Stage changes in policy and Investment, Progress against milestones		■	■	■				
Influence: Outcome Case Report, Policies enacted		■	■	■				
Interest: At-scale adoption, Impact (SRF targets)			■	■	■	■	■	■
Evidence: Ex-post Impact studies complete				■	■	■	■	■

Source: Presentation to CGIAR System Council meeting, November 2018.

achievement (if complete) or an explanation (if incomplete, extended for a further year, canceled, or changed).

Table 13 summarizes the overall achievement of 2018 milestones, as reported in the CRP and Platform annual reports. Across the CRPs and Platforms, 71% of milestones were completed in 2018. A further 24% were extended.

The highly technical nature of most research means that subject matter specialists are needed to assess the relevance, scientific quality and efficiency of research. Since research is inherently risky, people who understand the research are in the best position to assess whether a missed milestone is a sign of poor management, or a sign that the research needs to be redirected, or whether it was simply a poor year (for example a year that experienced a drought) and the work needs to be repeated. RBM is therefore the role of CRP management, with oversight and appropriate challenge from their independent steering committees and governance bodies.

In 2018, some milestones were extended due to financial or resource constraints. In some instances, there were insufficient funds in 2018 to complete a milestone, or inadequate staffing when a staff member had resigned during the year (RICE, 2018), or it took longer than expected to recruit new staff (LIVESTOCK, 2018). Other reasons for extension included the aim to determine greater scaling opportunities (PIM, 2018), factors related to the external environment (political, legal, economic or market factors) (CCAFS, 2018), and research and science revealing opportunities for extensions (BIG DATA, 2018).

Milestones that changed in 2018 were done so due to factors related to the external

environment. For example, a CCAFS milestone was to ensure that national planners in at least one country supported the incorporation of CCAFS-informed climate services, insurance and/or safety nets into CSA or adaptation investment portfolios for international climate finance providers, yet in 2018 national planners in two countries (Colombia and Nepal) agreed to do this (CCAFS, 2018).

Another factor influencing milestone change was the nature of partnerships. WLE had a milestone to promote 16 business models for resource recovery from fecal sludge through an ongoing free MOOC. A change was required as the host MOOC did not adopt the WLE provided modules. Therefore, a free online curriculum of resource recovery and reuse (RRR) business models will instead be made available. As part of this milestone, WLE also established a new partnership with the National Institute of Business Management in Sri Lanka (WLE, 2018).

Changes were also made for financial reasons. Due to a lack of common operational funding and communication between RICE and a pathologist to tackle three diseases in target sites, a RICE milestone to determine the spatial distribution of pests and diseases and the deployment of available isolines was changed. RICE will conduct a workshop to build a common strategy in specific sites where bilateral funding is available (RICE, 2018).

Two milestones from EiB were delayed in 2018. The first was related to a reprioritization of breeding use cases based on landscape analysis using sample tracking for genotyping and field data collection apps. However, in 2018 the prioritization remained the same. The second milestone aimed to ensure that Core Systems are certified as BrAPI (Breeding

Table 13: Achievement of planned research for development milestones in 2018

PLANED MILESTONE STATUS	TOTAL	%
Cancelled	7	2%
Changed	8	2%
Completed	270	71%
Delayed	2	1%
Extended	91	24%
Total	378	100%

Source: CRP and Platform 2018 annual reports.

Application Programming Interface) Version 1 compliant; that workflow was implemented for the case studies identified in EiB's first year, and connectivity across the different tools or systems was implemented. The third component of this milestone has been delayed until 2019 (EiB, 2018).

Milestones were cancelled primarily because they had been moved or redirected to a different Flagship or cluster of activity within a CRP (WHEAT, 2018; GLDC, 2018).

System-level RBM

At the System level of CGIAR the overarching concern is whether all Programs and Platforms have well-functioning and transparent management and governance systems in place that carry out high quality RBM. This assurance is vital in order for System Funders to contribute pooled funding with confidence that will be used well in any part of the System. This is the rationale behind the introduction of new [Program Management Performance Standards](#) for CGIAR in 2018.

The standards are innovative in that they focus program efforts in each business cycle on a limited number of well-defined high-priority areas identified jointly by key stakeholders. These standards complement the more complex analysis carried out in independent appraisals and evaluations. They highlight key aspects of management, and provide a strong incentive for managers to fix any problems within the business cycle because these must be addressed before Programs can be considered for funding for the next business cycle.

Following a consultative process across CGIAR and its Funders, an initial six standards, and draft assessment criteria were approved in December 2018 for the current business cycle (2019-21). These include standards for the approval of grants and allocation of funding; financial management; transparent documentation; quality of results reporting; and the identification of gender relevance of research. The criteria for the standards are to be piloted in 2019, with an official assessment in 2020, which will feed into decisions on the next business cycle.

This performance report, and the data collection and assessment undertaken as part of the reporting process respond to two standards in particular:

- Performance standard 2: [correct reporting of gender within the research portfolio](#).
 - This standard aims to ensure that CGIAR is recognized as a global leader for the science of gender in agriculture, and the integration of high-quality gender research throughout the CGIAR research portfolio.
 - In this report there is a dedicated section to reporting on integrating gender and equity into CGIAR research for development.
- Performance Standard 5: [Program reporting to CGIAR](#) (annual reports, CRRIs, OICRs) is of adequate quality and the evidence presented is properly archived, linked and accessible.
 - This standard aims to provide assurance to Funders and other stakeholders that CGIAR results reporting is of high quality and credible and supported throughout by high quality evidence.

The data presented in this report were assessed at several levels to assure quality: by Flagship leaders, by CRP Program Management Units, by Management Information System (MIS) managers and by a quality assurance team. See Appendix A for more information on data collection and methods.

CGIAR Platforms

Three Platforms support the work of CGIAR: GENE BANK, BIG DATA and the EiB.

The Genebank Platform

The activities of [GENEBANK](#) in 2018 were targeted specifically to bring about increased conservation and use of genetic resources with the aim of achieving CGIAR SLOs and SDGs. The work of GENE BANK directly contributes to [indicator 2.5.1 of SDG Target 2.5](#), which aims to “maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks ... and promote access to and

fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge”.

In 2018, a total of 96,566 germplasm samples (66,930 accessions) were distributed by the CGIAR genebanks to users. Of these, 56,393 (58%) were distributed to recipients outside CGIAR in 87 countries and 40,173 samples (42%) were provided to CRPs. For the second year in a row, germplasm distribution outside the CGIAR exceeded that inside CGIAR.

Table 14 shows germplasm numbers for 2017 and 2018. It shows that the percentage of samples delivered outside of CGIAR was higher in 2018 (58%) than in 2017 (56%). It also shows that developing countries received a larger proportion of germplasm in 2018 (77%) compared to 2017 (67%).

Figure 4 presents a summary of germplasm distributions for 2018 (GENEBANK, 2018).

By the end of 2018, CGIAR genebanks were managing 773,112 accessions, including 25,576 in vitro accessions and 32,212 accessions held as plants or trees in screenhouses or fields. Approximately 80% of total accessions

are immediately available for international distribution. Of the seed accessions, 57% is secured in safety duplication at two levels and 78% is duplicated at the Svalbard Global Seed Vault (SGSV). 72% of clonal crop collections is safety duplicated in the form of cryopreserved or in vitro cultures.

Progress is being made in upgrading collections and strengthening quality management systems (QMS) of both genebanks and germplasm health units (GHUs). More than 156 standard operating procedures have been drafted and genebank procedures for acquisition, distribution, conservation, regeneration and characterization have been audited and will be externally validated in 2019 and 2020.

The Platform for Big Data in Agriculture

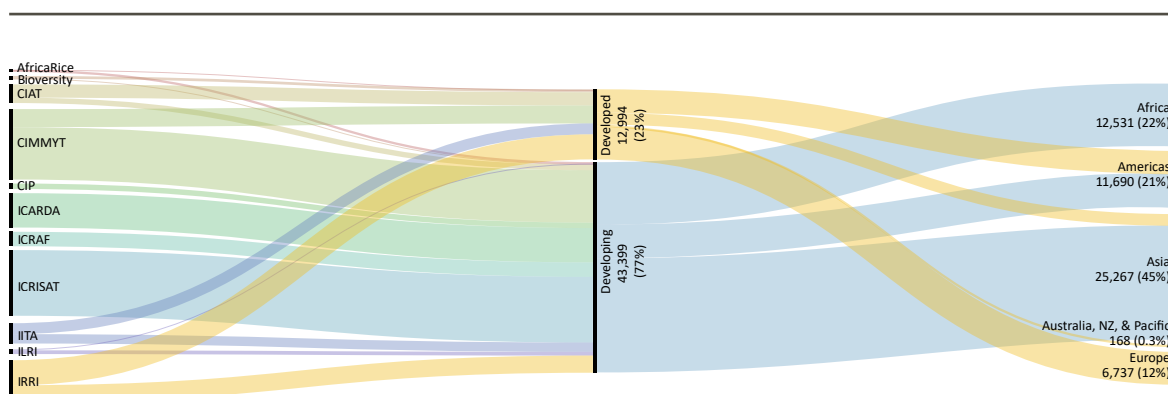
The ultimate goal of the **BIG DATA** is to harness the capabilities of big data to accelerate and enhance the impact of international agricultural research. This platform aims to provide global leadership in organizing open data, convening partners to develop innovative ideas, and demonstrating the power of big data analytics through inspiring projects.

Table 14: Germplasm numbers delivered by CGIAR to developing countries and users for 2017 and 2018

	NUMBER OF SAMPLES DELIVERED OUTSIDE OF CGIAR	NUMBER OF SAMPLES DELIVERED TO DEVELOPING COUNTRIES
2017	61,376 (56%)	41,336 (67% of samples delivered outside of CGIAR)
2018	56,393 (58%)	43,423 (77% of samples delivered outside of CGIAR)

Source: Genebank Platform [2017](#) and 2018 annual reports.

Figure 4: Germplasm samples distributed by each Center to users outside CGIAR and the geographical region of recipients in 2018



Source: GENEBANK, 2018.

In 2018, BIG DATA launched [GARDIAN](#), which has made datasets, publications, and crop varieties across all Centers and genebanks of the CGIAR easily accessible and FAIR (Findable, Accessible, Interoperable and Reusable) for the first time.

The Platform's Communities of Practice (CoP) reached several hundred members in 2018. When the European Union's General Data Protection Regulation came into effect, the Platform and the CGIAR System Organization developed an online course to help agriculture development researchers understand its wide-ranging implications for legal and ethical use of research data.

Also in 2018, the [Annual Big Data in Agriculture Convention](#), co-hosted by ILRI and ICRAF, attracted 400 attendees, 2,500 remote participants, and millions of social media views. The convention reached its target of 60% non-CGIAR participants, with global information technology firms, start-ups, governments, and other research institutions forging new partnerships and seeing the breadth and depth of CGIAR research (BIG DATA, 2018).

The Platform offered five start-up grants in 2018 to data-driven projects under their innovation process, the [Inspire Challenge](#), and granted scale-up awards to three projects from the 2017 cohort. The Platform reviewed the innovation strategy of the Inspire Challenge and improved the application process to source fewer "basic research" innovations. As a result, over 90% of submissions in 2018 targeted small producers as users of data innovation (BIG DATA, 2018).

The Excellence in Breeding Platform

[EiB](#) seeks to modernize breeding programs targeting the developing world for greater impact on food and nutrition security, climate change adaptation and development. Drawing on innovations in the public and private sector, the platform provides access to cutting-edge tools, services and best practices, application-oriented training and practical advice.

A key output for EiB in 2018 was the Platform's contribution and response to the Crops to End Hunger Initiative (CtEH). EiB began to introduce continuous improvements in product pipeline

management, including an annual stage-gate decision process supported by an online product profile tool to focus variety turnover on market knowledge (EiB, 2018).

Also in 2018, capacity development workshops to support breeding scheme optimization were held in Africa and Asia, with a breeding scheme assessment tool applied to the [National Agricultural Research Organization \(NARO\)](#) and the [Kenya Agricultural and Livestock Research Organization \(KALRO\)](#) breeding programs.

Business volume for low-density genotyping services grew from USD 200,000 in 2017 to USD 800,000 in 2018, covering 14 CGIAR mandate crops, and these are being applied to key traits and quality control by smaller crop breeding programs in Africa and Asia.

For bioinformatics, biometrics and data management, advances were made in system interoperability, data analytics and capacity development in 2018 (EiB, 2018).

Collaboration across CGIAR

All CRPs and Platforms engage in cross-CGIAR partnerships and collaboration. A number of new partnerships were initiated in 2018, paving the way for greater collaboration in the future. The three Platforms are proving to be valuable partners for the CRPs.

Figure 5 presents the number of reported collaborations among CRPs and Platforms for 2018. A significant number of collaborations (105 out of 240, 44%) was identified between the Agri-Food System (AFS) and Global Integrating CRPs, with certain "hot spots". For example, FTA and PIM reported eight collaborations, as did RTB and CCAFS. These collaborations provide evidence of synergies between these two types of CRPs and leverage their impact.

Data from 2018 also revealed the high number of collaborations between the two commodity-related platforms (GENEBANK and EiB) and the eight AFS CRPs, which are benefiting from the exchange of knowledge on plant genetic resources and improved breeding technologies to modernize several CGIAR breeding programs and related pipelines, as requested through CtEH.

Use of Pooled Funding (W1/2)

The CGIAR Trust Fund provides for two types of pooled funding for programming carried out by the CRPs and Platforms: Funding Windows 1 and 2 (W1/2), in addition to W3 funding. An explanation of these funding types can be found in the Funding section of the report.

W1/2 funding is used by the CRPs to take advantage of opportunities to accelerate research or pathways to scale and impact. The range of actual activities funded by W1/2 during 2018 included developing and piloting innovations; gender and youth integration; capacity building; communication; innovative research and data generation; ex-ante and ex-post impact assessments; enhancing partnerships and collaboration; and policy engagement. CRPs split their W1/2 funding between cross-cutting support at the CRP level and funding for their flagships. Platforms are almost entirely funded through W1/2; as

such, they use the funds to cover the critical recurring costs of maintaining the functions of genebanks, breeding and data management, as well as opportunities for innovation.

W1/2 funding was valuable for strategic investments along the whole impact pathway, from upstream research to downstream development of business models and multi-stakeholder partnerships for innovation and scaling out. LIVESTOCK shifted percentages of their funding from generating new data to developing strategies, tools and business plans to achieve impact, demonstrating a shift in priorities as a CRP becomes more mature (LIVESTOCK, 2018).

Table 15 provides a list of examples of W1/2 use reported in 2018.

A full list of internal CGIAR collaborations across CRPs and Platforms can be found in Annex 7.

Table 15: Examples of W1/2 use in 2018

CRP OR PLATFORM	TYPE OF USE	EXAMPLE
EiB	Development of tools	The development of standardized tools such as an online product profile tool; a template for breeding program improvement plans; a digital needs assessment; and genotyping services support.
A4NH	Multi-stakeholder engagement; capacity development	Strategic engagement with national partners in food systems analysis; assessment of multi-stakeholder partnerships to identify opportunities for scaling up; and partnership building and capacity development activities.
GLDC	Capacity development	Support for graduate students and interns to undertake work on an improved understanding of youth realities, youth aspirations and transitions in the drylands.
LIVESTOCK	Data and knowledge generation	Mapping African tick distribution and diagnostics to guide antibiotics use.
RTB	Development of tools	Maintenance and improvement of breeding support tools such as RTB-base , BrAPI ; enrichment of protocols and trait dictionaries with gender-responsive scoring methods useful in participatory varietal selection.
WLE	Development of tools	The development and implementation of disaster risk management tools in South Asia.

Source: CRP and Platform 2018 annual reports.

Figure 5: Number of reported collaborations among CRPs and Platforms for 2018

Agri-food system CRPs	FISH	FISH															
	FTA	0	FTA														
	LIVESTOCK	0	0	LIVESTOCK													
	MAIZE	1	2	1	MAIZE												
	RICE	2	0	0	2	RICE											
	RTB	2	3	0	3	3	RTB										
	WHEAT	1	1	1	4	2	1	WHEAT									
	GLDC	0	0	3	5	0	2	3	GLDC								
Integrating CRPs	A4NH	2	0	2	4	2	3	4	1	A4NH							
	CCAFS	2	4	5	3	4	8	4	0	3	CCAFS						
	PIM	2	8	5	5	4	5	2	2	4	5	PIM					
	WLE	2	4	1	1	1	3	1	1	2	5	2	WLE				
Integrated research platform (PIM)	Gender	1	1	1	1	1	2	1	1	1	1	2	2	Gender			
Platforms	Genebank	0	2	4	0	2	3	1	1	0	1	0	0	1	Genebank		
	EiB	2	1	3	2	4	1	2	1	0	0	0	0	1	2	EiB	
	Big Data	2	1	3	1	6	5	3	1	1	2	3	0	2	2	1	Big Data

Source: CRP and Platform 2018 annual reports.

Cross-CGIAR collaboration contributes to the release of a biofortified zinc maize hybrid MAIZE 2018 annual report

After many years of breeding research, Guatemala's first [biofortified zinc maize hybrid](#), ICTA HB-18, was released in May 2018 as part of efforts to improve food and nutrition security in a country where over 46% of children under five suffer from chronic malnutrition.

More than 40% of Guatemala's rural population were found to be deficient in zinc, an essential micronutrient that plays a crucial role in pre-natal and post-natal

development, and is key to maintaining a healthy immune system.

It was developed by CIMMYT, MAIZE, A4NH and Guatemala's Institute for Agricultural Science and Technology, with support from HarvestPlus. Commercialized by the private sector company Semilla Nueva, the biofortified zinc maize hybrid contains 6-12ppm more zinc and 2.5 times more quality protein compared to conventional maize varieties.

Source: MAIZE, AR 2018.

Improving Efficiency

Highlights of efficiency improvements in 2018 included:

- Taking advantage of the EiB platform for AFS breeding programs. This involved sharing protocols (for example, barcoding and sampling), service providers (molecular markers, bioinformatics), sequencing and High Throughput Phenotyping facilities.
- Connecting AFS CRP and Center breeding programs with the CtEH initiative and the product line approach towards more demand-driven variety delivery.
- Connecting all the CRPs' and Platforms' annual results in a common management information system from the Managing Agricultural Research for Learning and Outcomes (MARLO) program and the Monitoring, Evaluation and Learning (MEL) platform through the CGIAR Level Agricultural Results Interoperable System Architecture (CLARISA), including a quality assurance process for these data which will be fed into a System-wide results dashboard in 2019.

Program Monitoring, Evaluation, Learning and Impact Assessment (MELIA)

All CRPs and Platforms integrate monitoring, evaluation, learning and impact assessments to test their assumptions, learn and improve their work. In 2018 the CGIAR Communities of Practice (CoPs) on monitoring, evaluation and learning (MEL) and impact assessment (IA) held a joint meeting. The meeting covered discussions on strengthening a shared understanding of MEL and IA roles and responsibilities; continuing to build CGIAR quality standards and guidelines for MEL and IA work undertaken at the project, Program, Platform, Center and System levels; exchanging and sharing the MEL and IA work of the CRPs, Platforms, Centers, and at System level; and reviewing the MEL and IA work plans and Terms of References.

An example of MELIA work in 2018 was a program evaluation of [remote weather stations \(RWSs\)](#) in Sri Lanka, a project implemented by IWMI. The risk information technology used in this project was subsequently the focus of a Challenge Fund project, also implemented by

IWMI. The Challenge Fund is a joint initiative of the Global Facility for Disaster Reduction and Recovery (GFDRR) and UK Aid and aims to bridge the gap between technology and on-the-ground user needs in the field of disaster risk identification to build greater disaster resilience. The scope of the evaluation included the IWMI Challenge Fund project and broader efforts involving this technology in Sri Lanka.

The evaluation found that the RWSs were continually developed and improved from their innovation to the time of the evaluation; partnerships with six local organizations were formed or strengthened; the tool was co-developed with ten beneficiaries; the project was gender-informed because a gender analysis was conducted and gender gaps were identified and communicated; 144 beneficiaries were trained; and USD 741,900 was leveraged (WLE, 2018).

An example of an ex-post impact assessment in 2018 was IFPRI's study on the impact of their [decentralization strategy on country development indicators in Africa and Asia](#). The study used country-level panel data on 57 countries in Africa and Asia from 1981 to 2014 to assess the relationships between IFPRI's in-country presence (as measured by staff present) and various policy and outcome indicators in those countries.

An econometric model with country fixed-effects, year fixed-effects, and country-specific time trends was used, controlling for several factors deemed to affect the different policy and outcome indicators such as the country's research capacity, production environment and resources, political economy and institutions, and complementary investments.

It was found that IFPRI's presence and intensity of its policy-oriented research in a country is positively and significantly associated with most of the policy and outcome variables analyzed. Estimated benefit-cost ratios were moderate to high in the range of 8.4–25.4 for land productivity, 9.6–17.3 for labor productivity, and 5.5–75.3 for GDP per capita. These translate into internal rates of return of 101–207 percent for land productivity, 101–161 percent for labor productivity, and 75–383 percent for GDP per capita (PIM, 2018).

Also in 2018, an ex-post impact assessment of the [livelihood impacts](#) of improved cassava varieties in Nigeria was published in the *Journal of Agricultural Economics*. The assessment found that adoption of improved cassava varieties has led to a 4.6 percentage point reduction in poverty, though this is sensitive to the measurement of adoption status. Therefore, accurate measurement of adoption is crucial for a more credible estimate of the poverty reduction effect of adoption. The analysis also suggested that farmers who are more likely to be adopters are also likely to face higher structural costs. Therefore, addressing structural barriers that make improved technologies less profitable for the poor would be important to increase the poverty reduction effect of improved cassava varieties (RTB, 2018).

A list of the status of evaluations, impact assessments and learning exercises in 2018 can be found in Annex 8.

Oversight and Advice from System Governing bodies

Key 2018 developments

During 2018, CGIAR's governing and advisory bodies provided important strategic direction, oversight, and accountability* for the System.

Key developments included:

- **Agreement of the inaugural [CGIAR System 3-year Business Plan \(2019-2021\)](#).** Stewarded by the System Management Board (SMB) through to approval by the System Council in November 2018, the plan reflects the broad input and commitment of CGIAR's stakeholders to working in an increasingly aligned and strategic manner (refer below).
- **Establishment of a [CGIAR System Reference Group \(SRG\)](#)** as a forum in which Funders and the SMB can assess CGIAR's comparative advantage and design bold action to better deliver research and innovations that support global efforts to address the world's fragile food system. Recommendations of the SRG are anticipated to be endorsed by the System Council in November 2019, to then inform the development of a longer term 'CGIAR 2030 Plan' (the 2030 Plan), a key action in the 2019-2021 Business Plan.
- **Ensuring a fully constituted [System Council Assurance Oversight Committee \(AOC\)](#)** to provide assurance of the completeness and effectiveness of System-wide audit functions, with structured reporting lines between internal and



Researchers in discussion at a food market in Uganda. Photo: N. Palmer/CIAT

*All decisions of the [System Management Board](#) and [System Council](#) are publicly available.

external auditors and the System Council; and oversight of System-wide governance, risk management and internal controls.

- **Articulating the forward-looking direction of the System Council's independent science and impact assessment advisory bodies** for implementation in 2019, with support from a newly established Advisory Services Shared Secretariat.

Functioning of the System Council

The System Council continued during 2018 to keep under review the strategy, mission, impact and continued relevance of the CGIAR System in a rapidly changing landscape of agricultural research for development. In addition to the 27 formal decisions taken during 2018, the System Council used its convening power to steward the System's conversations on proactive measures to strengthen gender equality in both CGIAR's research and its workplaces. The commitment of System Council members on its Standing Committees and other related groups further contributed to effective functioning of this governance body's important mandate.

Functioning of the System Management Board

The System Management Board (SMB) also functioned effectively in 2018. It met four times (twice virtually) and added retreat days for dedicated strategic discussion. During 2018, the SMB progressed 51 formal decisions, reached continuously across the System for opinion and presentations by expert staff, dealt with compliance matters in ways that strengthened Funder confidence, and acted on reports of its Audit and Risk Committee, as

well as two ad hoc Working Groups. The key achievement for the year was its oversight of the design of a new business planning cycle, culminating in submission of a 2019-2021 three-year business plan to the System Council for approval in November 2018.

Three-year Business Plan 2019-2021

To fully unlock the potential of the [2016 CGIAR governance reforms](#) – which opened the door to a reinvigorated sense of collective ownership – in 2018 the CGIAR System approved an inaugural [CGIAR System 3-Year Business Plan \(2019-2021\)](#).

The new CGIAR Business Plan adds up to an ambitious but achievable set of innovations to create a more efficient, focused and less fragmented System. It represents a period of sustained change to proactively manage a necessary evolution of the CGIAR System as it faces profound shifts in its operating environment.

The business plan sets out 10 action points that aim to achieve successful implementation of CGIAR's research portfolio; greater cooperation between Centers; a new portfolio developed as part of a new 2030 Plan; a step change on gender both in the workforce and in research programs; and stabilized funding that is commensurate with the task.

During the business plan period, the 2030 Plan will be developed to set out an ambitious forward vision for the CGIAR System including a new round of programming for the 2022-2030 period, framed in terms of CGIAR's planned contribution to meeting the SDGs. The SMB

The 10 priority actions of the CGIAR business plan 2019-2021

- Action 1: Implement and enhance the portfolio of CRPs and Platforms
- Action 2: Create finance sustainability and growth in CGIAR
- Action 3: Strengthen Program performance management
- Action 4: Improve people management
- Action 5: Pursue new cross-Center alliances
- Action 6: Enhance collaboration with delivery partners
- Action 7: Align and enhance assurance systems
- Action 8: Align high-quality independent advisory services into System-level decision-making
- Action 9: Strengthen collective resource mobilization and communication efforts
- Action 10: Prepare a longer-term plan

Source: [CGIAR, 2019](#).

will lead the development of the 2030 Plan, with the SRG operating as a consultation platform in 2019.

System Advisory Functions

The CGIAR System's 2018 objective, expert advisory bodies comprised:

Independent Science and Partnership Council (ISPC)

2018 was a very productive year for ISPC with multiple publications timed to provide inputs to System wide thinking on the possible future focus of CGIAR research.

The interface between publicly funded research and the private sector is increasingly important and the ISPC/Commonwealth Scientific and Industrial Research Organisation (CSIRO) strategic study, [“Public Agricultural Research in an Era of Transformation: The Challenge of Agri-Food System Innovation”](#), explores how the *United Nations 2030 Agenda for Sustainable Development (SDG) transformation agenda* reframes agricultural research and innovation.

The publication proposes that CGIAR develops four new narratives on scaling, partnership, social license and science, that frame critical areas of CGIAR's activities and role.

The Science Forum 2018 on “Win more, lose less: Capturing synergies between SDGs through agricultural research” was held from 10-12 October 2018 in Stellenbosch, South Africa, co-hosted by the Agricultural Research Council, South Africa. [Background papers](#) were prepared prior to the meeting and a [summary brief](#) of the meeting is available.

In recent years the ISPC has convened a series of three workshops on foresight in CGIAR, culminating in November 2018 in the launch of the book, [“Agriculture and food systems to 2050”](#), produced by ISPC. [Briefs](#) summarizing discussions at the workshops are also available on the ISPC website.

Standing Panel on Impact Assessment (SPIA)

SPIA was an integral part of the ISPC in 2018 and focused on ex-post impact assessment of CGIAR research. SPIA produced five major synthesis studies during 2018 and many

resulted from the SPIA-led [Strengthening Impact Assessment in the CGIAR \(SIAC\)](#) project. These included studies on: [the findings of the 25 impact assessments conducted under SIAC](#); [the adoption and diffusion at scale of on-farm natural resource management \(NRM\) practices](#); [the rigor revolution in impact assessment and its implications for CGIAR](#); [the impact and influence of policy oriented research in CGIAR](#); and [methods for assessing the impact of agricultural research on poverty](#). In addition, 13 [impact briefs](#) based on studies funded under SIAC were produced.

In November 2018, SPIA hosted and co-organized a [joint meeting of the Monitoring, Evaluation and Learning and Impact Assessment Communities of Practice](#) at FAO in Rome. The objective was to better coordinate the work of the two CoPs in light of recent changes in CGIAR's reporting standards, integrated performance framework, and independent advisory services (including SPIA itself).

SPIA also integrated data collection on a prioritized set of CGIAR innovations into wave 4 of a nationally-representative household panel survey implemented by the Ethiopian Central Statistical Agency. Approaches introduced in wave 3, for example visual aid protocols for identifying sweet potato varieties, will be maintained while adding DNA fingerprinting for varietal identification from crop cuts for sorghum, maize and barley.

ISPC and SPIA launched a new website in late 2017 which resulted in a major improvement in overall visibility. Data collected from Google Analytics from October 2017 until March 2019 indicate that sessions per month increased from 865 to 1,374, users per month increased from 522 to 915, and page views per month increased from 2,507 to 3,307.

Independent Evaluation Arrangement (IEA)

IEA completed a compilation and review of all evaluative studies (evaluations, reviews, and impact assessment studies) in CGIAR over the past 10 years in 2018. This was followed by a thorough study, in collaboration with SPIA, of over 200 impact assessment studies completed over the past 10 years, including mapping to SLOs and thematic areas for a better understanding of coverage and gaps.

The studies, analysis and findings will feed into both the new evaluation cycle and be used by CGIAR focal points for future planning of impact assessment studies.

A review of CGIAR's Open Access – Open Data (OA-OD) policy and implementation support was completed in 2018, in advance of full implementation of the policy across CGIAR. The review team found OA- OD policy had already resulted in a cultural shift in Centers and CRPs, with positive demonstrable changes being implemented across the System.

Recommendations from the review focused on the need for clarity in System-level governance and management for OA and OD oversight and reporting, as well as dedicated resources at Center and System level to support OA-OD practices. It also called for updating the guidance material needed for compliance, and for the different communities (legal, open access, data managers) to come together, as well as an active central role to champion and promote OA and OD across CGIAR. The SMB considered all six recommendations and fully agreed with three, and partially agreed to the remaining, with indication that BIG DATA would take on many of the actions and responses proposed.

Forward-looking operational principles for System Council advisory bodies

Building on 5 operational principles established based on broad consultation over the prior 12 months, in October 2018, the System Council approved terms of reference for:

- CGIAR's [Independent Science for Development Council \(ISDC\)](#), as a newly mandated successor to the Independent Science and Partnership Council;
- [CGIAR Standing Panel on Impact Assessment \(SPIA\)](#), with an elevated role to provide direct advice to the System Council; and
- A [CGIAR Advisory Services Shared Secretariat](#), to provide operational support to ISDC and SPIA, and to ensure the delivery of high quality external independent evaluative data according to the CGIAR System's multi-year evaluation plan as a successor to the IEA.

Steps were taken in late 2018 under the oversight of the System Council's Strategic Impact, Monitoring and Evaluation Committee to ensure that these mandates will be effective by April 2019.

System Council Intellectual Property Group (SC IP Group)

Strategic management of intellectual assets by CRPs and their partners is essential for realizing CGIAR's impact. The [CGIAR Principles on the Management of Intellectual Assets \(IA Principles\)](#) and the [accompanying guidelines](#) provide guidance to Centers on ways intellectual assets can be used to achieve impact for CGIAR target beneficiaries and further CGIAR's strategy. The IA Principles seek to achieve a delicate balance between maintaining the founding value of global accessibility of CGIAR research results and achieve targeted impacts using intellectual property rights and licensing.

The SC IP Group facilitates coordination between the System Council and the [System Organization](#), and advises the System Council in order to enable it to provide adequate oversight of Intellectual Asset management in CGIAR, while safeguarding sensitive and confidential information.

For 2018, the SC IP Group found that CGIAR Research Centers have overall complied with the IA Principles and that the justifications provided in the Centers' reports were adequate. They further noted excellent progress across all Centers in the implementation of open access policies.

In 2018, the Centers reported one provisional patent application, five plant variety protection applications, five Restricted Use Agreements, and 73 Limited Exclusivity Agreements.

Definitions of Restricted Use Agreements and Limited Exclusivity Agreements can be found in the [IA Principles](#). The justifications provided for these intellectual property applications and agreements were found to be consistent with the IA Principles. Highlights from 2018 are available for review in the CGIAR System Intellectual Assets Management Report 2018.

5 operational principles for CGIAR Advisory Services

Independence of advice, being neither Funders, members of the System Council, nor implementers of CRPs or Platforms and avoiding other potential conflicts of interest;

Improved efficiency, with a view to providing advice that maximizes CGIAR's impact while reducing overall costs;

Improved communication, such that various assessments and evaluation workstreams in the System are aligned with CGIAR Business Plan cycles;

Improved and systematic linkages between science and development through innovation and effective partnerships, such that innovation and partnerships are embedded in all aspects of CGIAR's advisory services;

Higher ownership and improved coordination of the advice by the System itself, such that the advice provided by the advisory services needs to be communicated to and formally discussed by the System Council on a regular basis.

CGIAR System Internal Audit Function

2018 was the first year of operation of the newly designed [CGIAR System Internal Audit Function](#), the primary purpose of which is to identify strategic recommendations that add value and improve CGIAR System-wide operations, achievable only by reason that the Internal Audit Function arrangements take a cross-System view.

A major feature of the work of the Internal Audit Function team is to provide Centers and the SMB with evidence-based and benchmarked recommendations grounded in engagement of wide-range of stakeholders and whole of system data. This helps to prioritize actions that strengthen the cross-System operational environment that is fit for purpose given the nature of CGIAR research activities.

Providing valuable information upon which to make improvements, key 2018 engagements:

- provided assurance to CGIAR's stakeholders that CGIAR Centers have in place procurement, anti harassment and whistle-blowing policies and continue to strengthen these;
- established a baseline of arrangements supporting objectivity of the external auditors of CGIAR entities contributing to further discussions on maximizing the benefits of this important assurance provider;
- assessed the extent to which risks and opportunities related to common CGIAR ICT systems are well managed.

In 2018, a whole of System review of the quality of Internal Audit teams benchmarked to international standards was undertaken, with the results of it being shared with Centers and SMB in early 2019.

V. FINANCIAL HIGHLIGHTS FROM 2018

Funding Channels

Investments to CGIAR may be delivered through the multi-Funder CGIAR Trust Fund and/or directly to specific projects in CGIAR Research Centers (outside the Fund), which is called Bilateral funding. Funding to the CGIAR Trust Fund is channeled through three Windows, at increasing levels of Funder collective action:

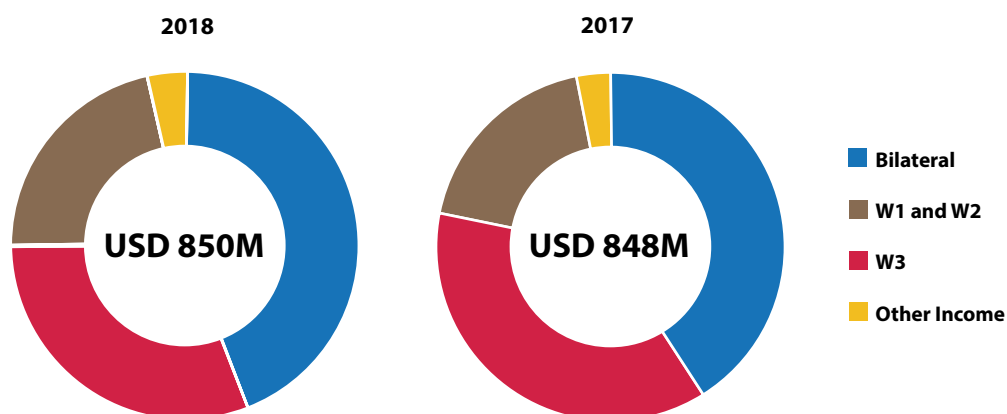
- Window 3 (W3) – Project investments: funding allocated by Funders individually to projects that are defined by the Funders themselves (with partners) and that are aligned with system-wide investments.
- Window 2 (W2) – Program investments: funding allocated by Funders individually to any component (CRP, Platform or

initiative) of the system-wide portfolio as prioritized, defined and approved by the Funders collectively through the System Council.

- Window 1 (W1) – Portfolio investments: funding allocated to the entire CGIAR portfolio of approved system-wide investments prioritized and allocated by Funders collectively through the System Council – supporting CGIAR as a whole.

In 2018, CGIAR recognized revenue of USD 850 million, of which W1 and W2 represent 22%, an increase of 3% (19% in 2017); W3 was 31%, a decrease of 6% (37% in 2017); Bilateral was 44%, an increase of 3% (41% in 2017); and Other Income remained at 3% for both years. See Figure 6 below.

Figure 6: CGIAR Revenue by source of funding, 2018 and 2017



Analysis of System revenue since 2011 by funding source is shown in Figure 7. W1 and W2 is shown to begin to increase proportion of funding.

Figure 8 shows the main categories of expenditure. These included 85% of

expenditure on research and collaboration expenses combined, and 15% on general, administrative and System-level costs. These distributions remained stable for both years, although overall expenses in 2018 decreased by 6% to \$860 million, down from \$865 million in 2017.

Figure 7: CGIAR System revenue by source of funding

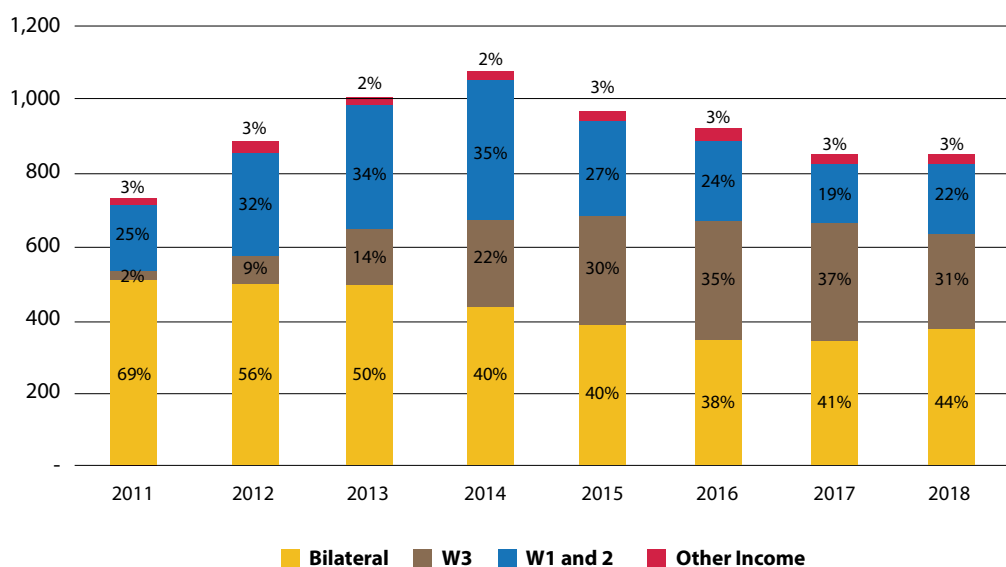


Figure 8: Expenses by main category

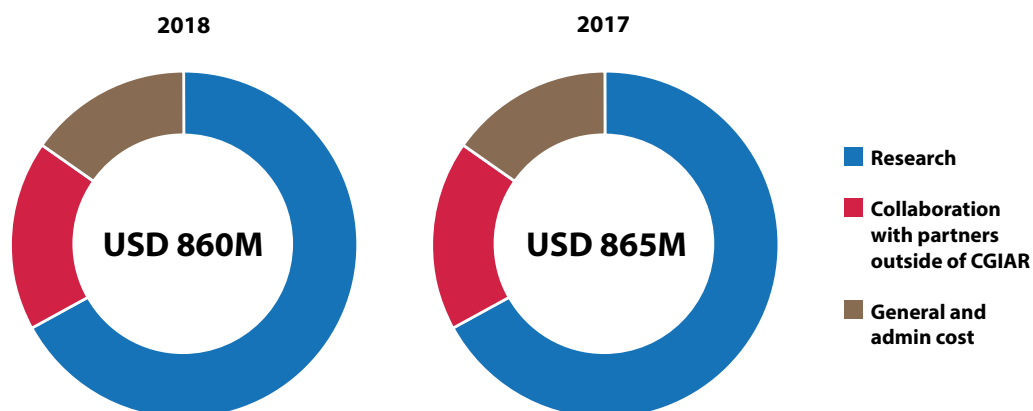
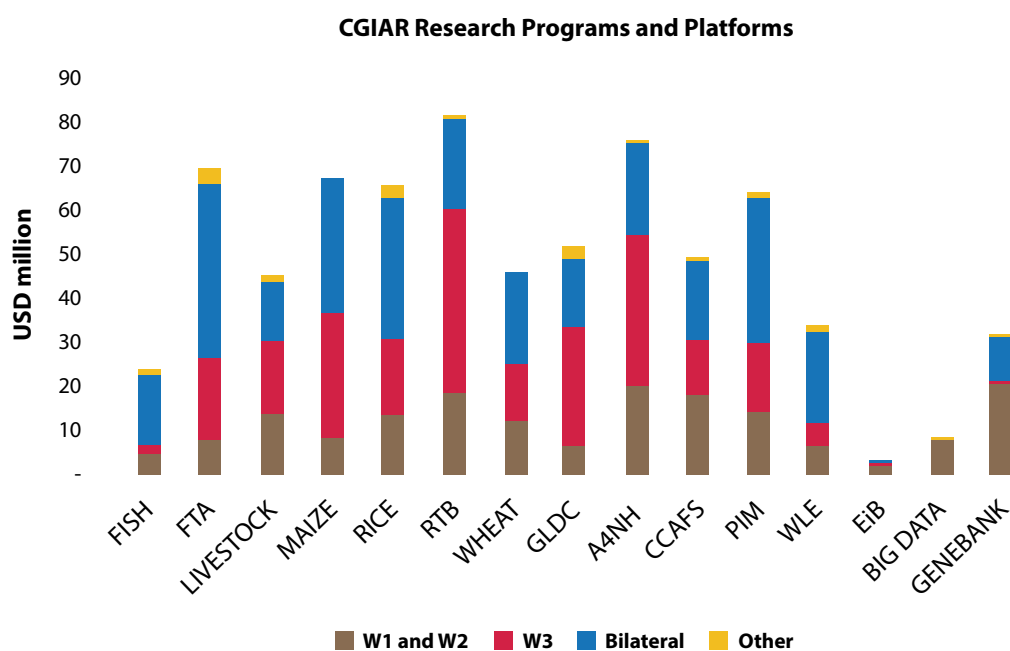


Figure 9 shows expenditure by CRP, Platform and funding channel. It can be seen that there is a wide range in the overall size of CRPs and Platforms – overall expenditure in 2018 varied from about USD 24 to 82 million. There is also wide variation in CRP and Platform access to pooled W1 and W2 funding; generally, this accounted for around 20% of overall

expenditure, but in some programs (e.g. FTA and MAIZE), the percentage was as low as 12%. This is important as W1 and W2 funding adds value not only through its flexibility but also because it helps direct investments to agreed System-level priorities (e.g. gender, monitoring and evaluation) that are not always included in project budgets.

Figure 9: Funding to CGIAR Research Programs and Platforms by funding channel



For access to more detailed information of funding by Center, CRP, Platform or Funder, please refer to CGIAR Financial Report dashboard: <https://www.cgiar.org/impact/finance-reports/dashboard>.

VI. FUNDERS

CGIAR greatly appreciates the contributions made by all funding partners, without which none of our work would be possible, including investments to CRPs through targeted projects and bilateral investments in CGIAR Research Centers.

CGIAR Trust Fund Contributors



Bilateral Contributors

- | | | |
|-----------------------------------|-------------------------------------|---------------------------------|
| Abu Dhabi | Global Crop Diversity Trust | Nigeria |
| Asian Development Bank (ADB) | Gulf Cooperation Council | Norway |
| African Development Bank (AfDB) | Honduras | Organization of the Petroleum |
| Afghanistan | Inter-American Development | Exporting Countries (OPEC) Fund |
| Arab Fund | Bank (IDB) | Peru |
| Australia | International Development | Philippines |
| Bangladesh | Research Centre (IDRC) | Portugal |
| Belgium | International Fund for Agricultural | Rockefeller Foundation |
| Benin | Development (IFAD) | Russia |
| Bill & Melinda Gates Foundation | India | Rwanda |
| Brazil | Indonesia | Sierra Leone |
| Burkina Faso | Iran | South Africa |
| Canada | Ireland | Spain |
| China | Italy | Sudan |
| Colombia | Kazakhstan | Sweden |
| Congo | Kellogg Foundation | Switzerland |
| Cote d'Ivoire | Kenya | Syngenta Foundation |
| Denmark | Liberia | Syria |
| Egypt | Libya | Tanzania |
| European Commission | Luxembourg | Thailand |
| Food and Agriculture Organization | Malawi | Turkey |
| of the United Nations (FAO) | Mexico | Uganda |
| Finland | Morocco | United Nations Development |
| Ford Foundation | Mozambique | Programme (UNDP) |
| France | Nepal | United Kingdom |
| Germany | Netherlands | United States |
| Ghana | New Zealand | World Bank Group |

VII. ANNEXES

Data Annexes

Annex 1: [CGIAR Outcome Impact Case Reports in 2018](#)

Annex 2: [CGIAR innovations in 2018](https://www.cgiar.org/impact/annual-reports/cgiar-system-annual-performance-report-2018/)
<https://www.cgiar.org/impact/annual-reports/cgiar-system-annual-performance-report-2018/>

Annex 3: [CGIAR peer-reviewed publications in 2018](#)

Annex 4: [External partners in 2018](#)

Annex 5: [CGIAR contributions to international and national policies, legislation and significant investments in 2018](#)

Annex 6: [Achievement of planned milestones in 2018](#)

Annex 7: [Internal CGIAR collaborations across CRPs and Platforms in 2018](#)

Annex 8: [Status of evaluations, impact assessments and learning exercises in 2018](#)



A woman watches over her herd of cattle at Garissa Livestock Market, the largest livestock market in Kenya. Photo: Kabir Dhanji/ILRI

VIII. REFERENCES – CGIAR ANNUAL REPORTS

[A4NH] CGIAR Research Program on Agriculture for Nutrition and Health. Annual Report 2018. CGIAR Research Program on Agriculture for Nutrition and Health: Washington DC, USA.

[BIG DATA] CGIAR Big Data in Agriculture Platform. Annual Report 2018. CGIAR Big Data in Agriculture Platform: Cali, Colombia.

[CCAFS] CGIAR Research Program on Climate Change, Agriculture and Food Security. Annual Report 2018. CGIAR Research Program on Climate Change, Agriculture and Food Security: Wageningen, the Netherlands.

[EiB] CGIAR Excellence in Breeding Platform. Annual Report 2018. CGIAR Excellence in Breeding Platform: Texcoco, Mexico.

[FISH] CGIAR Research Program on Fish. Annual Report 2018. CGIAR Research Program on Fish: Penang, Malaysia.

[FTA] CGIAR Research Program on Forests, Trees and Agroforestry. Annual Report 2018. CGIAR Research Program on Forests, Trees and Agroforestry: Bogor, Indonesia.

[GENEBANK] CGIAR Genebank Platform. Annual Report 2018. CGIAR Genebank Platform: Bonn, Germany.

[GLDC] CGIAR Research Program on Grain Legumes and Dryland Cereals. Annual Report 2018. CGIAR Research Program on Grain Legumes and Dryland Cereals: Telangana, India.

[LIVESTOCK] CGIAR Research Program on Livestock. Annual Report 2018. CGIAR Research Program on Livestock: Nairobi, Kenya.

[MAIZE] CGIAR Research Program on Maize. Annual Report 2018. CGIAR Research Program on Maize: Mexico City, Mexico.

[PIM] CGIAR Research Program on Policies, Institutions and Markets. Annual Report 2018. CGIAR Research Program on Policies, Institutions and Markets: Washington DC, USA.

[RICE] CGIAR Research Program on Rice. Annual Report 2018. CGIAR Research Program on Rice: Manila, the Philippines.

[RTB] CGIAR Research Program on Roots, Tubers and Bananas. Annual Report 2018. CGIAR Research Program on Roots, Tubers and Bananas: Lima, Peru.

[WHEAT] CGIAR Research Program on Wheat. Annual Report 2018. CGIAR Research Program on Wheat: Texcoco, Mexico.

[WLE] CGIAR Research Program on Water, Land and Ecosystems. Annual Report 2018. CGIAR Research Program on Water, Land and Ecosystems: Colombo, Sri Lanka.

IX. CGIAR RESEARCH CENTERS

The 15 CGIAR Research Centers are independent, non-profit research organizations, conducting innovative research. Home to more than 8,000 scientists, researchers, technicians, and staff, CGIAR Research Centers work to create a better future for the world's poor agricultural producers and food consumers. Each Center has its own charter, board of trustees, director general, and staff. Centers collaborate on shared research, policies and services at the global level, guided by the System Management Board and overseen by the System Council.



- | | | |
|---|--|---|
| 
AfricaRice
<p>● The Africa Rice Center (AfricaRice)
 www.AfricaRice.org</p> | 
Bioversity International
<p>● Bioversity International
 www.bioversityinternational.org</p> | 
CIAT
<small>International Center for Tropical Agriculture
 Since 1967 / Science to catalyze change</small>
<p>● The International Center for Tropical Agriculture (CIAT)
 www.ciat.cgiar.org</p> |
| 
CIFOR
<p>● The Center for International Forestry Research (CIFOR)
 www.cifor.org</p> | 
CIMMYT
<small>International Maize and Wheat Improvement Center</small>
<p>● The International Maize and Wheat Improvement Center (CIMMYT)
 www.cimmyt.org</p> | 
CIP
<small>INTERNATIONAL POTATO CENTER
 A CGIAR RESEARCH CENTER</small>
<p>● The International Potato Center (CIP)
 www.cipotato.org</p> |
| 
ICARDA
<small>Science for resilient livelihoods in dry areas</small>
<p>● The International Center for Agricultural Research in the Dry Areas (ICARDA)
 www.icarda.org</p> | 
ICRISAT
<small>INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS</small>
<p>● The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
 www.icrisat.org</p> | 
IFPRI
<small>INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE</small>
<p>● The International Food Policy Research Institute (IFPRI)
 www.ifpri.org</p> |
| 
IITA
<small>Research to Nurture Africa</small>
<p>● The International Institute of Tropical Agriculture (IITA)
 www.iita.org</p> | 
ILRI
<small>INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE</small>
<p>● The International Livestock Research Institute (ILRI)
 www.ilri.org</p> | 
IRRI
<p>● The International Rice Research Institute (IRRI)
 www.irri.org</p> |
| 
IWMI
<small>International Water Management Institute</small>
<p>● The International Water Management Institute (IWMI)
 www.iwmi.org</p> | 
World Agroforestry Centre
<p>● World Agroforestry (ICRAF)
 www.worldagroforestry.org</p> | 
WorldFish
<p>● WorldFish
 www.worldfishcenter.org</p> |

CGIAR Research Centers as of 31 December, 2018

APPENDIX A: METHODS AND DATA SOURCES

Data Sources

The source of data is indicated for each table, figure and annex. Data were mainly sourced from annual reports by CGIAR Research Programs (CRPs) and Platforms, using standard reporting templates and indicators. Altmetric data are drawn from online sources.

Process

This was the second year of reporting against new CGIAR-wide templates and common results reporting indicators. The templates and guidance were modified in 2018 to respond to detailed comments received in 2017. All reporting templates and guidance documents for 2018, along with Frequently Answered Questions (FAQs), can be viewed on the [CGIAR reporting website](#).

The process went more smoothly in this second year. However, some details of the templates and guidance still require further improvement. This will be particularly important in view of the weight that is placed on high quality reporting in 2020 to meet the new Program Management Performance Standard on Quality of Results Reporting.

Data Quality Assurance

The [agreed principles](#) behind reporting include

checkability and evidence for all claims. Checks on data for 2018 were carried out at several levels: by Flagship leaders, by CRP Program Management Units, by Management Information System (MIS) managers (when relevant) and lastly by a quality assurance team.

Time frames were tight, teams were stretched, and it is unlikely that the compiled databases are completely error-free. However, researchers are aware that all claims would be visible in the public domain and potentially scrutinized by their immediate colleagues and partners, as well as Funders, and this is a strong incentive for avoiding over-claiming.

For System-level quality checks, most attention was paid to checking claims of outputs, outcomes and impacts: data on progress towards system level targets, Outcome Impact Case Reports, policies and innovations, as well as gender scoring. Before carrying out the full quality assurance (QA), the System Organization managed a participatory (peer review) QA exercise involving around 30 members of the CGIAR Monitoring, Evaluation and Learning Community of Practice (MELCOP) to pre-test the QA criteria, as well as to make recommendations for improvements in the reporting guidance and templates.

Key reporting dates for 2018

Feb-Mar 2018	Quality assurance paper circulated for comments
30 April 2018	Deadline for CRP and Platform annual reports
	Construction of databases
5-20 May 2018	Participatory Quality Assurance / Peer review exercise
	Quality Assurance and checking data back with CRPs
	Compiling overall report
	Annual performance report and underlying data submitted to need information



CGIAR is a global research partnership for a food-secure future. CGIAR science is dedicated to reducing poverty, enhancing food and nutrition security, and improving natural resources and ecosystem services. Its research is carried out by 15 CGIAR Research Centers in close collaboration with hundreds of partners, including national and regional research institutes, civil society organizations, academia, development organizations and the private sector.

CGIAR System Organization

1000 Avenue Agropolis
34394 Montpellier
France

Tel: +33 4 67 04 7575
Fax: +33 4 67 04 7583
Email: contact@cgiar.org

www.cgiar.org