



Advisory
Services



CGIAR Research Program 2020 Reviews: Climate Change, Agriculture and Food Security

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**CGIAR Research Program 2020
Reviews: Climate Change,
Agriculture and Food Security
(CCAFS)**

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CAS Disclaimer

By design, the CGIAR Results Dashboard was a key source of data for the 2020 CRP Reviews. During the pilot phase of the CRP Reviews, issues with interoperability and resulting data quality between the management information systems (CLARISA and the Dashboard) and extracts from CRP systems (MARLO and MEL) were discovered. For harmonization, CAS engaged with the MARLO team and the CRP MEL focal points to conduct data cleaning and pre-analysis for CRP review teams. This exercise revealed the limitations of CGIAR's reporting/repository systems for evaluation purposes; these limitations were mostly due to changing reporting requirements and discrepancies in whether CRPs adopted MARLO or MEL systems. Moreover, in the case of peer-reviewed journal articles, the protocol used by the CRP review teams to identify relevant publications differed from the guidance applied by CRPs (the CRP review teams' bibliometric analysis used only publications indexed by International Scientific Indexing [ISI], available through Web of Science). Therefore, CAS acknowledges discrepancies between the CGIAR Results Dashboard, and the data provided to the Review teams for their analysis, which should not be seen as a factor having influenced the analysis by the CRP review teams.

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Annexes are available here:

bit.ly/CCAFS-CRP2020-Annex

A 2-page brief is available here:

bit.ly/CCAFS-CRP2020-Brief

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Abbreviations

A4NH	Agriculture for Nutrition and Health CRP
AGNES	African Group of Negotiators Experts Support
AMEDD	Association Malienne d'Éveil au Développement Durable
AR	Annual Report
AWD	Alternate wetting and drying
CAC	Consejo Agropecuario de Centroamérica
CAS	CGIAR Advisory Services Secretariat
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
CCAFS	Climate Change, Agriculture and Food Security CRP
CINSERE	Climate Information Services for Increased Resilience and Productivity in Senegal
CIRAD	L'organisme français de recherche agronomique et de coopération internationale pour le développement durable des régions tropicales et méditerranéennes
CIS	Climate information services
CLIFF	Climate, Food, and Farming
CLIFF-GRADS	Climate Food and Farming–Global Research Alliance Development Scholarships
COP26	26 th Conference of Parties of the UNFCCC
CRP	CGIAR Research Program
CS MAP	Climate-Smart Maps and Adaptation Plan
CSA	Climate-smart agriculture
CSV	Climate-Smart Village
CSIRO	Commonwealth Scientific and Industrial Research Organisation
FP	Flagship Program
FTA	Forests, Trees and Agroforestry CRP
GHG	Greenhouse gas
GLDC	Grain Legumes and Dryland Cereals CRP
IARI	Indian Agricultural Research Institute
ICRP	Integrating CGIAR Research Program
ICT	Information and communication technology
IDO	Intermediate Development Outcome
IRI	International Research Institute for Climate and Society, Columbia University
ISC	Independent Steering Committee
ISI	Institute for Scientific Information (now used for services provided by Clarivate)
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
JCR	Journal Citation Reports
LED	Low-emissions development
LMIC	Low- or middle-income country
LP	Learning Platform
LTAC	Local Technical Advisory Committee

MARLO	Managing Agricultural Research for Learning and Outcomes
MEL	Monitoring, evaluation, and learning
MRV	Measurement, Reporting, and Verification
MWG	Multidisciplinary Working Group
NAMA	Nationally Appropriate Mitigation Action
NAP	National Adaptation Plan
NARS	National agricultural research system
NDC	Nationally determined contribution
NGO	Nongovernmental organization
OICR	Outcome Impact Case Report
PIM	Policies, Institutions and Markets CRP
PMU	Program Management Unit
RP	Regional Program
SICA	Sistema de la Integración Centroamericana
SLO	System-Level Outcome
SMO	System Management Office (of CGIAR)
SRF	Strategy and Results Framework
ToC	Theory of change
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
W1, W2, W3	Windows 1, 2, and 3 for donor support to the CGIAR
WBCSD	World Business Council for Sustainable Development
WISAT	Women in Global Science and Technology
WLE	Water, Land and Ecosystems CRP
WoS	Web of Science

NB: The names of individual CGIAR Centers are not listed above.

Executive Summary

Background and Context

CCAFS is one of four cross-cutting Global Integrating Programs within the CGIAR portfolio. It seeks to address challenges of climate change and food security by mobilizing CGIAR and partner science and expertise to achieve positive change with respect to climate-smart agriculture (CSA), food systems, and landscapes. Phase II (2017–20) builds on Phase I (2011–16). CCAFS is a partnership of 15 CGIAR Centers, led by the Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT) (hereafter referred to as 'the Alliance'), with 27 non-CGIAR strategic partners. Research activities are carried out through four Flagship Programs (FPs) and two cross-cutting Learning Platforms (LPs). The FPs/LPs are as follows: FP1–Policies and Priorities for CSA; FP2–Climate-Smart Technologies and Practices; FP3–Low-Emissions Development; FP4–Climate Services and Safety Nets; LP5–Gender and Social Inclusion; and LP6–Scaling Climate Smart-Agriculture. Leadership of CCAFS's FPs and the cross-cutting LPs is assured by the Alliance, one other CGIAR Center (the International Livestock Research Institute [ILRI]), and four non-CGIAR partners (University of Vermont, Columbia University, Women in Global Science and Technology [WISAT], and University of Leeds). Regional Programs (RPs) are led by CIMMYT and ICRISAT as well as the Alliance and ILRI. CCAFS is organized under five regions: Southeast Asia, South Asia, East Africa, West Africa, and Latin America, with named RP leaders. RP leaders play a significant role in CCAFS management, especially in scaling-up activities. Within each region, there are specified focal countries.

Purpose and Scope of the CCAFS 2020 Review

In 2020 the CGIAR CAS Secretariat is conducting independent reviews of all 12 CGIAR Research Programs (CRPs) to inform the System Council and CRPs. This review focuses on the work of the CCAFS CRP during the years 2017 to 2019 of Phase II. The review questions, set by the CAS are (1) Quality of science: To what extent does the CRP deliver quality of science, based on its work from 2017 through 2019?; (2) Effectiveness: What outputs and outcomes have been achieved, and what is the importance of those identified results?; (3) Future orientation: To what extent is the CRP positioned to be effective in the future, seen from the perspectives of scientists and of the end users of agricultural research (such as policymakers, practitioners, or market actors)?

Approach and Methodology

This rapid desk-based review covers effectiveness and quality of science. Effectiveness is assessed in terms of achievements against plans and using the theory of change (ToC). The quality of science is assessed by the quality of inputs, processes, and outputs. Mixed methods are employed. Key sources of data were CCAFS program documentation and management data; 40 interviews with CCAFS program leadership and staff, donors, and partners; bibliometric data on 400 scientific journal articles; and other publications and communication. Aspects of the monitoring, evaluation, and learning (MEL) and reporting system have made assessment challenging.

Key Findings and Conclusions

Quality of Science

Based on interviews with CCAFS management, partners, and stakeholders, we conclude that CCAFS benefits from high-quality inputs. Research leaders include some who could be regarded as thought leaders, and research teams demonstrate notable diversity in terms of disciplines (though skills in political economy and qualitative research/ethnography could be better represented). Through its network of partners, the skill base is also diverse in terms of countries of origin and affiliation, which enhances CCAFS's legitimacy. Lack of gender diversity among research project leaders (though less so among CCAFS management itself) is a concern, but not seen as within CCAFS's mandate to remedy. CCAFS enjoys processes and partnerships that ensure that its research is relevant to a variety of next users and is both credible and legitimate. These advantages include its perceived independence from CGIAR Centers; its complex but effective matrix management structure with FPs, RPs, and cross-cutting LPs; and mutually cooperative relations with both Northern and Southern partners. Bibliometric and direct assessment of research outputs show a wide range of high-quality and original research across the

FPs and LPs. CCAFS articles are published in a wide and generally appropriate range of high-quality journals. Direct assessment of a small but diverse sample of technical publications and communication products shows high quality and high relevance to users.

Effectiveness

CCAFS has operated in a favorable context of widespread prioritization of national and regional policy priorities for climate-smart agriculture (CSA), albeit more for adaptation than for mitigation, in the majority of its focal countries. CCAFS is judged to have been effective as assessed by achievement of planned outputs and outcomes (measured by milestones, policy contributions, innovations, and OICRs). However, these indicators have limited meaning. Reporting progress by CCAFS against its 2022 numeric targets, would be helped by further substantiation of the figures. Outcome assessment indicates that CCAFS is producing important global public goods on climate, agriculture, and food security. Through partnerships and capacity development, combined with an emphasis on scaling and gender-transformative change, it is engaging in successful science-policy interactions from global to local scales. Significant outcomes can also be identified for each FP and for LP5, which aligns with a recent study that found CCAFS is a catalyst for climate change action.

CCAFS has influenced policies and investments at different scales, building a global presence; contributed to raising climate and agriculture up the international agenda; and helped to strengthen capacity, policies, and investments. It has successfully facilitated science-policy interactions through diverse partnerships and enabling more impact-oriented research that is appropriate to decision-makers' needs. Its approach has given it significant influence over policy and investment decision-making. There is substantial evidence of testing of technical and institutional innovations that have catalyzed climate-smart agriculture on the ground. The program has been curtailed by a year and suffered budget cuts, and COVID-19 has delayed projects and impact studies, which will likely affect the program's ability to achieve planned numeric targets. Nonetheless, many of the innovations and policy contributions will continue to achieve change over time, often beyond the end of the program.

Impact evidence centers upon four impact contribution cases, with further impact evaluations underway. Two contribution cases are provided for SLO. There are no impact contribution cases for SLO 2, indicating less achievement on food and nutrition. Two impact contribution cases are reported for SLO 3: Improved natural resource systems and ecosystem services, specifically target 3.2 on Reduced Greenhouse Gas Emissions.

Management and Governance: The CRP's management and governance approach has strongly supported its effectiveness. The matrix institutional arrangement of FPs and regional teams is complex, requiring coordination, but has generally worked well. Success factors include the location of the Program Management Unit (PMU) independent of a specific CGIAR Center; the role of regional teams in coordination, research track records, and knowledge of national and regional policy processes; strategic engagement with external partners; a supportive ISC advisory function and internal efforts to learn about what works; an outcomes-focused culture that facilitates sustained interactions with decision-makers; innovations in management systems; a facilitative leadership style; and a strong focus on communications. The program falls short of a coherent program design, but this is due to systemic CGIAR constraints. Learning and reflection on strategy could be strengthened further by improved use of ToC approaches. The reporting system is weak, with unnecessary dualities and inadequate for assessing the CRP's contributions against the ToC. Currently, evidence is of varying quality and fragmented. Budget issues and the influence of donor funding can affect program priorities and partnerships, but the process of making the cuts was well handled. The program has responded well to COVID-19 challenges, but some delays are inevitable.

Collaboration with other CRPs: CCAFS collaborates with all CGIAR Centers (though to varying degrees) as its core partners. It also collaborates with other CRPs: PIM, A4NH, WLE (the other Integrating CRPs), and FTA were all mentioned more than once in the interviews as CRPs with which CCAFS has good collaboration.

Contribution to Cross-cutting Issues

Capacity development is central to the CCAFS approach, and achievements on capacity strengthening appear significant. However, capacity development is poorly articulated in the ToC, the reporting is insufficiently systematic, without clear targets for this work. High participation in training and capacity-strengthening activities occurred across all regions and FPs, across categories of stakeholders, and technical and policy issues. Work on gender within CCAFS has advanced in Phase II, despite fluctuating prioritization within the wider CGIAR System and budget cuts. Collaborative work on gender with all the

FPs tends to fluctuate over time with staffing and levels of prioritization. Significant outcomes include the advancement of conceptual frameworks and understanding of gender and CSA; monitoring and learning on gender and CSA; research on new themes such as climate information services (CISs) and gender; sharing of CCAFS gender and CSA research with donors, government policies, and global investments; and synthesis of lessons learned on gender and climate change to build a research agenda. There has been significantly less progress on youth owing to budget cuts and a lack of prioritization, and more analysis is needed on forms of discrimination that intersect with youth issues. The FPs are responding in different ways on the youth issue, with varying levels of expertise and limited outcome evidence.

Future Orientation

The program is currently synthesizing lessons, which aligns well with the upcoming COP26. CCAFS has strong prospects for achieving change in the remaining year of the program, although pandemic disruption, budget cuts, and program curtailment will affect its ability to meet 2022 targets. It contributes to the global debate on transforming food systems, but a stronger political economy analysis is needed that includes delineation of systems being targeted and addresses anticipated change processes in the future. The main risk is of a loss of momentum and talent from the program given the uncertainty over the change process within CGIAR. The program is not able to tell a sufficiently clear contribution story with respect to its stated goals; work is ongoing to address this, but this should be strengthened.

Recommendations

Recommendations for the CGIAR System

Recommendation #1: Continue to fund targeted research and science-policy engagement on CSA, possibly as part of a broader, integrating effort on transforming food systems, rather than tackling climate change solely through mainstreaming in CGIAR.

Recommendation #2: Integrate the climate change and nutrition agendas more closely.

Recommendation #3: Significantly strengthen the incorporation of theory-based working into planning, monitoring, evaluation, and learning.

Recommendations for the CRP

Recommendation #1: Synthesize significant outcomes and evidence to create a credible contribution claim for the end of the program, to continue informing internal reflection and adaptive management, and to improve external reporting.

Recommendation #2: Make improvements in the short term to OICR reporting to ensure that it enables tracing of evidence against the ToC and includes analysis of assumptions.

Recommendation #3: Identify key lessons learned from an integrated program approach and targeted work on climate change as a cross-cutting theme to inform the One CGIAR transition.

Recommendation #4: Continue to build the future research agenda over the coming year, examining the root causes of challenges; identifying transformative solutions, including a broader range of levers; addressing questions of political economy; and extending work on nutrition, pests and diseases, and climate security. Ensure that this work is adequately informed by social science expertise, especially political economy/political ecology and particularly with respect to the food and natural resource sovereignty implications of market-oriented development.

Recommendation # 5: Consider extending engagement at the landscape scale and examining the role of landscape approaches in future transformative change agendas, recognizing the blurring of rural-urban boundaries and the need for ecosystem-based solutions to challenges related to climate, food security, livelihoods, and nature.

Recommendation #6: A stronger feminist and political science perspective could enable CCAFS to engage more effectively on equity and affirmative measures, including as part of transformative change thinking.

Recommendation #7: Engage systematically with the COP 26 process and event to capture opportunities to influence decision-makers. CCAFS has a major opportunity to have a strong presence and influence at COP26, which aligns with the end phase of the program and its current focus on synthesizing and disseminating lessons and evidence.

1 Background to the CRP 2020 Review

1.1 Purpose and Target Audience of the Review

The purpose is to “assess the extent to which the CCAFS research program is delivering Quality of Science and demonstrating effectiveness in relation to its own Theories of Change.”

Key objectives are as follows:

- To fulfill CGIAR’s obligations around accountability regarding the use of public funds and donor support for international agricultural research
- To assess the effectiveness and evolution of CCAFS’s work as a CRP in 2017–21
- To provide an opportunity for CCAFS to generate insights about its research contexts and programs of work, including lessons for future CGIAR research modalities.

The study is accountability focused, but where lessons are identified these will be noted. Primary review users will be the CGIAR System Council, with additional potential insights for the CCAFS program management and the wider climate-smart agriculture community of practice. Supplementary review questions have been included to increase the utility of the review for CCAFS. Additionally, the lessons may inform the One CGIAR transition in 2022. The findings, conclusions, and recommendations aim to inform the CRP as it refines its 2021 Plan of Work and Budget for the remaining program year and offer lessons to inform future research modalities.

1.2 Overview of the CRP and Its Context in Research for Development

CCAFS is one of four Global Integrating Programs (ICRPs) within the CGIAR portfolio. It seeks to address the increasing challenge of global warming and declining food security, focusing on agricultural practices, policies, and measures, through strategic global partnerships. CCAFS aims to contribute to three System-Level Outcomes (SLOs): reduced poverty, improved food and nutrition security for health, and improved natural resource systems and ecosystem services. CCAFS’s purpose is to “marshal the science and expertise of CGIAR and partners to catalyze positive change towards climate-smart agriculture (CSA), food systems and landscapes, and position CGIAR to play a major role in bringing to scale practices, technologies, and institutions that enable agriculture to meet triple goals of food security, adaptation and mitigation” (CCAFS Full Proposal, 2016). CCAFS Phase II builds on Phase I. It became an ICRP in Phase II, given that climate change has been mainstreamed across CGIAR and is a cross-cutting theme.

CCAFS is organized under four Flagship Projects (FPs) and two Learning Platforms (LPs that cut across the FPs¹): FP1 – Policies and Priorities for CSA; FP2 – Climate-Smart Technologies and Practices; FP3 – Low-Emissions Development; FP4 – Climate Services and Safety Nets; LP5 – Gender and Social Inclusion; and LP6 – Scaling Climate-Smart Agriculture. CCAFS is also organized under five regions: Southeast Asia, South Asia, East Africa, West Africa, and Latin America, with named Regional Program Leaders.² RP Leaders play a significant role in CCAFS management, particularly, but not solely, in scaling-up activities. Within each region, there are specified focus countries, although there has been considerable activity in other countries within the regions, with evident program outcomes. The Theory of Change (ToC) for CCAFS is that science and policy engagement lead to climate-smart agriculture (CSA) implementation and policy and institutional change, which, in turn, result in the anticipated sub-Intermediate Development Outcomes (IDOs), IDOs, and SLOs. Each FP and the gender and social inclusion Learning Platform contributes through specific impact pathways (IPs); hypotheses link each IP to the main ToC. Assumptions are articulated at the IP level.

¹ Each of the four FPs has an associated Learning Platform, with LP5 and LP6 acting as independent or cross-cutting Learning Platforms (e.g., in the Full Proposal, p. 24). However, the documentation is inconsistent, and LP5 and LP6 are sometimes listed as “Flagship Programs.”

² One RP Leader covers both South and Southeast Asia.

1.3 Scope of the Review and Review Questions

The review focuses on CCAFS and its Flagship Programs (2017–19). Guided by the ToC, emphasis is on CCAFS's sphere of control and influence—i.e., the quality of inputs, activities, outputs, and short-term and intermediate outcomes that are anticipated to lead to development impact. The TOR review questions (Annex 1) are (1) Quality of science: To what extent does the CRP deliver quality of science, based on its work from 2017 through 2019?; (2) Effectiveness: What outputs and outcomes have been achieved, and what is the importance of those identified results?; (3) Future orientation: To what extent is the CRP positioned to be effective in the future, seen from the perspectives of scientists and of the end users of agricultural research (such as policymakers, practitioners, and market actors)?

1.4 Approach, Methods, and Limitations

All CRPs have a ToC and associated IDOs, which contribute to the CGIAR overall Strategy and Results Framework (SRF) and System-Level Outcomes (SLOs). This review analyzes the program TOC and the constituent FP impact pathways and regional ToCs and uses them as a guide in assessing effectiveness, although the ToCs are not expected to provide a comprehensive road map or align with CRP-specific measurement structures and available information sources (CAS Review Guidelines). The methodology employs mixed methods. Qualitative and quantitative data were collected and combined in a process of triangulation to answer the three main review questions and all sub-questions.

By reviewing the quality of science and effectiveness, this analysis supports an assessment of CCAFS's potential until the CRP's end (2021) and for the One CGIAR transition period. Key methods included a series of 40 semi-structured interviews with CCAFS stakeholders, including CCAFS management, staff, donors, and partners, with iteration on "most significant outcomes" (Annex 5). Interview checklists varied according to each interviewee's role (Annex 5). Program documentation and data were analyzed: CCAFS documents; semi-structured interviews; data on staffing and financial resources; annual reporting data (2017–19), including the online information management system (MARLO) and CGIAR Results Dashboard; Outcome Impact Case Reports (OICRs); and selected peer-reviewed journal articles, technical publications, and communication outputs. The CAS Secretariat provided integrated data analyses: a bibliometric analysis of the 400 reported peer-reviewed journal articles, as well as statistics on policies, innovations, milestones, and OICRs derived from the MARLO system.

The quality of science assessment analyzes the quality of inputs, including the depth and breadth of research staff skills and diversity, and processes, based mainly on interviews with CCAFS management and partners. The quality of outputs is reviewed through the bibliometric analysis (400 journal articles, including impact factor rankings for journals, and coauthorship data). Additional analysis of the quality of science in selected publications is found in Annex 6. Assessment of effectiveness is based on (1) analysis of achievement of milestones against those planned (Annex 8), (2) analysis of OICR deep dive studies (Annex 14), and (3) analysis of diverse sources of evidence, assembled to test the program's ToC (Annex 10). Management and governance are assessed through a review of financial reports, especially use of W1/W2 funds; reports from the Independent Steering Committee (ISC); and interviews with CCAFS leaders, staff, and partners. Direct use of data from MARLO and the CGIAR Dashboard, as well as interviews with FP, LP, and RP Leaders, informed the assessment of effectiveness and analysis of the reporting system.

Limitations: Because this is a desk-based review, no travel or face-to-face interaction was possible. Focus on specific elements of the program covered by selected OICRs compared with the breadth of the overall program means that the assessment cannot represent the range of program outcomes. The review was constrained by the relatively short time frame allotted (August 2020 to 31 October 2020). Certain aspects of MARLO and the reporting system also make assessment challenging.

1.5 Management and Quality Assurance

The review team comprised the evaluation specialist/team leader and the subject matter specialist. The CAS Secretariat managed the review, providing oversight through regular check-ins and standardized quality assurance metrics. The preliminary findings and draft report were shared with the peer reviewer, CAS Secretariat, and CCAFS Program for feedback and factual corrections.

2 Findings

2.1 Quality of Science

2.1.1 Quality of Research Inputs

Skills and diversity of CCAFS leadership: CCAFS is a partnership of all 15 CGIAR Centers with an additional 27 strategic partners. CCAFS is led by the Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT), which employs the Director and the Head of Global Policy Engagement Research. Leadership of CCAFS's FPs and the cross-cutting LPs on Gender and Social Inclusion and Scaling CSA is assured by the Alliance, one other CGIAR Center (ILRI), and four non-CGIAR partners (University of Vermont, Columbia University, Women in Global Science and Technology [WISAT], and University of Leeds). RPs are led by CIMMYT and ICRISAT as well as the Alliance and ILRI. Individuals within the leadership group have disciplinary backgrounds spanning ecology, agriculture, soil science, geography, climate modeling, carbon management economics, international and rural development, business administration, and history, with many of them having had strongly interdisciplinary careers. The decentralization and regional structure of CCAFS means that nationals of developing countries make up 6 of the 11 in the leadership group.³ Of the full-time staff in CCAFS management, 53% are female, but female staff are more likely to be in junior roles such as science officers, communications officers, or support staff (females make up 62.5% of full-time roles outside senior management). Of part-time CCAFS management staff, 7 are male and 8 are female. However, of the designated contact points for CCAFS within the CGIAR Centers (over which CCAFS management has little or no influence), 12 are male and 4 are female.⁴

Skills and diversity of research teams: CCAFS research is implemented by a wide range of international partners. They include all CGIAR Centers. While some Centers' involvement declined over Phase II, all Centers are represented in the 2020 list of researchers working in CCAFS projects provided by the PMU. Of CCAFS's 27 strategic or first-tier partners, 13 are classified as research partners: Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), CIRAD, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Future Earth, Global Research Alliance on Agricultural Greenhouse Gases, Indian Council of Agricultural Research, International Research Institute for Climate and Society (Columbia University), National University of Ireland Galway, University of Leeds, University of Oxford, University of Vermont, Utrecht University, Wageningen University and Research. In addition, a large number of other international or Northern-based research institutions are partners on projects. Institutions providing coauthors for CCAFS journal articles include⁵ the International Institute for Applied Systems Analysis (IIASA), French National Institute for Agricultural Research (INRA), Potsdam Institute for Climate Impact Research, Lviv Polytechnic National University, University of Aberdeen, National Institute for Environmental Studies (Japan), Sophia University Japan, Cornell University, and the Norwegian University of Life Sciences.

Many research partners are based in developing countries and include universities, national agricultural research systems (NARSs), NGOs, and others such as⁶ the Ghanaian Council for Scientific and Agricultural Research, the Malian NGO AMEDD, the Ministry of Agriculture (Senegal), International Care Ministries in the Philippines, University of Nairobi, Kwame Nkrumah University of Science and Technology (Ghana), Esoko Ltd. (Ghana), and Université Nationale d'Agriculture du Bénin. Other NARSs acting as partners in CCAFS include those of Burkina Faso, Kenya, Mali, and Senegal (with the Indian Council for Agricultural Research already mentioned as a program-level strategic partner). One notable publication (Shyamsundar et al. 2019) has authors from the following institutions: the Nature Conservancy, a US-based NGO; one Indian university; five other Indian research institutes; two international research institutions; two Australian universities; three US universities; and one Indian private sector company.

Some indication of the diversity of partnerships can be gauged from examination of the authorship of CCAFS research outputs. For the 395 analyzed outputs, lead authors by country of affiliation are drawn from 48 countries, of which 29 are in Africa, Asia, or Latin America. Not surprisingly, 51% of lead authors come from six countries (in descending order the USA, Kenya (headquarters of ILRI), India, the UK, the

³ Defined as the Program Management Committee, other Flagship Leaders and other Regional Program Leaders

⁴ From documentation made available by CCAFS management

⁵ A small selection of the partners, taken in this case from the sample of 18 journal articles selected for ad hoc assessment

⁶ As above

Netherlands, and Colombia). More than 88% of papers are credited to authors from more than one country. The ratio of multicountry papers to all papers is less than 70% for only a very small number of countries, responsible for only 17 outputs.⁷

The 400 research outputs represent 1,923 authors. Of the top 20 most productive authors (measured by number of articles coauthored), six, including the single most productive author, are nationals of developing countries. Sex-disaggregated data on CCAFS researchers is not easily available. Among those identified as project leaders in the 2020 list, 25 (83%) are male and 5 are female.⁸ A general consensus in CCAFS management is that the gender composition of research teams is a matter for the CGIAR Centers and research partners, and one that CCAFS, as a CRP, should not, and does not have the resources to monitor or influence.

CCAFS draws on skilled researchers of high academic standing. Eight researchers listed as authors of CCAFS outputs have h-indices of 30 or more, and a further 16 have h-indices of between 29 and 11, indicating a substantial record of highly-cited articles. Interestingly, three of the four RP Leaders have h-indices of 17 or more, demonstrating that the regional dimension is not a secondary axis in the matrix, but one of real importance managed by high-level researchers. Overall, several of the core team and other CCAFS-associated researchers can be regarded as international thought leaders on climate change and agriculture interactions.

The disciplinary span of CCAFS research is extremely broad, including climate impact and emissions modeling at a range of scales, some agronomic studies, econometric analyses based on household surveys, research into processes to understand farmer and stakeholder perceptions and choices, and research on science-policy interfaces. The wide disciplinary range of the core CCAFS team is clearly complemented by the large number and high standing of strategic and other research partners and the individuals within them. Wageningen alone has 30 individuals listed as CCAFS team members in 2020. There are two qualifications to this finding. While there is much thoughtful work on science-policy interfaces, this work could be said to lack a political economy dimension that can look at the influence of interests (economic, ideological, professional) on the making and implementation of climate policy.⁹ A large number of outputs have used qualitative or mixed research methods, but these generally involve semi-structured interviews and/or focus groups specifically convened for the research, and a semi-quantified presentation of findings. More in-depth qualitative and ethnographic work—of which at least one example (Wernersson 2018) exists within the program—would be helpful in tracing deeper connections between climate, society, and sustainable options for agriculture.¹⁰

Overlaying all questions of team skills and diversity is a strong ethos of orientation toward results, including impacts at both the farmer and policy levels. This orientation has been a core value of the program, promoted personally by the Director through many channels, including that of ensuring that the senior leadership shares this vision. As a Northern research partner noted, the orientation to impact was “there from the start,” referring to the early days of the Challenge Program in 2010. There was no evidence that the results orientation detracts from researchers’ ability to satisfy traditional academic expectations that they will publish highly cited journal articles (nor evidence that the drive for publication detracts from results).

Availability and stability of funding: Figures for the CCAFS program as a whole are given in Table 1 below. Figures for actual expenditures by CCAFS FPs 2017–19, taken from CCAFS Annual Reports, are given in Annex 7. Annual Reports also include annual budget figures, which are higher but not greatly higher. Data in Table 1 show that overall funding has seen a slight decline in nominal terms, while Window 3/bilateral expenditures as a proportion of the total remained markedly constant over the three years.

Budget constraints, including declining budgets, were of concern in interviews with FP and RP Leaders, but not to the extent expected. High expectations on program leaders and other core staff to secure Window 3/bilateral funding were accepted as necessary, and these efforts were generally successful (Table 1). It was generally accepted that CCAFS leadership had budgeted W1/W2 by results, protecting more successful projects (in terms of CCAFS’s own vision and results framework) and discontinuing

⁷ Papers from each country were identified by the affiliation of the lead author. The countries scoring low for multi-country papers were Sri Lanka, Benin, Ethiopia, Ghana, Morocco, and Canada.

⁸ This information was verified by web searches where gender was not apparent from the name.

⁹ Examples of the sort of approach intended here would be Waterbury (2013), Quan et al. (2017), and Sovacool (2018) at levels from the region to the village.

¹⁰ One example would be index-based insurance, where more exploratory work on farmer attitudes to risk and insurance as a response to it is needed.

unnecessary projects. In some cases, this sharply reduced budgetary allocations to CGIAR Centers, and there was a clear sense that Centers did not have a secure entitlement to a share of W1/W2 budgets.

Table 1: Actual expenditures by funding window, 2017–19

Funding window	2017		2018		2019		2017–19	
	Expenditures ('000 US\$)	%	Expenditures ('000 US\$)	%	Expenditures ('000 US\$)	%	Expenditures ('000 US\$)	%
W1/W2	18,208	32.7	18,323	35.6	17,431	32.5	53,962	33.5
W3/bilateral	37,559	67.3	33,090	64.4	36,238	67.5	106,887	66.5
Total	55,767	100.0	51,413	100.0	53,668	100.0	160,849	100.0

2.1.2 Quality of Process (including Partnerships)

The CCAFS model of partnership with all CGIAR Centers, high-level inclusion of strategic non-CGIAR partners, and a great range of other partners has worked well. While the Director is an Alliance staff member, his location outside the Alliance and the PMU's location in Wageningen helps create and maintain a perception within and outside management of CCAFS's distinctiveness from the Alliance, and thus from any specific CGIAR Center. Donor representatives compared this favorably with the situation in other CRPs, where the perceived identification with the interests of the lead Center can be problematic. Researchers strongly appreciated the individual leadership style of the director.

The CCAFS architecture is complex, comprising four FPs, two cross-cutting LPs that function in many ways like FPs and are presented in external communications (such as on the CCAFS website) as FPs, and RPs. This complexity did not prevent CCAFS from producing flexible and relevant research, recognized for its legitimacy. The role of the FPs as the primary entities for identifying, planning, and budgeting research projects is clear. The constructive roles taken by the RP Leaders in designing and implementing gap-filling projects, in attracting bilateral funding (such as the USAID CINSERE project in Senegal), and in disseminating findings and translating them into policy is impressive.

CCAFS Phase II research planning, in its major outlines, was done largely at the beginning of the phase, based on the mandates of the various FPs. Adjustments to projects, curtailment of a few projects, gap filling, and designing of more translational projects are done by senior management annually. This process commands a high level of approval by researchers and stakeholders.

Good collaboration between the FPs exists. Some OICRs (e.g. those covering the development of the Happy Seeder technology in India) show research serving the objectives of more than one FP. RPs assist this integration. FP3, dealing with mitigation, remains *relatively* less integrated with other FPs (though note that the Happy Seeder OICR links the work to both FP3 and FP2). The FP Leader argued that a stricter working definition of climate-smart agriculture that included emissions reduction as definitional, rather than being a part of CSA "where appropriate", would have helped with the further integration of FP3. However, this argument is countered by other views that small-scale farmers cannot be regarded as responsible for emissions reduction except when they are externally compensated. How and in what circumstances smallholders and other members of the rural poor could be compensated for emission reductions could be further explored as a research priority.

Partnerships with Northern research partners appear to be productive and respectful. One Northern partner saw great advantages for his institution in allying itself with CCAFS's results orientation, which also allowed the partner to "learn the language" for use with other development-oriented research funders. At the same time, he saw CCAFS as having a stronger push for quality of science (e.g., the need to publish in high-impact journals) than other donors. Neither he nor anyone else we spoke to saw this push as a contradiction to the CRP's orientation toward results and impact. He also praised CCAFS's excellence in communication (to policymakers). Another Northern partner saw strong advantages for her institution, which has its own impact strategy, in broadening its networks in developing countries, and in bringing together CCAFS's capacity and resources to achieve impact with its own. This institution could not fulfill its own strategy in the climate change field without collaboration with CCAFS. Both Northern partners mentioned the opportunities to recruit and supervise PhD students, although one mentioned that

the time-limited funding cycles of three years were insufficient. Challenges for Northern partners within CCAFS principally concerned the need for quick responsiveness to opportunities and matching the pace of work in Northern universities.

There were limited opportunities to interview Southern partners. While one of the Northern partners perceived CCAFS as having only weak linkages with NARSs, the representative of one NARS expressed satisfaction with the CCAFS partnership, noting a significant number of publications on which he had been duly credited as an author. He added in writing: "We have put together multidisciplinary and multi-institutional teams at national and regional level, participated in several training sessions on different topics and produced several scientific and development publications. We also developed a partnership in the intervention area with technical services of government, NGOs, and local authorities to develop models of Climate-Smart Villages." He saw participation in multidisciplinary teams and the opportunity to share experiences with other NARSs and national partners in regional workshops as part of capacity building.

Once research is commissioned, processes to ensure the quality of research at the CRP level are light touch and generally regarded as in the remit of the participating Centers (and other partners leading projects). There is no CRP-level review of papers submitted to academic journals, as it is assumed the journals themselves will carry out peer review. CCAFS management does not generally direct researchers to particular journals, except when high-level reviews, syntheses of research, or think pieces are planned, in which case senior management will decide on a journal. Research ethics (e.g., informed consent and anonymity of respondents) and the mentoring of early-career researchers within research teams are generally seen as issues for Centers.

2.1.3 Quality of Outputs

CCAFS produces a wide variety of outputs. Besides peer-reviewed journal articles and book chapters, output types include blog posts, extension materials, guidance documents and manuals, news items, press releases, reports, training materials, videos, websites, and working papers. This subsection discusses these outputs inasmuch as they cast light on the quality of CCAFS science in the broadest sense.

Documentation made available to the review team gives details of 400 scientific outputs from Phase II of CCAFS in Institute for Scientific Information (ISI) publications that are available in the Web of Science (WoS). These are a subset of a larger dataset of 469 total scientific publications during the period.¹¹ The great majority of 1,923 people credited as coauthors across these articles were not affiliated with CCAFS, with an average of 4.81 authors per article. Seven articles are single-authored. Average citations per article are 7.685, with 179 citations for the most-cited article. The articles contain 19,388 references. Production of articles has been fairly constant across the years of Phase II: 2017: 131; 2018: 143; 2019: 123; 2020:3¹² (up to the point of compilation of data). The articles are marked as belonging to the following publication categories: article, 348; review, 34; editorial material, 7; article/proceedings paper, 5; article/data paper, 2; review/book chapter, 1; correction, 1; news item, 1; and letter, 1.

The distinction between articles and reviews is not explained, and some high-level syntheses of research are marked as articles while arguably being review-like, but this is not a major criticism. Overall the figures point to a substantial output of peer-reviewed articles, the great majority reporting on original research. Thirty articles have a total citation count on WoS of five or more citations per year since publication (see Annex Table 6.1).¹³ With minor exceptions, this list is identical to the top articles by total citation count, though in a different order. The list shows several articles with impressively high citations (3 with more than 100 citations; 13 with more than 30 citations). In 14 of the 30 articles, lead authors give their affiliation as CCAFS, a CGIAR Center, or a CCAFS strategic partner.

Some caveats must be made. First, the majority of these articles (24 out of 30) date from 2017. This is partly in accord with citation trends over time (2017 articles will have had a greater chance to hit their peak citation rate per year), but it also indicates that these articles are highly likely to have been the result of Phase I research. Second, a number of the articles, including the two with the highest overall

¹¹ A crude calculation based on actual expenditure for 2017–19 and this figure of number of outputs gives \$400,000 per article, but the authors are not aware of any credible international benchmarking of scientific production per research spend for a program like CCAFS, and this assessment fails to take into account the fact that CCAFS has a strong impact orientation, and much of its effort is directed to non-peer-reviewed outputs.

¹² This refers to three publications that were accepted and available online in 2019, before being finally published in the respective journals in 2020.

¹³ Web of Science citation counts can be significantly smaller for the same output than those from Google Scholar

citations and citations per year (Griscom et al. 2017 and Springmann et al. 2018) are review-like articles with long author lists in which those with an obvious CCAFS link are not prominent.¹⁴ These multiauthor articles demonstrate that CCAFS can engage in high-level academic partnerships for shaping international research and public discussion, which may indirectly demonstrate the quality of CCAFS's own science but cannot themselves be taken to do so directly. Third, in a few cases (most notably the two articles on aflatoxins and mycotoxins) the connection to CCAFS is tenuous.

CCAFS Phase II articles have been published in 165 journals or books. The 15 journals in which the most CCAFS outputs have been published during Phase II are listed in Annex Table 6.2. These account for 155 articles, or 39% of the total. They cover a broad range of topics and disciplines, mainly within the biophysical sciences. Impact Factors range up to 9.412 for *Proceedings of the National Academy of Sciences* and 8.555 for *Global Change Biology*. In addition, *Nature* (Impact Factor 36.28) and *Science* (Impact Factor 31.201) have seen the publication of two and one CCAFS outputs, respectively. Annex Table 6.2 gives the Journal Citation Reports (JCR) categories of each of the 15 most-used journals, and the journal's rank and quartile within those categories. These parameters are important given that citation counts differ markedly across disciplines. All but 3 of the 15 journals are in the top quartile for their category or all their categories; 8 journals are in the top 10 for one or more categories. *Global Change Biology* (accounting for eight CCAFS outputs) is ranked first for biodiversity conservation, and *Agriculture, Ecosystems and Environment* (accounting for 11 CCAFS outputs) is ranked second for multidisciplinary agriculture.

Given the disciplinary span of CCAFS, it is noteworthy that relatively few papers have appeared in social science, development studies, or economics journals. Journals in these categories that have published CCAFS articles include *Global Food Security* (7), *Food Security* (5), *Global Environmental Change* (4), *Development in Practice*, *Ecological Economics*, *Gender, Technology and Development*, *Journal of Rural Development*, and *World Development* (3 each). These are all highly esteemed journals in their fields. Another 11 journals have published one or two CCAFS outputs each; outputs in such journals come to 44, or 11% of the total—somewhat low for a multidisciplinary program.

Annex Table 6.2 includes a column on the Open Access status of the journals. Determining this status is not always easy, either from lists provided by CCAFS or from journal websites, so the indicator is not in every case reliable, but the great majority of the most-used journals allow either "Gold" Open Access (public access to the published version, usually in exchange for an article processing charge) or "Green" Open Access (public access to a pre-print, sometimes after an embargo period). CCAFS is seen in this way to participate in general CGIAR policy in favor of Open Access publishing.

A particularly useful measure of the attention a scientific article has attracted in wider public discussion is the Altmetric Attention Score, a weighted count of attention in a wide range of media. Weighted scores include 8 points for mention in a major international newspaper, 5 points for mention in a blog, and 3 points for mention in a policy document, alongside a range of other weights for other media and contexts. Altmetric Attention Scores range as high as 2,357 for some articles, with an average score of 36 across 403 articles, of which about 40 had a score of zero. Annex Table 6.3 presents the 30 articles (from the same ISI/WoS subset of the database) with the highest Altmetric Attention Score. There is a comparatively small overlap between the nine articles appearing both in this list and in the list of most-cited articles (Annex Table 6.1), although the top two articles (in a different order) are the same in each list. Compared with the high-citation articles, a similar number of lead authors (15/30) are affiliated with CCAFS, a CGIAR Center, or a CCAFS strategic partner. Also compared with the former list, there is a higher concentration of a few journals and publishers: *Nature* and its family of journals, *Science*, and *PNAS*, as well as high-profile open-access journals such as members of the *Frontiers* group and *Sustainability*. This suggests that journal choice (either very high impact or well-known Gold Open Access) is a driver of high Altmetric Attention Scores.

Eighteen scientific outputs were assessed in more detail. These were selected from lists supplied by the FP/LP Leaders. Where more than three were suggested per FP, an ad hoc choice was made to represent different themes within the FP and Program, with a bias toward more recent articles, and articles with a clear link to CCAFS research on the ground. Results of this assessment are reported in Annex Table 6.4. These results are interesting for the program as whole but should be regarded with caution as a measure of program quality, still more so as a measure of FP/LP quality.

Choice of journal was considered highly appropriate in the great majority of cases. Ten articles were assessed as having the highest level of relevance — significant international applicability as global public

¹⁴ It would be of limited utility to try to quantify the CCAFS contribution through author lists given that CCAFS-affiliated staff can appear in such lists under a variety of institutional affiliations.

goods. Originality was assessed as high in 11 cases, moderate to high in 1, and moderate in 6. Academic rigor was assessed as high in 10 cases, moderate in 6, and low in 2. Attribution of coauthorship was appropriate in most cases: some of the global studies had author teams entirely from the North, but others had a greater North-South spread of authors. National- and regional-level studies generally had good representation of authors from those nations or regions, but this was lacking in two cases. The outputs assessed were all fully or partially CCAFS funded, and authors who were closely associated with CCAFS, or with the CGIAR Centers more broadly, were well represented. The overall picture is of a wide range of high-quality and original research, across the FPs, LPs, and regions.

Annex Table 6.5 presents an assessment of 17 technical publications and communication products. These were selected ad hoc from lists provided by the CCAFS director and FP Leaders (so representing outputs considered as of high quality) and include four publications used in the preparation of OICR deep dives. This selection covers a wide spread of publication types, from a substantive research-based Working Paper, through highly user-oriented manuals, to Info Notes and press releases. As with Annex Table 6.4, this assessment should be regarded with caution as a measure of program quality, still more so as a measure of FP quality. The quality is generally assessed as high, and in the case of three outputs as very high. The report *Financing the Transformation of Food Systems Under a Changing Climate* (Millan et al. 2019) presents a clear analysis leading to a summary of short-, medium-, and long-term strategies for governments, philanthropic donors, responsible investors, and other corporate actors. One output (FAO and GRA 2020) assessed from the broader suite of materials on Livestock Activity Data Guidance (L-ADG) is well-targeted, systematic in presentation, with extensive use of visuals and hyperlinks. The Working Paper “Changing Diets and Transforming Food Systems” (Vermeulen et al. 2019) is genuinely innovative and interesting in setting research agendas and the context for more policy-oriented work. On the other hand, the profile sampled from the CSA Country Profiles, that on Ethiopia (CIAT and BFS/USAID 2017), had problems of balance between food crops, cash crops, and pastoralism, with an inadequate and in some areas questionable treatment of the latter. Info Notes, press releases, and other such materials were well written and fit for purpose.

2.2 Effectiveness

2.2.1 Achievement of Planned Outputs and Outcomes

Overall, the program achieved 78% of its milestones. Out of 104 milestones, 81 were achieved, 18 were extended, 1 was canceled, and 4 were changed. In 2017, out of 34 milestones, 23 were completed, 10 were extended, and 1 was canceled. In 2018, out of 33 milestones, 26 were completed and 5 were extended. In 2019, out of 37 milestones, 32 were completed, 3 were extended, and 2 were changed.¹⁵ Milestone achievement has been spread fairly evenly across the FPs, with good progress against what was planned. This section provides a qualitative assessment of progress by FP, based on an analysis of annual milestone achievements and other achievements reported (ARs 2018 and 2019), followed by an analysis of policies and innovations. The milestones have limited value as indicators of progress along the program ToC because of inconsistencies within the reporting system. A more valuable assessment of progress can be found in section 2.2.4, using a theory-based evaluation.

2.2.1.1 Flagship Program 1: Priorities and Policies for Climate-Smart Agriculture

Of 25 milestones identified from the annual reports, 21 were completed and 4 were extended (3 in 2017 and 1 in 2018). The reasons for extension of milestones were logistical and financial. Three of the milestones that were extended were deemed low risk (in terms of likelihood of delivery by CCAFS). All milestones on innovation capacity strengthening of partners and poor/vulnerable communities were delivered (e.g., the work with the African Group of Negotiators, which advanced consensus on agriculture and climate in the UN Framework Convention on Climate Change (UNFCCC) process and supported capacity on gender, leading to Gender Action Plans). Delivery was initially slower on the nutrition sub-

¹⁵ These figures were generated through detailed analyses of annual reports; see Annex 8. However, there are a few discrepancies with data from the MARLO system, the Dashboard, and the CAS Secretariat pre-analysis. The latter gave these figures: Overall, CCAFS completed 83.17% of its milestones (84 were completed, with 17 extended, 4 changed, and 1 canceled). Note that this analysis is based on a distinct count returning the number of unique values for milestones, which means that milestones can be double counted. The canceled milestone was the result of budget cuts (2017–19). FP1 completed 21 and extended 4 milestones. FP2 completed 26 milestones, with 6 extended. FP3 completed 19 milestones, extending 3, with 2 changed and 1 canceled. FP4 completed 18 milestones, extended 4, and changed 2 (Results Dashboard data, pre-analyzed by CAS). According to the CGIAR Dashboard, CCAFS had 84 milestones (2017–19), of which 79% have been completed. This figure is similar to that found by the review team.

IDO, and milestones were extended, but these have been delivered in later years, and there has been a growing emphasis on nutrition and food systems more recently, underpinned by collaborations with the Agriculture for Nutrition and Health (A4NH) CRP. All milestones on improving climate change impact forecasting and technology development were delivered. All milestones were completed on gender-equitable control of productive resources, including milestones on informing regional and national policy agendas, and innovative work was conducted on youth participation in policy and technical debates using gaming. Most milestones were delivered on promoting an enabling environment for climate resilience, with extensive science-policy engagement across scales; actions included establishing national learning alliances in West and East Africa, informing World Bank investments and project implementation, engaging with the Global Commission on Adaptation, and developing an action-research agenda on transforming food systems under a changing climate.

2.2.1.2 *Flagship Program 2: Climate-Smart Technologies and Practices*

The review team's analysis found 30 milestones, of which 24 were completed, and 6 were extended.¹⁶ Political insecurity was a challenge leading to one of the extensions (Nicaragua). All milestones focused on reducing production risks were delivered, except for one which was delayed but later completed. Key achievements include the securing of agreements with three Indian states to scale up residue management, uptake of CSA practices by a sustainability standard, improving cocoa and coffee extension in multiple countries with CSA training materials, and building climate information services (CIS) advisories in Latin America. Milestones were mostly completed on improving access to financial and other services (two were extended, one of which adapted to the merger of two global sustainability standards). Achievements include best bets prioritization with South African local authorities, CSA pilots with a multistakeholder platform in Ghanaian cocoa, informing of investment plans in West Africa, contributions to the establishment of the Althelia Biodiversity impact investment fund in Brazil, a new partnership with the World Business Council for Sustainable Development (WBCSD) on CSA metrics for companies, and work on micro-loan risk assessment with Root Capital.

Milestones on improved forecasting of climate impacts and technology development were all delivered. Climate-smart cocoa practices in Latin America were developed, and there was testing of 40 CSA options in 20 countries in 2017 and 94 in 2018, including analysis of gender dimensions in most cases. Milestones on gender-equitable control of productive assets and resources are also all completed, except for one extension. Besides farm trials and fruit tree introductions to benefit women, the FP created a monitoring system for Climate-Smart Villages (CSVs) to generate evidence at much greater scale on gender impacts and potentials. The latter was scaled up to 11 countries and taken up by regional bodies in Central America. All milestones were completed for innovation capacity strengthening of partners and poor/vulnerable communities, except for one, which was later completed. Examples include influence over national policy and institutional frameworks in many countries (e.g., Cambodia, Colombia, Guatemala, Honduras, India, Laos, Myanmar, Philippines, and Vietnam). CSA country profiles were completed for 21 countries in Sub-Saharan Africa and Asia. The African Compendium Dataset was published in 2019. See Annex 8 for more details.

2.2.1.3 *Flagship Program 3: Low-Emissions Development (LED)*

Out of 24 milestones, 18 were completed, 3 were extended, 2 were changed, and 1 was canceled. The latter, a milestone involving development of a framework for innovation and monitoring of sustainable cattle farming in Brazil, which would have contributed to the sub-IDO on land, water, and forest degradation minimized and reversed, was canceled as a result of budget cuts. Ten milestones were categorized as low risk (categorizations were not requested in 2017), and all were completed.

Milestones related to more efficient use of inputs were delivered, except for work on the analysis of Food Losses and Waste for Low-Emissions Development (poor delivery by external partner and subsequent staff turnover); it was later completed in 2020. Meanwhile, other work was undertaken on a separate topic (low-emission finance initiatives) and collaborations with the World Bank (LED agriculture blueprint) and IFAD (greenhouse gas [GHG] portfolio footprint). Achievements relate to trials on efficient management options for fertilizer, feed, water, and land use in several countries, such as pasture restoration (Colombia, Brazil), N-fertilizer management (East Africa), alternate wetting and drying (AWD; Vietnam), and soil carbon sequestration (Water, Land and Ecosystems CRP). Milestones on reducing net GHG emissions from agricultural, forest, and land use were all delivered, with one extension that was later completed. Achievements include contributions to a key report for the UNFCCC; advanced

¹⁶ Note that Results Dashboard data pre-analyzed by CAS_report that FP2 completed 26 milestones and extended 6 (4 in 2017); 1 of the latter was categorized as low risk.

measurement, reporting, and verification (MRV) methods for livestock emissions; a blueprint to upscale AWD in Vietnam; and guidance on LED standards in dairy (China).

Milestones focused on improving the capacity of women and youth to participate in decision-making were nearly all achieved; one milestone was not achieved because monitoring gender indicators was perceived as a lower priority than GHG MRV, and there was a switch to other activities (e.g., influencing a World Bank project, informing the Kenya Dairy Development Board's Gender Strategy). Innovation capacity-strengthening activities for partners and poor/vulnerable communities were all successfully completed. Examples include contributions to the SAMPLES platform, which enables developing countries to measure agricultural GHG emissions and to identify food security and mitigation-oriented solutions, and development of a Mitigation Options Tool (CCAFS-MOT) and a Global N Database dashboard. See Annex 8 for more details.

2.2.1.4 Flagship Program 4: Climate Services and Safety Nets

Overall, out of 24 milestones, FP4 completed 18 milestones, extended 4, and changed 2. The exact reasons for extension and changing are sometimes explained in the annual reports, but not always. In 2017, 6 were completed and 1 was extended. In 2018, 4 were completed, 2 were extended, and 2 were changed. In 2019, 8 were completed and 1 was extended. Two of the milestones that were extended were deemed low risk,¹⁷ but work is either continuing or already achieved.

All milestones on improving access to financial and other services were delivered, except for one that was changed. Achievements include the piloting of index-based flood insurance, adopted at national level, and incorporated into a World Bank project in Assam, plus uptake of CCAFS science in new insurance services for approximately 25,000 cotton farmers (Malawi, Nigeria). Milestones were all delivered on building capacity to deal with climate risks and extremes. Four national and two regional bodies adopted CCAFS science. Other achievements include collaborations on improving climate services in northern Ghana and two provinces in Vietnam, radio programming in Senegal and Rwanda, and development of information and communication technology (ICT)-based climate advisories in India and Nepal. Four milestones focused on the enabling environment for climate resilience were completed, but these were extended (reasons not completely clear). Achievements include a literature review of cost-benefit analyses of climate services in agriculture and the expansion of CS-MAP use in Vietnam. All milestones were delivered on the gender equity sub-IDO: e.g., four organizations are using CCAFS strategies to better support women farmers' participation in climate services and agricultural insurance in Cambodia, Laos, Malawi, Rwanda, and Vietnam. Innovation capacity strengthening of partners and poor/vulnerable communities was partially delivered. Three were completed, one was extended (reasons are not clear from the AR), and one was changed. In four countries there was progress on provision of training materials and uptake of climate services and weather-related insurance (Colombia, Honduras, Nigeria, and Rwanda), and a key regional disaster risk management strategy in the Central American region expanded its approach to agroclimatic risk management.

FP4 focuses on generating and synthesizing rigorous, high-quality evidence of costs and benefits and developing tools that major insurance initiatives need to optimize the impacts generated through their programs: this work has been slow, but FP4 is currently partnering with India's national insurance scheme (R4: Rural Resilience Scheme) and with Africa's Agriculture and Climate Risk Enterprise (ACRE). The team is synthesizing available evidence and conducting randomized control trials on different approaches for scaling up insurance. It takes time to generate findings, as farmers need to have been insured for multiple agricultural seasons. Please see Annex 8.

2.2.1.5 Analysis of Innovations and Policies

No targets are set for policies and innovations, which reduces their evaluative potential. Evaluative scales would provide greater nuance while also offering transparency in assessment. Overall, CCAFS has produced 74 innovations (2017–19), with an even spread across years (CAS Secretariat analysis, Dashboard, MARLO, ARs). The majority of innovations are categorized as research and communications methodologies and tools (44), such as the Food Security and Drought Monitoring and Early Warning Tool. These are followed by production systems and management practices (14), such as Climate-Related Risk

¹⁷ The first "low-risk" milestone, "based on assessment of current FP4 project portfolio and opportunities, an adjusted project portfolio will target analyses and engagement to inform at least seven additional policy decisions within three years"—was extended. However, work in this area is continuing, and more progress is expected in 2020. The second milestone, "Building on FP4 investment in its design/launch, ongoing CCAFS East Africa engagement of the Climate Research for Development Africa initiative, etc.", saw work extended into 2019, but the milestone was completed in 2019.

Maps and Adaptation Plans, and social science innovations (12), such as CSA Innovation Platforms and Local Technical Agroclimatic Committees. No biophysical or other types of innovations are reported. The majority (25) are stage 3 innovations—i.e. they are available for uptake, with 4 being taken up by next users. Geographically, a majority are of global (24) or national (28) relevance, with fewer at subnational and national levels. The highest number comes from Southeast Asia and South Asia, closely followed by Latin America and East Africa. FP2 has developed the most (36), followed by FP1 (25) and FP4 (23)—however, there is a lot of cross-collaboration between the FPs.¹⁸

Overall, CCAFS in Phase II has increased its focus on policy implementation. It has delivered 58 policy contributions, with the highest number achieved by FP1 (35), followed by FP2 (31), FP3 (25), and FP4 (24) (2017–19) (CAS Secretariat, Dashboard, MARLO, ARs). A majority was achieved in 2018 (3), with budget cuts a reported reason for fewer in 2019. A majority achieved level 2 (39), with 4 achieving level 3—i.e., evidence of impact on people and/or the natural environment. A majority of policy contributions are categorized as policy or strategy (44) (e.g., Vietnam government strategy for implementation of Climate-Smart Maps and Adaptation Plans, the Myanmar Climate-Smart Agriculture Strategy), with 9 budget or investment contributions (9) (e.g., World Bank agricultural investments for improved climate resilience in agriculture), 3 curricula (e.g., public-private CSA cocoa extension training materials), and 3 legislative interventions (e.g., advancing implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture [ITPGRFA]). Geographically, the highest emerged at the national level (32), with far fewer at other levels. By region, East Africa (16) and Southeast Asia (15) were the highest contributors. By FP, FP1 contributes the highest number (35).

It is important to recognize the wide scope of the contributions from different organizations, countries, and types of policies, and that this success reflects both the quality of the science and the critical role of the regional teams in providing sustained interactions with policy and investment decision-makers, which can enable the teams to work proactively and responsively and to be closely aligned to the needs and interests of decision-makers at different levels. Assessing contributions to policies is notoriously challenging—yet it is critical to achieving systemic change. CCAFS is undertaking a study to more fully map and interrogate the policy contributions achieved, which should inform improved planning and future reporting. In the evaluation period, 38 OICRs were produced by CCAFS (10 in 2017, 11 in 2018, and 18 in 2019).¹⁹ Five OICRs were selected to provide coverage of the different FPs, regions, and the highest levels of maturity (see Annex 11) and were analyzed to determine how specific policies and innovations contribute to the SRF, and how the activities reflect CGIAR (and CCAFS) comparative advantage in delivering research for development (R4D). See Annex 11 for detailed analyses of OICRs.

2.2.2 Demonstrated Importance of Outcomes (Deep Dive on Selected OICRs)

The theory of change analysis in section 2.2.4 provides a rapid “most significant outcomes” assessment, which provides broader insights into the demonstrated importance of outcomes. From the deep dive analyses of the OICRs, some issues arise with respect to the quality of the underpinning evidence in some cases, but all the OICR deep dive studies demonstrate substantive outcomes achieved. More detailed findings can be found in Table 2 and Annex 14

¹⁸ Note that the numbers reported per FP do not add up to the total number of innovations (74), because more than one FP can contribute to an innovation (CAS Secretariat, Dashboard).

¹⁹ FP2 has the highest number of reported OICRs (22), with an even spread between the others, and it also reports the most level-2 and level-3 OICRs. For the period 2017–19, FP1 reported 3 OICRs at level-1 maturity, 9 at level-2 maturity, and 1 at level-3 maturity. FP2 reported 8 at level 1, 11 at level 2, and 3 at level 3. FP3 reported 5 at level 1, 4 at level 2, and 2 at level 3. FP4 reported 3 at level 1, 7 at level 2, and 1 at level 3.

Table 2: Summary of findings from Outcome Impact Case Report deep dives

Features	3140: Smallholders implementing low-emissions agriculture in East Africa	3313: Climate information services in Senegal improving household income and stakeholders' action planning	3347: Happy Seeder technology in NW India contributing to increased yields, profits, water, and nutrient saving
FP, year, and level of maturity	3, 2019, 2	4, 2019, 3	3/2, 2019, 3
Research or scaling activities reported	Participatory action research (Phase I) to improve local institutional sustainability and generate a manual/training for farmers on sustainable land management practices, with existing voluntary carbon market projects. Impact evaluation underway in Phase II (delayed by COVID-19).	Phase I work to create large-scale CIS, with some models using national and local multidisciplinary working groups (MWGs). Impact evaluation study and study of stakeholder engagement funded under Phase II.	Building on Phase I work, testing of Happy Seeder tractor-drawn tool as an alternative to burning rice residues. Synthesis of this work in a very high-profile journal paper. Collaboration for scaling at different levels by multiple govt. agencies with CCAFS.
Summary of reported impact	344,000 t CO ₂ e sequestered (2010–16), of which 24,788 tCO ₂ e of verified carbon credits sold to the BioCarbon Fund. Approx. 30,000 smallholder farmers participating in Kenya (70% women), via 1,730 farmer groups. Main farmer benefits are related to yield and food security. Manuals still used (Kenya, Uganda). Earlier CCAFS science and approach informed world's largest private carbon fund.	a) 7.4 million people covered nationally. b) Models with MWGs significantly increasing yields, production, and income. c) Scaling processes resulted in better interagency collaboration at local level and improved production of CIS, empowerment for NGOs, and better linkages for producer organizations.	Happy Seeder technology with mulching adopted instead of residue burning by 500k farm households over 1.3 million ha, with benefits in increased yields, incomes, water, and nutrient saving, and reductions in air pollution and GHG emissions.
Comments on congruence with ToC	Positive contribution to impact pathway of FP3.	Positive contribution to impact pathway of FP4.	Positive contribution to impact pathway of FP3 and FP2.
Comments on quality of evidence, and other comments	Strong evidence on carbon sequestration. Findings of study on impact of use of manual in Kenya still awaited. An ICRAF study on the wider carbon project validates the livelihood benefits.	a) Process for deriving coverage figure opaque. b) Appropriateness of quantitative methodologies for impact assessment has been questioned. c) Stakeholder engagement study is both original and rigorous. OICR 3120 shows how the work has developed by piloting different models for cost-recovery of CIS.	<i>Science</i> article is an excellent synthesis of farm-level benefits, and example of evidence that mobilized govt. efforts. Measurement of scale of impacts largely derived from ARs. Sequencing of impacts in OICR hard to follow.
Overall assessment	OICR covers work conducted mainly under Phase I, but carbon sequestration is clear, and livelihoods benefits of improved manual/training likely (impact study awaited). Impressive scaling achieved.	Notwithstanding concerns on evidence, OICR demonstrates strong contribution of CCAFS knowledge on CIS to development outcomes.	A good example of wide partnerships, convening power, and influence of CCAFS on policy, and indirectly on farmer practice, in India.

2.2.3 CRP Management and Governance

Overall, the management and governance approach has strongly supported CRP's effectiveness. The matrix approach, integrating FPs, and regional teams, has worked well. For Phase II, more robust processes for identifying projects have been developed, based on lessons from Phase I. This has allowed the program to have a more strategic focus on its priorities—but there is still scope in future CGIAR programs to support coherent program design, with adequate levels of resources controlled by the core team. CCAFS also led the way on improvements to reporting systems, although it still does not function appropriately to support theory-based monitoring and evaluation.

Adaptive management based on lesson learning: Good adaptive management in contexts of complexity requires strong learning loops to respond to uncertain and unpredictable changes in socio-ecological and policy systems and recognizing that stakeholders hold incomplete knowledge. The program has a strong impact ethos. There are both informal and more structured processes of learning from evidence and experience. For example, the ISC requests thematic topic presentations from RP or FP leaders on activities and future strategy. In addition to the individual performance processes within Centers, annual 360-degree assessments are carried out as part of performance-based assessment, alternating each year between regions, FPs, and "sometimes" contact points (according to written feedback from the director). However, the real potential of the ToC for supporting adaptive management and evaluation has not been realized.

Responding to challenges: One of the biggest challenges is the COVID-19 pandemic. The program has experienced delays in research projects, science-policy engagement, and impact assessments. However, CCAFS has made adaptations to the extent possible. It has increased the move to online collaboration, which was already part of the CCAFS approach, given its global reach.

Initial challenges in creating the ToC stem largely from the CGIAR Strategy and Results Framework, which includes a plethora of sub-IDOs overlapping at different stages of the change process.

Success as an integrating program: The location of the PMU independent from any specific CGIAR Center has bolstered its identity as an integrative program and allowed it to focus on the strategic partnerships needed to achieve program goals. Success is also linked to dedicated funding, which enables parallel advances to be made in research and science-policy engagement. The program involves a complex set of institutional arrangements. However, stakeholder and program feedback suggests that these arrangements have worked relatively well for all FPs and in all regions—although more program design coherence is needed in future. All regions have performed well (analyses of OICRs, policy, and innovation data, interviews).

Collaboration with other CRPs: CCAFS collaborates with all CGIAR Centers (though to varying degrees) as its core partners. It also collaborates with other CRPs. Policies, Markets, and Institutions (PIM); A4NH; WLE; and Forests, Trees and Agroforestry (FTA) were all mentioned more than once in the interviews as CRPs with which CCAFS has good collaboration. Significantly, the first three of these are the other Integrating CRPs, a pattern that was specifically mentioned by some interviewees. GLDC, the Platform on Big Data, and HarvestPlus (a cross-Center partnership though not a CRP) were also mentioned.

Role of the ISC: Feedback from the ISC and program leadership and staff was highly positive about the strategic support and advice that the ISC provides, especially when challenges and tensions arise and budget cuts need to be made. The regular presentations by staff were said to be important in promoting reflection and learning. However, theory-based thinking could also strengthen and systematize this interaction.

Strategic selection of partnerships: The program has excelled at developing partnerships with external organizations and ensuring that these partnerships bring value to the program in achieving its goals. Different coalitions and partnerships are needed at different scales and across scales—transdisciplinary work will require engagement with the public, with media, with social movements, and increasingly with the private sector. Future engagement should include NGOs and businesses, including small and medium-sized enterprises (SMEs).

Balancing strategic science and global engagements with demand-driven science-policy engagement across scales: The program recognizes that both are needed to respond effectively to climate and agriculture challenges, and has been fairly effective in balancing these needs. Some researchers have embraced the importance of conducting demand-led science-policy interactions and/or mainstreaming gender-transformative approaches. Overall, this culture has increased in the program, even as the programs also fund high-quality science. CCAFS also uses its partnerships well to amplify its impacts.

Program design and theory of change: Because of overall CGIAR systemic constraints, there were limits on how well CCAFS could design a coherent program and shape of its ToC. This contributed to flaws in the ToC and the reporting of results. The program ToC is too abstract, high level, and conceptual. It does not articulate how change is anticipated to happen. For example, which actors will be involved? How will attitudes, social norms, capacity, behavior, and practices shift? What enabling environment changes are needed to facilitate systemic change? Too few causal steps are elaborated, and the assumptions are not unpacked and linked to those causal steps. The overall contribution claim is also not well established to support monitoring, learning, and evaluation. Further analysis of the ToC is provided in Annex 10.

Reporting system: The reporting system has fundamental flaws, such as inconsistencies, the duality of the milestone system versus the more outcome-oriented reporting, and the lack of systematic use of theory-based approaches in monitoring and evaluation. A large donor-imposed the milestone system of reporting on the program, but that approach has had a highly negative effect, wasting time and undermining the quality of the more valuable theory-based reporting approach. The formulation of milestones is sometimes poor, and reporting does not always use the same terminology as the plan of work and budget (POWB), creating confusion. Further, the key performance indicators relating to numbers of policies and innovations and their level or stage of maturity have limited value, but they take time to collect. Importantly, the rating of the level of maturity and stage of innovation do not provide a full picture of the magnitude and importance of the decisions influenced and whether policies and investments are well influenced. In addition, the program does not closely track its outcome targets; figures had to be pulled together for this review. And for some outcome targets (sub-IDOs), there are currently no data available, and it is not clear why. Glitches and inconsistencies affect the reliability of MARLO, creating a lack of consistency in places.

Funding: The program has adapted well to significant budget cuts, leveraging significant amounts of other funding to help plug gaps. There has been a cost to partnerships and collaborative working in some instances. Additionally, a focus on external funding can sway priorities away from core and strategic foci. W1/W2 funding has been used strategically and effectively for gap-filling and scaling-up initiatives.

Communications prioritization: CCAFS has intentionally incorporated strong communications, and this investment has paid off by supporting the program's global, regional, and national presence and by amplifying its reach and influence (Carneiro et al., 2020). However, communications on the overall contributions of the program are less strong because of the lack of use of theory-based approaches.

Leadership and capability: There was highly positive feedback on the leadership of the CRP (strategic vision held, impact orientation, emphasis on collaborative working and partnership building, and the fair handling of budget cuts). The RP leaders have a strong science track record; most combine research experience and reputation with buy-in to the demand-led and outcome-oriented research agenda. External stakeholders also commented on the quality of the FP leaders, indicating that strong talent has been attracted to the program. By reaching out of the CGIAR System, CCAFS has brought fresh perspectives and increased capacity. The gender component has had support from program leadership, but the wider CGIAR enabling system has been less supportive, and its reach into the different FPs, due to varying capacity within the FPs, has been a little variable at certain times. Work on youth has been much less of a focus owing to budget cuts. In some areas, capabilities are lower: Some of these are recognized, leading to new partnerships and skills being brought in, such as in nutrition, but others are not (e.g., political economy and political ecology, ethnographic research). There is an ongoing debate about the relative roles of mitigation and adaptation within the program, and their potential integration and resourcing.

2.2.4 Theory of Change and Progress along ToC (CRP and Flagships)

To provide an analysis of progress along the program's ToC, this section analyzes the program-wide data available, policy and innovation contributions reported (from results dashboard data, pre-analyzed by CAS; MARLO; annual reports; interviews; OICRs), and findings from a rapid "most significant outcome" identification and analysis per impact pathway. The original ToC (Program Proposal, 2016) was made more simple, leading to a newer version being used within the program. It focuses on CSA implementation (e.g., farmer adoption of CSA technologies, practices, and services) as well as policy and institutional change enabling climate adaptation, mitigation, and resilience, and it envisions interactions between the two elements. CCAFS science and policy engagement occurs through partnerships, capacity development for scaling, and gender and social inclusion in CSA, plus program knowledge management, communications, and monitoring, evaluation, and learning.

However, there are flaws in the CRP ToC, which make it challenging for a reviewer to assess progress and contributions. Formulation of outcomes is insufficient for understanding causal change steps in different

sets of actors in terms of attitudes, capacity, practice and rule changes, scaling processes, interlinkages, transformative change, and associated assumptions. The impact pathways have multiple weaknesses. Essentially they are basic results chains, which do not include outputs, have simplistic and inconsistent formulation of outcome stages and huge leaps between stages, do not clearly reflect the objectives and goals of specific programs and how they feed into the broader program whole, and do not link assumptions to causal steps. Indicators are only weakly linked to the ToC and in a few instances are not sufficiently comprehensive. The clusters of activity (CoA) terminology appears to be mainly administrative and adds complexity rather than clarity.

The ToC does not appear in the ARs and is not reported on systematically. The bountiful evidence on outcomes collected by CCAFS is not synthesized against the ToC in reporting. The OICRs are a valuable effort to present contribution claims, and to a certain extent, the internal process and independent review of these reports helps ensure their quality prior to submission. However, the OICRs also vary in quality, and the template does not clearly link to the ToC, which itself is weak. This situation undermines the value of the evidence, which is not yet synthesized. Several studies are underway as part of a “leave no evidence behind” initiative, but this is somewhat belated and is too late for this review or to support ongoing learning. Evaluative scales are not used to describe the levels and nature of anticipated change. Some change will occur post-program.

There was a mixed response from CCAFS staff about the use of the ToC and their familiarity with it. Those involved in MEL felt that efforts had been made but that ToC-based approaches had not been properly embedded. FP and RP leaders were generally reasonably positive about ToC approaches. In Central America there is a strong alignment between the regional ToC and regional strategies. However, it is clear that while many in the program understand that the ToC encourages outcome orientation and they use it to report, they are often not very familiar with the ToC and are not using it proactively to monitor progress and test specific assumptions or identify unexpected and unintended effects. It is therefore difficult for the program to present a coherent contribution claim to the external world. Donor feedback indicated that while they value the program, accountability (in the broader sense) is a bit fuzzy owing to limits in program design coherence and systematic reporting of contributions. For external reviewers, it is difficult to trace change against the ToC using the evidence available. A strong impact ethos has been cultivated, and there are ongoing learning processes for strategic adaptive management, but these are not closely linked to reflection and evidence building on the ToC and testing of key assumptions to inform adaptive management. This stems partly from the fact that the ToC and nested impact pathways themselves are weak, but it is a missed opportunity.

2.2.4.1 Program-wide Data on SLOs and Impact Evidence

One of the key SLO indicators is number of farm households that have adopted improved varieties and practices, yet this is an outcome indicator rather than an output indicator. For the program as a whole, while not tracked on a regular basis, statistics on SLOs and sub-IDO targets were provided for this review by PMU (see Annex 8). They indicate that at impact level, there is progress in terms of contributing to SLO 1 (reduced poverty), but achievement is below the target (6.44 million have adopted improved varieties, breeds, or trees and/or improved management practices against a target of 11 million—i.e., 58.8%). It is not clear why this is an impact indicator, but there are several factors to take into account. First, there have been budget cuts. Second, there is another year to go and more impacts will likely be felt. Third, the COVID-19 pandemic has created delays in implementation, not least to impact evaluation studies, which will provide more evidence at the impact level (delayed studies cover an additional 2 million farmers). If positive impact is found for these additional farmers, then the cumulative figures will be nearer the target but may not achieve them, because the program has been curtailed by one year. Achievement against the “9m people exiting poverty, including women” indicator is lower—3 million currently reported out of 9 million—i.e., 33.3%. The program may have not been adequately resourced to assess impact on poverty, and there are arguments for investing more resources at an earlier point in the ToC (e.g., at different outcome stages). The same issues outlined above apply to the program timetable, funding, and delayed impact evaluations. On SLO 2 (improved food and nutrition security for health), surprisingly, no data have been collected by the program. For SLO 3 (improved natural resource systems and ecosystem services), no data were collected for the target relating to forest saved from deforestation. However, 52.66 MtCo₂ expected over the next 10-20 years against the target of 160MtCo₂ is reported for GHG reductions. This figure will rise over the course of next year but may not reach the full target, especially given the pandemic, program curtailment, and other factors. Data are not reported at the IDO level. Achievement on sub-IDOs against targets is given in Annex 8.

Impact evidence currently reported (on the Dashboard) comprises four contribution cases. SLO 1 and 3 each have two contribution cases; SLO 2 has none, indicating less achievement on food and nutrition. For

SLO 1 (reduced poverty), first, 7 million people in Senegal are accessing climate-informed advisories resulting from CCAFS research on the full value chain of advisories. This result is supported by an impact evidence study showing that 68% of farmers used the advisories, leading to changes in land preparation, crop variety choice, planting dates, and harvesting and conservation decisions, creating 10–25% increases in crop incomes. For reasons explained in more detail, we have concerns about the provenance of both the farmer coverage figure and the income figures. Second, in Rwanda, 111,835 farmers received climate information, with 81% using the information to improve their crop management; associated crop income increased by 30%. In addition, 550,000 farmers have received climate-informed advisories from local technical agroclimatic committees (LTACs) across five Latin American countries, of which an estimated 40% have improved their production through changed practices or timings, and the farmers report diverse benefits (Giraldo et al, 2020, Outcome Harvesting Report).

Two impact contribution cases are reported for SLO 3 (improved natural resource systems and ecosystem services), specifically for target 3.2 on reduced greenhouse gas emissions. First, CCAFS and RICE CRP research on technical options, suitability, and investment needs have led to the scaling up of alternate wetting and drying (AWD) of rice, reducing GHG emissions by over 1 million tCO₂e/yr. Ten private companies and development organizations have adopted AWD rice. Earlier research and engagement by these two CRPs identified suitable areas for AWD and climate risk regions that could significantly upscale AWD, and Vietnam put the appropriate policies in place. Second, no-burn and no-till agriculture has been promoted in India through the Happy Seeder technology for rice and wheat systems. This technology has reached approximately 0.5 million farm households on 1.3 million hectares in northwest India and has contributed to improved yields, increased farmer profits, and water and nutrient savings. Importantly, the reduction in burning that has been achieved lessened air pollution (with 5 million potential beneficiaries) and emissions in 2019 by approximately 4 million tCO₂e.

2.2.4.2 Outcome Evidence: Achieving Policy and Institutional Change

A recent CCAFS study (August 2020) explores the earlier stages of this program ToC (Carneiro et al., 2020). Using a web analytics approach (machine learning on content disseminated by CCAFS using different digital platforms) and 16 qualitative interviews, this evaluative study sought to assess the CCAFS program (2012 – 2019) influence in raising awareness about climate change among program stakeholders and concludes that “CCAFS is a catalyst for action on climate change, by informing, building capacity, and mobilizing thousands of actors for adaptation solutions in agriculture.” Stakeholder interviews demonstrate that CCAFS has “laid the foundations for an agriculture-focused approach to climate change by raising the awareness of direct stakeholders, who in turn amplify the program’s purpose across countries and regions.” Such engagement has occurred across scales, from applied field researcher, engagement with governmental bodies via capacity strengthening and institutional support, through strategic partnerships with international development organizations on project design and delivery, and globally via advocacy and knowledge dissemination, creating a multiplier effect for program reach (Carneiro et al., 2020, 52–53).

The digital methods analysis also shows this amplifying effect: CCAFS-aligned messaging by partners on social media has a potential reach of 5.8 million users on Twitter and 59 million users on Facebook. Content related to CCAFS engagement on government partner websites grew by 10%(2012-2019), indicating “heightened sensitivity to climate issues” and increased policy space for agricultural adaptation in the policy agendas of countries “receiving projects” (Carneiro et al., 2020, 53). Given the centrality of strategic partnerships to the program, the study assessed the CRP’s place in the development and research sectors and found it has played a “central role bridging different actors”—fulfilling the initial vision for an Integrating CRP. On knowledge exchange, analysis of the reach of project deliverables (via hyperlink analysis) found that CCAFS knowledge had a strong reach (thousands of websites across 150 countries; strong presence on academic and research platforms; presence on social media, government, and international organization websites in the global North and South). Global public awareness (query analysis on Google Trends) also shows an upward trend in search interest in the concept of climate-smart agriculture since 2011. The concept of climate-smart agriculture was originated by the FAO,²⁰ but the stakeholder interviews indicate that CCAFS has played a key role in formulating and advancing the implementation of climate-smart agriculture frameworks (Carneiro et al., 2020).

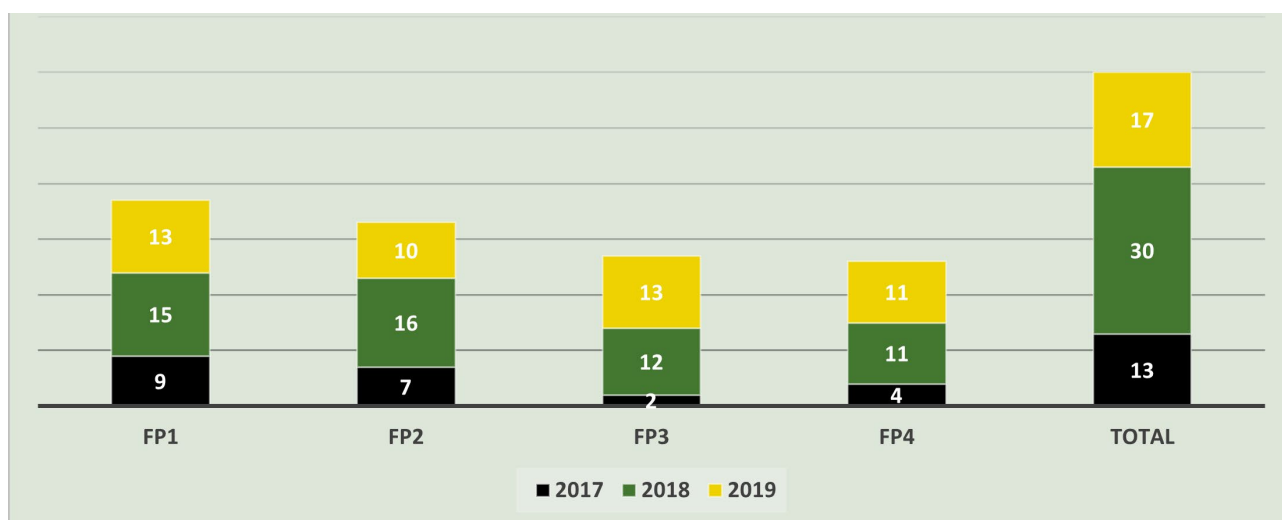
Stakeholder interviews largely confirm the findings of this web analytics study. For example, a donor stakeholder reported that CCAFS has achieved a “global presence” and has informed numerous policy and

²⁰ The concept of climate-smart agriculture was first launched by FAO in 2010 in a background paper prepared for the Hague Conference on Agriculture, Food Security and Climate Change (FAO, 2010), in the context of national food security and development goals.

investment strategies. This is confirmed by the analysis of OICRs and deep dives in Annex 14. A senior national Kenya government stakeholder, Ministry of Agriculture, Livestock and Fisheries, stated that CCAFS has “many best practices on climate-smart agriculture,” has supported policy development in relation to low-carbon development, supported the concept of the nationally appropriate mitigation action (NAMA) for the dairy sector, led to the establishment of a national multistakeholder platform on climate-smart agriculture, and informed submissions to and capacity in negotiations in the UNFCCC via capacity-strengthening work with the African Group of Negotiators.

Overall CCAFS has delivered 58 policy contributions (MARLO, see Figure 1 and Annex 8), with a majority achieving level 2 (policy or law enacted) and 4 achieving level 3 (impact on people/environment of changed policy or investment environment). Strikingly, many more policy contributions are made at the national level (32 of 58, Annex Table 9.1) than at other levels (global, regional, or subnational), suggesting that the national level is the critical place to affect policy change. The policy contributions are wide-ranging in nature and reflect the importance of sustained interaction with policymakers and the critical role of the regional teams as interlocutors, coordinators, and identifiers of policy and investment opportunities (stakeholder interviews). The regional teams work proactively and responsively to ensure close alignment between decision-maker interests and priorities across scales—especially sub-national, regional, and global scales, though the landscape level could receive more attention. Policy contributions were highest from East Africa (16) and Southeast Asia (15). Unsurprisingly, FP1 made the highest number of policy contributions (35). Many of the policy contributions reported include advances in implementation rather than pure policy formulation—this is important given the risks of non-implementation that bedevil policy processes in low-income countries. These figures do not capture the scale of the policy contributions or their potential to contribute to transformative change. Assessing relative contribution to policies is notoriously challenging, yet it is critical to achieving systemic change. In 2020 CCAFS is belatedly undertaking a meta-analysis to more fully map and interrogate the policy and investment contributions achieved in Phase II.

Figure 1. Number of policy contributions by flagship and year



Source: Dashboard data pre-analyzed by CAS

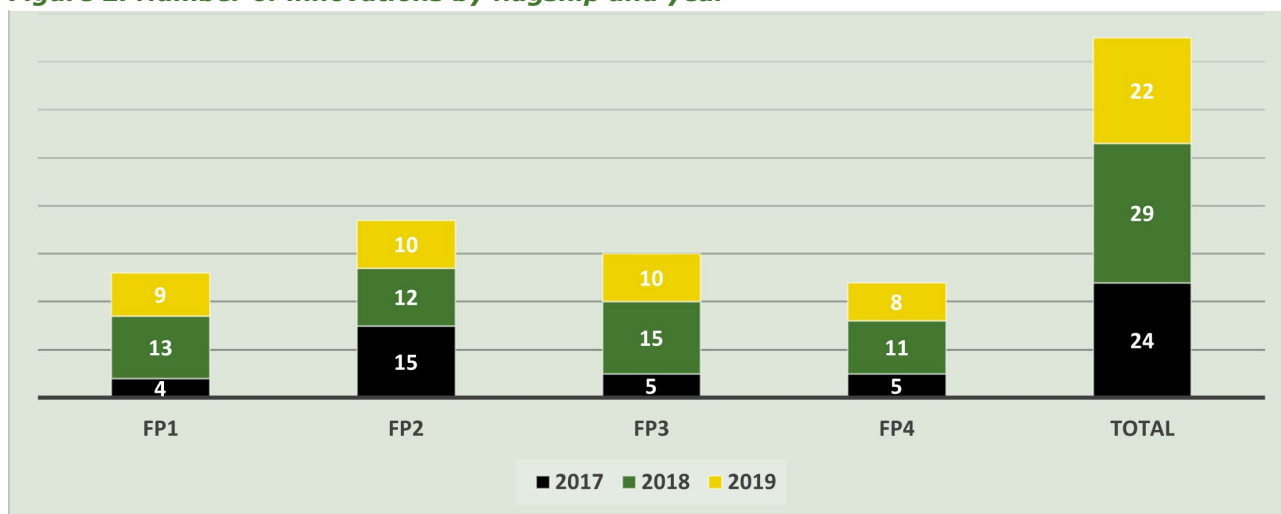
2.2.4.3 Outcome Evidence: CSA Implementation

There are two routes by which CCAFS can catalyze CSA implementation. First, this catalyzing effect can occur directly via the CSVs, in which CSA technologies and practices have been tested, best bets identified, and scaling mechanisms tested and encouraged. This route involves changes in attitudes, capacity, and practices and ultimately affects climate adaptation, agricultural productivity and food security, and mitigation. Second, it can occur indirectly through CCAFS work to influence policies and investments. This route involves not only changes in attitudes, capacity, and practices, but also scaling and impact among broader sets of stakeholders—e.g., national-level decision-makers, impact investors, development banks, and public-private agrocommodity initiatives.

Evidence reported in MARLO and dashboard data pre-analyzed by CAS shows that CCAFS produced 74 innovations (2017–19). Innovations in research and communication methods and tools include the Global

Community Seedbanks Platform, a new method for measuring GHG with closed chambers at nighttime, and the Food Security and Drought Monitoring and Early Warning Tool. Innovations in production systems and management practices include the use of rooftop rainwater harvesting system (RWHS) to irrigate home-based vegetable gardens in Laos and climate-related risk maps and adaptation plans for rice production in Vietnam’s Mekong River Delta. Examples of social science innovation are the platforms for CSA in Honduras; the local technical agroclimatic committees (LTACs), which generate climate forecasts and crop response; and tools to integrate and measure gender equality in monitoring and evaluating climate services. No biophysical innovations were reported. A majority of these innovations have reached stage 3—i.e., they are available for uptake—with 16 at stage 4 (uptake by next user). Twenty-four have global relevance, and 28 have national relevance (Dashboard data, pre-analyzed by CAS; MARLO). Geographically, the largest number of innovations are located in Southeast Asia and South Asia, closely followed by South America and East Africa. Unsurprisingly, most innovations were generated by FP2.

Figure 2. Number of innovations by flagship and year



Source: Dashboard data pre-analyzed by CAS

2.2.4.4 Outcome Evidence: Flagship Impact Pathways

The review team undertook a rapid exploration of FP impact pathways and the connection to the overall CCAFS program ToC. While the program is more than the sum of its parts, assessment of the FP contribution and scrutiny of relevant impact pathway assumptions and the hypotheses linking these to the program ToC present insights and help to build a contribution story. These have been developed by the review team but iterated with FP leaders for error checking; see Annex 10 for the detailed analysis. In terms of the achievement of outcome targets, as for the impact targets, there is still one year to go for the program, and the targets were set for 2022, with the program being curtailed by one year.

FP1 has been successful in influencing policy and investments, in collaboration with regional teams, due to sustained interactions with decision-makers (in policy, investment, and programming). It has strengthened capacity in areas such as national adaptation planning, foresight, and scenario capacity and their application in planning, in advancing national and regional CSA policies, including attention to gender and social inclusion, and investment in CSA. FP1 has significantly exceeded its targets on several outcome indicators, reporting that it achieved 273% of the target to inform 11 policy decisions based on CCAFS science and engagement, influencing 30 policies. Similarly, the quantity of investment influenced exceeded the target by 111%. However, targets relating to nutrition and gender are lower than anticipated, although climate and nutrition studies have been conducted with A4NH. The significant outcomes identified for FP1 for which there is some evidence are as follows: capacity strengthening for key CSA stakeholders; embedding of science-policy engagement and capacity via multistakeholder approaches; priority setting, foresight analysis, and scenario research input into relevant policy processes; national and regional policy design and implementation on CSA, including gender and social inclusion; promotion of investments in CSA in low- and middle-income countries, and input into food system planning and investment by climate and nutrition studies. The significant outcomes (to the extent evidence is available) confirm the hypotheses linking FP1 to the program ToC—i.e., that CCAFS science and engagement by FP1 can inform decision-makers’ decisions and encourage scaling. To add rigor, more evidence should be collected on the contributions of FP1 and CCAFS to change in relation to policy and investment cycles, on the actors involved, and on alternative explanations of change.

FP2 has facilitated innovations in, and scaling up of, participatory CSVs in many countries around the world. CCAFS reports that it has significantly exceeded several outcome-indicator targets. It has tested and/or evaluated 94 CSA practices across the CSV network, assessed gender dimensions for 63, and assessed mitigation potential for 45. There are diverse outputs communicating the results (AR, 2018; MARLO and CCAFS website). For some practices there has been significant scaling (e.g., crop residue management in India, which has increased incomes for 2 million farmers). CCAFS reported testing/evaluating 64 practices across the CSV network in 2019, of which 20 were assessed for gender dimensions and 14 were assessed for mitigation (AR, 2019). A CSA Monitoring Framework was established and scaled out across the CSV network. On one outcome indicator, “number of sub-national public and private initiatives providing access to novel financial services and supporting innovative CSA business models,” CCAFS provided figures that indicate underachievement, but analysis of ARs and FP leader feedback identifies much greater achievement: the FP reached 24 organizations (AR, 2018) in different African countries., had significant influence in Central America through the development of a Climate-Smart Agriculture Strategy and mainstreaming of gender considerations (AR, 2019, interviews), and influenced national strategies in Myanmar and Tanzania. The annual reporting and independent review process (ARs 2017–19) evaluated 22 OICRs to which FP2 contributed as good or excellent in achieving different levels of maturity. Significant outcomes identified for FP2 (according to available evidence) are as follows: (1) extensive participatory evaluation of CSA practices and technologies, and development and scaling of the CSV approach in Cambodia, India, Laos, Myanmar, Nepal, Philippines, and Vietnam; (2) improvement in the capacity of diverse public-private sustainable commodity initiatives to incentivize CSA practices that benefit smallholders; (3) improvements in subnational government capacity on climate-smart agriculture; (4) success in informing policies, investments, and CSA business models to scale CSA practices²¹; and (5) better understanding of the gender impacts of CSA and approaches to gender-sensitive CSA monitoring.

The available evidence indicates that most of the main impact pathway assumptions have held true: for example, CSA does require capacity for context-specific approaches, supported by enabling policy and finance. Improved evidence and engagement with stakeholders respond to national and international demand (stakeholder interviews, OICRs, ARs) and have led CCAFS science and engagement to inform the quality of policies and investments. The extent to which investments are newly catalyzed or improved could be further reported on. Assumptions relating to CSA and its attractiveness to young people require greater scrutiny. Work on gender has explored and raised awareness about the gender dimensions of CSA and the assumptions involved (e.g., relating to labor-saving technology and women’s empowerment). There are differing perceptions of the degree to which mitigation is integral to the CSA concept and a priority in LMICs. CSA as a concept retains currency, but one stakeholder suggested that other concepts are also gaining traction (e.g., regenerative agriculture, nature-based solutions), and CCAFS should help clarify overlaps and divergences. With regard to the hypotheses linking the FP to the overall CCAFS ToC, there is some evidence that context-specific knowledge can lead to CSA at the local level, but the evidence is somewhat fragmented. Further, CCAFS’s focus on sustainable finance as a route to scaling has been valuable, but other critical aspects of the enabling environment and levers for change have received less attention.

FP3 has been highly strategic, contributing to raising low-emissions development (LED) momentum, engaging in global priorities, and fostering a strong group of Centers working on mitigation. Overall, FP3 has contributed to growing understanding of the potential for mitigation to be part of LED, with a growing focus on finance. More emphasis on the private sector and the World Bank has emerged in Phase II. The cost of measuring GHG emissions of specific crops and locations has shifted the focus toward the use of simple calculators and tools, but the uncertainties remain high, which holds back action in practice. The program has experienced challenges with respect to the relative focus on mitigation compared with adaptation by donors and, to some extent, internally within the program. More impact evaluation evidence is forthcoming. Future priorities focus on MRV and updating the NDCs.

FP3 reports that it has exceeded most of its outcome targets in terms of low-emissions plans developed, number of agricultural development initiatives influenced, and millions of hectares targeted by research-informed initiatives for restoring degraded land or preventing deforestation. On two indicators achievement is far below the targets: (1) policy decisions taken (in part) based on engagement and

²¹ Examples of such policy influence can be found in Kenya, Myanmar, and Vietnam. Informing-investment examples can be found at the national level, but also via technology-oriented approaches, and one impact investment mechanism innovation. Legislative innovations have been facilitated—notably, advancing implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture—in Bhutan, Burkina Faso, Costa Rica, Côte d’Ivoire, Guatemala, Nepal, Rwanda, and Uganda. Examples of CSA business model innovation and scaling also exist, such as the Happy Seeder technology promoted in India via public-private collaboration.

information dissemination by CCAFS, and (2) the number of organizations adapting their plans or directing investment to increase women's participation in decision-making about LED in agriculture. However, there is time for these figures to increase during the remainder of the program. Two OICRs achieved level-3 maturity (i.e., impacts at scale or beyond the direct CGIAR sphere of influence): the scaling of alternate wetting and drying technology and the adoption of the Happy Seeder technology, which contributes to GHG reductions. One OICR achieved level-2 maturity (i.e., impacts on policies or practices within the sphere of influence, such as at the project level).

Significant outcomes identified are as follows: (1) analysis of the potential of agroforestry for mitigation to inform revisions to nationally determined contributions and catalyze future investment; (2) advancement of mitigation in livestock sectors; (3) provision of a tool to assess GHG emissions in agricultural supply chains and engagement with investors to promote changes in corporate supply chains; (4) data generation, model validation, and training on the estimation of methane emissions from livestock; (5) input to UNFCCC negotiations in relation to facilitating a consensus on agriculture; and (6) support to donors to assess the GHG emissions of their own portfolios. Challenges have arisen with respect to addressing gender relations and advancing efficient reductions in GHG emissions, although some gender studies have been undertaken. In Kenya, work is still ongoing on the NAMA to integrate gender in the Dairy Board's gender strategy.

Available evidence suggests that the FP3 assumptions have largely held true: appropriate agricultural development programs and policies in target countries exist, and relevant decision-makers have been willing to implement LED, at least in certain geographies and sectors. Highly relevant information has been delivered to donors, the World Bank, and national policymakers on practices to reduce GHG emissions, viable business models, and enabling conditions. Hypotheses linking the FP to the program ToC have also largely held true: LED practices for agricultural landscapes and value chains have been shown to have potential to significantly reduce GHG emissions while also improving rural food security and livelihood options. The program has not worked extensively at landscape scales except in Vietnam (Mekong River Delta). Governments, the private sector, and donors have made large-scale investments in LED policies and programs, and there is some impact evidence at the farmer level, although impact studies have been delayed by COVID-19.

FP4 has expanded understanding of how to deliver effective climate information service systems, with significant outcomes in Ethiopia, Rwanda, Senegal, and Latin America. Work on flood insurance adoption has advanced, and randomized control trials are underway to test different models, but these must be based upon multiple seasons of farming. It reports significantly exceeding one target: "number of institutions using CCAFS research outputs for services supporting farm households." It has made good progress on two other indicators. Policy decisions have been influenced by CCAFS, although only 60% of the target has been achieved to date. Data have not been made available on the new investments catalyzed, although a study has been commissioned on this. The indicators do not include the proportion of farmers receiving climate services and insurance. For FP4, 11 OICRs were evaluated as good or excellent and hence included in the annual reports (2017–19); they achieved a range of maturity levels, but most were at level 2.

Significant outcomes identified are as follows: (1) improved climate information services to Rwandan farmers via capacity strengthening of national agricultural extension services; FP4 views the work in Rwanda as highly comprehensive, addressing different systemic challenges and opportunities (interview); (2) development of sustainable climate service business models in Senegal; impact evidence from Senegal is the most robust but could still be improved (see deep dive); business models have been delineated but need further testing; (3) expansion of local agroclimatic committees in Latin America informing farmer decision-making for livelihood benefits; (4) improved climate forecasting for agriculture in East Africa; continuing work includes a contribution to the establishment of a Digital AgroClimate Advisory Platform (EDACaP) in Ethiopia; and (5) improved understanding of gender-responsive climate information services (CIS). Note that work on gender has become stronger during Phase II from a slow start. A postdoctoral researcher with the Gender LP/FP has supported FP4's inclusion of gender equality in monitoring and evaluation of climate services (Gumucio et al., 2018), developed a checklist of gender considerations for climate services and safety nets (Gumucio & Schwager, 2019), and produced a peer-reviewed review of gender-responsive CIS (Gumucio et al., 2020). There is also an innovative research study of gender and insurance in Ghana, but it lacks clear relevance to policymaking.

FP4 is working to advance insurance approaches on the international agenda. These approaches tackle risk for smallholders as part of a broader portfolio of risk management strategies, but there are challenges with index-based insurance for smallholders, and scaling has been an issue. FP4 is helping to build the global policy agenda by pushing for the Global Commission on Adaptation to promote digital advisory services and has guided climate service investors in India, Sri Lanka, and Nigeria. These are

significant influences on policies and investments, but more evidence is needed on how the degree to which such policies and investments lead to positive outcomes. FP4 has supported 40 institutions in their use of CCAFS science to support farm households' management of climate risks. It has influenced 26 policies and generated 23 innovations (8 taken up by next users). While the COVID-19 pandemic has created delays, it has also signaled the importance of bundling health and agricultural extension services (interview). Work on gender has advanced lately through analyses of gender-responsive approaches to insurance.

The FP4 impact pathway assumptions have largely held true: (1) interest in climate services and insurance by governments, development organizations, and funders has grown significantly globally during the program, and there are strong indications this will continue, with the FP contributing to this rise up the agenda; (2) partnerships have been sustained with diverse organizations, globally, regionally, and nationally; and (3) the investments being made are responsive to evidence. In terms of the overall hypotheses linking the impact pathway to the overall program ToC for CCAFS, the evidence is positive. In particular, when digital technological innovation is scaled up, there is evidence that climate information services are benefiting farmers by improving their farm management practices and their livelihoods (Rwanda, Senegal, and Latin America).

2.3 Future Orientation

CCAFS, having established an effective way of working with momentum building, has strong prospects for the future, but there are some risks.

2.3.1 Strengths in Terms of Future Preparedness

COVID-19 has delayed projects and impact assessments, although the program is making adaptations to the extent possible. Volatility in funding and curtailment of the program will also affect CCAFS's ability to achieve its set targets for 2022. The establishment of CCAFS as an Integrating CRP in Phase II, with a PMU located outside of any specific Center, combined with a strong collaborative ethos and impact orientation, has attracted strong talent, including strategically selected external partners that bring fresh perspectives and skills and help to amplify influence. Despite having a complex structure, the institutional arrangements have operated effectively because of effective leadership, strong talent within the team, a collaborative and outcomes-oriented ethos, and recognition of the importance of the complementarity between the regions and scientists—scientists who often have an action research mentality. A strong focus on communications has helped to amplify the impact of CCAFS's work.

Critically, a great deal of its effectiveness stems from its ability to work across scales, ensuring that it has a clear demand-led orientation. Many decisions are taken at the national level, and strong engagement is essential at this scale, but global reach is also critical—for example, in global UNFCCC negotiations and with the Global Commission on Adaptation—as is the ability to work at more localized levels to facilitate bottom-up processes of action research and voice.

As new issues have risen up the policy agenda, CCAFS has been agile and brought in new skills. Examples include enhancement of sustainable finance expertise and engagement of humanitarian agencies on the climate-conflict-peace-building nexus. Innovative approaches to building the capacity of partners and co-designing actions to respond to perceived challenges include secondments of staff to other organizations, support for social learning processes involving multiple stakeholders, post-graduate positions, graduate training schemes, and South-South learning exchanges.

A more coherent program design requires flexible resources and freedom to create a ToC that is nested within the overarching CGIAR ToC but has a clear internal logic that is well articulated in causal stages and identifies the actors and rules involved. CCAFS has had facilitative and strategic leadership (appreciated by a range of stakeholders), and this kind of leadership and incentives/requirements for collaborative working by researchers and engagement specialists should be taken up by CGIAR. CCAFS has innovated in terms of internal management systems (e.g., project selection, independent evaluation of Outcome Impact Case Reports, development of a more outcome-oriented reporting system), but the reporting system has many weaknesses. In the future CGIAR should embrace and learn how to embed ToC approaches in planning, monitoring, and learning loops for adaptive management and also support the creation of a stronger "contribution" claim for the CCAFS program, which reviewers and evaluators can then validate and assess.

Engaging the private sector is relatively new for CCAFS, which has recognized that the private sector can leverage scarce aid resources and has wide influence and resources, but requires rapid responses from the scientific community. It is questionable whether it is the role of CCAFS to work with individual private

companies to meet companies' capacity needs on CSA. Assumptions relating to pre-competitive collaboration initiatives should also be scrutinized from a political economy and effectiveness perspective. Other actors, such as media, could potentially be engaged more in the future, not as consumers of outputs but as stakeholders and targets for capacity strengthening.

CCAFS is aligning with the transformative change agenda, which is part of current development thinking, helping to amplify understanding of and attention to more systems-based thinking with respect to food systems. Its recent publication and event on transforming food systems helps build the research agenda, although it would benefit from stronger political economy analysis and more detailed reflection on defining what transformative change is and whose definitions count. More attention is needed on a broader range of levers and stakeholder partners for effective action. One example is the strengthened work on sustainable finance, but there are others to explore.

The ambition is necessarily and correctly high, and adequate resources should be dedicated to such an existential challenge for humanity. However, a coherent program also needs flexibility and cohesive design, underpinned by a stronger analysis of how change happens and who should be involved and based on a recognition of the scale of the changes required and the specific contribution areas that CCAFS seeks to make. There are many other areas to tackle, such as aquaculture, and more work is needed on nutrition (in collaboration with A4NH), although issues over mandate, as well as limits on resources, currently give limited scope for CCAFS to engage.

CCAFS is well prepared on gender and CSA, although more capacity is needed to continue to advance awareness raising and policy and investment contributions. The focus on youth and on intersectionality, in general, has been less strong. Insights from gender-transformative approaches, feminist thinking, and political economy/ecology should be combined to inform future transformative change work.

This approach has leveraged its resources well to amplify its effects, achieving a global presence, for example through UNFCCC global negotiations.

2.3.2 Potential Risks and Challenges Ahead

There is an undeniable risk of further disruption from COVID-19 pandemic during the remainder of the program. While program management, which has operated on the basis of remote contact and virtual meetings for some years, is well adapted to COVID conditions, there have been and will continue to be disruptions to and constraints on fieldwork, including important data gathering for end-of-program impact assessments and syntheses.

Funding volatility and cuts can be an issue and have taken a toll on the operation of partnerships. The program has been quite successful in leveraging donor resources, but this can sway the focus of the program away from globally or nationally agreed agendas and the program's own vision of how it will contribute.

There are concerns within the program that future One CGIAR plans will affect the momentum of the program in its final year and that future plans may not build on the aspects of CCAFS's approach which has led to their success in tackling climate-related challenges in agricultural adaptation and mitigation and food security. The uncertainty over the future also means the program risks losing talent in its final year.

As a flight-intensive development organization working on climate change, it has responsibilities with respect to its carbon footprint. The PMU implemented a carbon action (paying debts to nature in an East African institution), but it is not clear whether this action includes other steps for justifying and reducing GHG from air travel. CGIAR does not have a carbon policy with respect to air travel.

2.4 Cross-cutting Issues²²

2.4.1 Capacity Development

Capacity development (CD) is central to CCAFS's way of working with partners and its ToC. Many of the hypotheses and assumptions underpinning the ToC pertain to capacity strengthening, although capacity is not articulated as a causal step. CCAFS envisions capacity development among researchers and research users at individual, organizational, and institutional levels. In Phase II, CCAFS builds on extensive Phase I work to assess national capacity needs. The CD strategy includes (1) development of

²² Climate change itself is regarded as a cross-cutting issue at the CGIAR level, but it is not treated separately here as it the central theme of the entire program.

learning materials and approaches, (2) gender-sensitive approaches, (3) institutional strengthening, and (4) organizational development. The annual reports do not report systematically on these categories, instead focusing on numbers; of greater value would be an improved ToC and monitoring of practice changes and learning. To support the assessment of overall progress, evaluative scales for achievements in capacity strengthening are also desirable.

A 2017 assessment of CCAFS capacity strengthening found that 44.56% of CCAFS capacity development outputs were scored as “significant,” 4.21% as “principal,” and 51.23% as “not addressed”; 14,276 participants received CCAFS support (41% female). Research capacity among NARS was the priority. The capacity of developing-country researchers was advanced through the Climate, Food and Farming (CLIFF) program via PhD scholarships; a partnership with Global Research Alliance on Agricultural Greenhouse Gases (GRA) created three new years of funding and a broader network of host centers and participants. Attention to subnational capacity strengthening in Colombia, Ethiopia, India, and Vietnam increased, building on participatory action research processes in CSVs. The CSV research was used to inform major West African development projects (which themselves work with 780,000 farmers, of whom 36% are women) and the National Adaptation and Mitigation Initiative in Agriculture (AMIA) in the Philippines. In the latter, regional focal persons in the Philippines (department of agriculture, local government) received CCAFS support. Globally, South-South cooperation involved a diverse set of partners enabling participation in the UNFCCC negotiations, and capacity-strengthening on CSA prioritization, index-based insurance, and MRV for livestock emissions in UNFCCC processes. Regional and national capacity strengthening to implement NDCs, CSA, ITPGRFA, and the Nagoya Protocol and national capacity on MRV, scenarios development, and CIS was improved (AR, 2017).

In 2018 a much larger number of participants in CCAFS capacity-strengthening activities was reported—over 700,000²³—largely driven by the Rainforest Alliance and the Ghana cocoa sector collaboration on CSA extension practices for farmers and extension staff, and the training of 881 intermediary professionals in integrated climate services for agriculture (54,000 farmers were trained to respond to climate information). CCAFS provided training materials for NDCs, 20 countries gained Tier 2 method knowledge for estimating livestock emissions for MRV for NDC processes, and Cambodian parliamentarians were supported in knowledge exchange on climate, policy, and politics. Thirty-three CLIFF-GRADS fellowships were awarded to PhD students from the global South, including 17 women, and 9 received awards to conduct research (5 women). Globally, capacity strengthening continued in the UNFCCC negotiations, national adaptation plans (NAPs), and NDCs, including gender mainstreaming training for AGNES members and collaboration with countries in Southeast Asia on resilience to inform NAPs and NDC processes. New for 2018 was the engagement of the private sector via a joint workshop facilitated with the WBCSD, in which large global corporations were trained on CSA metrics, and a collaboration with the Council of Smallholder Agricultural Finance members to incorporate climate and deforestation risks in loan due diligence processes (AR, 2018).

In 2019 CCAFS reported that 29,732 participants benefited from CCAFS capacity-development activities (17,169 participated in formal training).²⁴ Capacity strengthening on scenario-based planning was undertaken in Cambodia, Costa Rica, El Salvador, Guatemala, and Honduras. National science-policy dialogue platforms were facilitated (Mali, Niger). Support continued to countries to develop their NDCs, national inventories, and MRV systems (China, Colombia, Cuba, Ethiopia, Kenya, and Vietnam). Gender and climate policy training was held with national policymakers in East Africa, including a dedicated awareness-raising workshop with parliamentarians in Tanzania. Capacity strengthening on IRI’s Maproom tools for agricultural decision-making was supported in Rwanda (for national and local governmental staff). LTAC approach training was conducted (Colombia, Guatemala, Honduras, Paraguay). Gender, youth, and smallholder-related capacity strengthening included collaborations with coffee cooperatives (Latin America), climate-smart rice production training for extension staff (Vietnam), youth productivity training with a dairy company (Colombia), and gender-sensitive CSA training nationally (Guatemala) and regionally (Consejo Agropecuario de Centroamérica [CAC], Sistema de la Integración Centroamericana [SICA]). Assessment of the CLIFF-GRADS scheme found positive outcomes for graduates.²⁵

²³ AR 2018 figures are for 292,362 female participants in short-term programs, and 398,035 female participants in long-term programs, with 412,125 male participants in short-term programs, and 306,452 male participants in long-term programs.

²⁴ AR 2019 figures report 11,480 female participants in short-term programs, and 5,059 female participants in long-term programs, with 12,000 male participants in short-term programs, and 5,090 male participants in long-term programs. PhDs are reported as 23 (men) and 16 (women).

²⁵ From 2011 to 2018 54 graduate students were supported, including 48% women. They generated 31 publications, 80% of respondents applied their new skills and knowledge in their work, and 71% could initiate innovation in their work, increasing their effectiveness.

2.4.2 Gender

Gender equality, the key concept used in much of the academic and practitioner literature, following a UN Women definition (UN Women, n.d.), reflects a rights-based approach in the CCAFS program, although affirmative action to enable processes of gender equity could be strengthened. Gender-transformative approaches are being promoted within CCAFS, and there are significant research, policy, and investment contributions, but there is some unevenness across the FPs in terms of capacity and progress, which vary over time. Targets were set in relation to gender and the sub-IDOs (Program Proposal, 2016), but CCAFS has provided no assessment of progress. Some of the policy work is still at early stages, and overall a stronger contribution story could be created for work on gender, jointly developed by the FP leaders and RP leaders in collaboration with LP5 and underpinned by evidence that reaches further along the ToC than is currently the case.

Collaboration has occurred with all of the FPs, but the extent of collaboration, the reach of LP5 into each FP, and the capacity within each FP has varied, including variation over time. For example, there is currently less dedicated expertise within FP1, whereas an FP4 gender post-doc gave it substantial capacity on gender. In terms of the regions, there are strong instances of empowering women through CSVs and different approaches in Latin America, South Asia, and West Africa, including in women's self-help groups, community-embedded land management committees, and community approaches. The post-doctoral position located within an FP has been an effective means of strengthening capacity within the FPs. Overall, within CCAFS understanding has grown of the critical importance of addressing gender and promoting gender research, including significant consciousness-raising on the part of at least one high-level CCAFS staff member.

Significant outcomes include (1) advancement of conceptual frameworks and understanding of gender and CSA; (2) monitoring and learning on gender and climate-smart agriculture and CIS; (3) research on newly emerging topics, such as gender and climate information services; (4) advice to donors, investors, and policymakers on gender and CSA; and (5) synthesis of lessons on gender and climate change to build a research agenda. See Annex 11 for more details.

Budget cuts in 2018 affected work on gender across CGIAR, with a loss of capacity and commitment; prior to that point, all CRPs had to allocate 10% of their budget to gender, but this requirement was dropped. This change affected all CRPs, not only CCAFs. At the same time as the gender platform was planned (now established), there was a loss of representation of gender expertise in the SMO and then the position of senior gender adviser was eradicated. While the platform plays an important role in promoting gender research and acting as the voice of gender researchers in CGIAR, it does not substitute for representation at the most senior governance level.

As with the ToC and reporting for CRP as a whole, it is also the case that there is limited synthesis of the gender contribution story, CCAFS would benefit from greater and more systematic analysis of the evidence, gaps, and assumptions; this would also require unpacking the ToC from a gender perspective. The hypotheses linking the FPs to the TOC should be interrogated based on available evidence along outputs and outcomes of the ToC.

2.4.3 Youth

Working with youth is an important strategy for achieving the sub-IDOs on equity and inclusion (Program Proposal, 2016). CCAFS planned to address youth and CSA both as an integral part of LP5 activities in CCAFS research and as part of scaling up CSA activities and in targeted youth-focused strategic research across FPs and regions. Key activities envisaged included disaggregation and analysis of data across activities; strategic research on youth engagement in policy and how to improve it at global and national levels; an examination of the role of youth along CSA value chains, including collaboration with agrifood system CRPs to build attractive off-farm opportunities for inclusion; research on ICTs, youth, and CSA and climate information services to promote entrepreneurship and climate resilience; and capacity-strengthening through participatory learning approaches with youth (Program proposal, 2016, and Youth Strategy, 2016). FP activities were tracked for 2017 and 2018.

To date, there has been significantly less progress on youth than on gender, partly because of budget cuts, according to the program director (interview), but also because of lack of prioritization (AR, 2019). The work remains urgent and important given the youth bulge, outmigration from rural areas affecting rural populations and agriculture, and climate challenges, and the lack of global research more generally on such issues. Challenges have arisen in the lack of prioritization of staff time and resources. The youth research undertaken so far has had insufficient analysis of intersecting forms of discrimination—e.g.,

gender, ethnicity, (dis)ability, and socioeconomic levels (AR, 2019). Further strengthening of age-related topics (including CSA-impacts on the elderly) and intersectional analysis is desirable.

The FPs all address youth issues in different ways and with variable levels of expertise, although some support is provided at conceptual levels and in guidance from the LP5 leader. Some outcomes are relevant to youth, but some of these are still underway or have yet to be published, so more time is needed to assess their effectiveness. Overall, the program shows comparatively less progress and effectiveness on youth issues. Few CRPs address youth issues in a significant manner.

Key outputs include (1) research on youth, climate, and migration in East Africa; (2) youth participation facilitated in global and national climate policy processes; (3) analysis of gender and youth issues in rice production in North, Central, and South Vietnam; and (4) young women and men's opportunity spaces in dairy intensification in Kenya. Most significant outcomes identified relate to the facilitation of individual and collective youth agency and livelihood benefits from climate-smart agriculture, through participation in CSV processes and their scaling through mainstreaming processes. Examples can be found in Cambodia, Colombia, Ghana, India, Laos, Myanmar, Nepal, Philippines, and Vietnam. In the latter, collaboration with public and private agencies on a new CIS business model has created livelihood opportunities for youth. A new impact investment vehicle in Brazil, which CCAFS helped to establish, includes a focus on youth-led initiatives. See Annex 12 for a more detailed analysis of youth-related outputs and outcomes.

3 Conclusions and Recommendations

3.1 Quality of Science

3.1.1 Quality of Research Inputs

Based on interviews with CCAFS management, partners, and stakeholders, analysis of citations and related data, and assessment of a small sample of articles, we conclude that CCAFS benefits from high-quality inputs, especially a grouping of researchers, including some who could be regarded as thought leaders, with notable diversity in terms of disciplines (though skills in political economy and qualitative research/ethnography could be better represented). Through its network of partners, the skill base is also diverse in terms of countries of origin and affiliation, which boosts CCAFS's legitimacy. Lack of gender diversity among research project leaders (though less so among CCAFS management itself) is a concern, but one not seen as within CCAFS's mandate to remedy.

3.1.2 Quality of Process (including Partnerships)

CCAFS enjoys processes and partnerships that ensure that its research is relevant to a variety of next users and is both credible and legitimate. These include its perceived independence from CGIAR Centers, its complex but effective management structure with FPs, RPs, and cross-cutting LPs, and its mutually cooperative relations with both Northern and Southern partners.

3.1.3 Quality of Outputs

The quality of research outputs is high, although in citation terms this is skewed by the inclusion of heavily multi-authored review-like articles. CCAFS articles are published in a wide range of high-quality journals, though it would be beneficial to further target (1) ultra-high-quality journals such as *Nature* and *Science* and (2) journals in the social sciences, particularly development studies, and economics. Direct assessment of a very small sample of articles gives a picture of a wide range of high-quality and original research across the FPs and LPs. Direct assessment of a small but very diverse sample of technical publications and communication products shows high quality and high relevance to users.

3.2 Effectiveness

3.2.1 Achievement of Planned Outputs and Outcomes

Overall, CCAFS has delivered a majority of its milestones, with fairly even contributions by the different FPs. The limited areas of slower delivery are partially explained by budget cuts, political instability, or

logistical issues. A large number of innovations in research and communication methodologies and tools have been delivered (74), most of which are available for use or in use. The innovations have global relevance and emanate from across the regions. On policy contributions, a wide-ranging set of policies have been influenced at different stages of the policy cycle, across multiple countries, although budget cuts reduced the numbers in 2019. CCAFS produced 38 independently reviewed OICRs. Fewer legislative or curriculum contributions were reported, but one of the legislative interventions was strategic in nature. Most policy contributions occurred at the national level, but there were also important global, regional, and subnational examples.

3.2.2 Demonstrated Importance of Outcomes

The importance of outcomes can be assessed using the most significant outcomes analysis and the deep dive OICRs. The three OICR deep dive studies all loosely align with the overarching program ToC, although that itself is fairly abstract. Even though the evidence could be more closely mapped to the ToC, all three provide evidence that CCAFS has contributed to anticipated outcomes and that it has played a key role in raising agriculture up in the climate policy agenda and gender-transformative approaches. It has done this by identifying evidence-based, practical solutions, and exploring effective scaling approaches. While many other organizations engage in this field, CCAFS has a fairly unique position in having both a strong capacity for science generation (including both basic and demand-led action research) and a global presence across five regions over an extended period, and it has a fairly sophisticated understanding of policy and investment influencing. The CSV approach has proved popular and is being scaled up in diverse countries, although work at the landscape scale has so far been limited. Work has recently grown on sustainable finance and on partnering with the private sector on CSA metrics, but there is limited recognition of the political economy questions associated with different socio-environmental trajectories, and there are unanswered questions about whose interests are advanced through such collaborations. The most significant outcomes assessment points to a similar overall conclusion. There is evidence to support each of the significant outcomes, although some of the evidence is fragmented and currently hard to find. The rigor of impact assessments varies, but overall there is sufficient evidence to support the conclusion that substantive outcomes have been achieved and there is more to come in the remaining year and post-program.

3.2.3 CRP Management and Governance

Overall, the management and governance approach has strongly supported the CRP's effectiveness. The matrix integrating institutional arrangement, linking FPs and regional teams, is complex and requires coordination but has generally worked well. Success has stemmed from several factors. The location of PMU independent of any specific CGIAR Center bolsters its identity on the global stage; amplifies its reach and influence, such as the consolidated presence at the UNFCCC COPs; and encourages coordination among Centers and collaborative work on shared research and engagement challenges, although this is not completely without tensions. The regional teams, acting as coordinators, add substantive research track records and facilitate responsiveness to national and regional policy priorities. The strategic selection and engagement of external partners brings fresh talent and perspectives. CCAFS has a supportive ISC advisory function and uses internal efforts to reflect on what works. It facilitates an outcomes-focused culture, relying upon sustained interactions with decision-makers. It innovates in management systems and processes, including in research project selection, collection of OICRs, and independent evaluation. It follows a facilitative style of leadership with a clear vision focused on effective science-policy interactions to ensure that research is relevant and credible, and it has a strong focus on communications. There are still limitations in the coherence of the program design and in terms of the budget over which the director has control. The reporting system is not adequate for a ToC-based assessment of relative contributions in a meaningful manner. A dual reporting system was imposed on CCAFS, adding complexity, and creating duplication. A lot of evidence is collected, but theory-based design, monitoring, evaluation, and learning is far from being fully realized in the program. Budget volatility and the influence of donor funding can affect program priorities, and the cuts have taken a toll on partnerships, but the handling of cuts has been effective. The program has responded well to COVID-19 challenges, but some delays to projects are inevitable.

3.2.4 Progress along ToC (CRP and Flagships)

The program ToC is too high level and abstract.²⁶ It does not articulate the causal steps of the different outcome stages (e.g., attitudes and norms changes, capacity, and practice changes, as well as scaling

²⁶ Regional ToCs and FP impact pathways were developed, but these also have flaws.

processes) and the actors and rules that need to change in order to achieve desired goals. Assumptions are of limited value as they are quite generic and not mapped to the causal steps. The evidence demonstrates that CCAFS has gained a global presence. It has contributed to raising agriculture up the global climate agenda, including advancing the climate-smart agriculture approach and advancing adaptation, mitigation, and resilience building in low- and middle-income countries. By working through strategic partnerships, it has attracted strong talent to its core team, including external partners. This has been key in keeping quality of science, which includes the quality of work translating science into policy, high in all FPs. It has successfully facilitated science-policy interactions through diverse partnerships based on trust, contributing to capacity strengthening, enabling more demand-led research that is appropriate to decision-makers' needs, and involving a strong impact orientation. Its approach has enabled it to have significant influence over policy and investment decision-making. There is substantial evidence of testing of technical and institutional innovations that have catalyzed CSA.

The most significant outcome analysis indicates sets of significant outcomes that the program has achieved for which there is available underpinning evidence, although of varying quality. FP1 has been successful in influencing policy and investments, in collaboration with regional teams, thanks to sustained interactions with decision-makers (policy, investment, and programming). Capacity has been strengthened in areas such as national adaptation planning, foresight and scenario capacity, and application in planning, advancement of national and regional CSA policies, including attention to gender and social inclusion, and investment in CSA. Less progress has been achieved on nutrition, although climate and nutrition studies have been conducted with A4NH. FP2 has facilitated innovations in participatory Climate-Smart Villages and the scaling up of these Villages in many countries. FP3 has been highly strategic, contributing to raising low-emissions development momentum, engaging in global priorities, and fostering a strong group of Centers working on mitigation. Diverse significant outcomes relate to agroforestry in NDCs, estimation of emissions and MRV, input into NAMAs in the Kenyan dairy sector, and support for consensus about agriculture within the UNFCCC process. FP4 has expanded understanding of how to deliver effective CIS, with significant outcomes in Ethiopia, Rwanda, Senegal, and Latin America. Work on flood insurance adoption has advanced, and randomized control trials are underway to test different models, but these must be based upon multiple seasons of farming. CCAFS's ability to tell a clear contribution story so far has been affected by the lack of coherent program design imposed by the CGIAR System. Despite the collection of large amounts of evidence, the reporting system remains fragmented and evidence has not been well synthesized to support ongoing learning or external communication.

3.3 Future Orientation

The program has strong prospects for the remaining year of the program, although COVID-19 disruption, budget cuts, and curtailment of the program will likely affect its ability to meet set targets for 2022. Nonetheless, good progress has been made on many outcome targets, and there is significant ongoing work that will advance CCAFS's contributions to positive change. The alignment of the end of the program—with its natural focus on synthesis, lesson learning, and dissemination—with the (delayed) COP26 creates exciting opportunities for CCAFS to influence and inform. There are diverse levers for transformative change; there is a need for CCAFS to continue to build out its work on transformative change with a deeper, more sophisticated understanding of political economy/ecology to inform analyses of root causes, differing values and perspectives, and potential solutions. To achieve transformative change requires addressing all systemic challenges, although this can occur in collaboration with other actors. Hence, there is a need to continue expanding engagement with different issues, types of actors, and levers for change.

If CGIAR seeks to address climate change through a purely mainstreaming approach, then there is a risk of severe loss of global presence and catalyzing influence at national levels, which CCAFS has achieved through its multi-scale, regionally grounded, and transdisciplinary approach. A mainstreaming approach is unlikely to deliver on transformative change of the kind that CCAFS is beginning to outline as a future research and engagement agenda. Regional and country programs should have a stronger presence and resourcing, to closely focus work and enable assessment of the effectiveness of research and engagement in specific geographic (if multi-scale) localities, while retaining scope for high-quality basic research. A cross-cutting function independent of specific Centers is important. Competition between the Centers and an integrating program has created tensions and undermined the effectiveness of the latter and should be addressed by CGIAR. Demand for climate change science, engagement, and outcomes will only grow. CCAFS has set out a clear vision of the future research agenda focused on transforming food systems in a changing climate context. But so far there is insufficient specificity about who is defining transformative change and on the political economy challenges involved.

3.4 Cross-cutting Issues (Capacity Development, Gender, Youth)

Capacity development is central to CCAFS's approach and its ToC, although it is underarticulated in the ToC. Achievements on capacity strengthening are significant, although the reporting is insufficiently systematic, and there are no clear targets for capacity development. Large numbers of people have participated in training and capacity-strengthening activities across all regions and FPs, from training of Ghanaian extension providers to support for NDC processes. These capacity-building interventions have also facilitated South-South cooperation and gender mainstreaming in UNFCCC negotiations. The capacity of developing-country researchers was advanced via the Climate, Food and Farming (CLIFF, later CLIFF-GRADS) program through PhD scholarships and extended research visits.²⁷

The Gender LP/FP has advanced understanding of gender within the CCAFS program during the Phase II CCAFS, despite fluctuating prioritization within the wider CGIAR System and budget cuts. There is collaborative work with all the FPs, although this fluctuates over time with staffing and levels of prioritization. The Gender LP/FP has made significant contributions to research, policy, and investment influencing, but it appears that CCAFS does not track data on progress on gender-related outcome targets. Some of the policy work is still at an early stage. A stronger contribution story could be created for work on gender and social inclusion, underpinned by evidence that reaches further along the ToC than is currently the case. A stronger feminist and political science perspective could enable CCAFS to more effectively engage on equity and questions of appropriate measures of development progress across its work, including as it engages more on transformative change. Significant outcomes include advancement of conceptual frameworks and understanding of gender and CSA; monitoring and learning on gender and CSA; research on new themes such as CIS and gender; input to donors, government policies, and global investments on CCAFS gender and CSA research; and synthesis of lessons learned on gender and climate change to build a research agenda. Still needed are more exploration of equity-focused approaches for achieving gender equality, and feminist and political science perspectives on transformative change.

There has been significantly less progress on youth owing to budget cuts and a lack of prioritization, and there is a need for more analysis of forms of discrimination that intersect with youth issues. There remain research and engagement gaps in youth in the context of climate and agriculture. The FPs are responding in different ways on the youth issue and with varying levels of expertise. There are substantive outputs, but some of this is still ongoing research or CCAFS has supported youth participation but evidence of outcomes is limited.

3.5 CGIAR System and CRP-Level Recommendations

3.5.1 Recommendations for the CGIAR System

Recommendation #1: Continue to fund targeted research and science-policy engagement on climate-smart agriculture, possibly as part of a broader, integrating effort on transforming food systems, rather than tackling climate change solely through mainstreaming in CGIAR.

Given the scale of the climate change challenges faced, it is essential that to be relevant, CGIAR builds on and learns from the CCAFS approach. Key aspects of this approach are ensuring coordination of work across CRPs; attracting high-level scientific, social science, and science-policy engagement talent to targeted work on climate change; sustaining a global presence while capturing opportunities through cross-scale working; adopting a strategic partnership approach; having a strong regional and national presence to facilitate and coordinate relevant demand-led research and policy engagement; creating a coherent program design underpinned by a well-thought-through ToC, a flexible and secure funding model, and delineated targets with designated actors and indicators; and producing high-quality science and engaging diverse actors and levers to catalyze practice change at scale in these target systems.

Recommendation #2: Integrate the climate change and nutrition agendas more closely. More work is needed at the intersection of climate change and healthy diets. The current CCAFS agenda of transformative food systems approaches could provide a basis for CGIAR work on nutrition to devote greater attention to climate projections and the socio-environmental impacts of transitions in low- and middle-income countries, while work on CSA might explore a wider range of nutritionally important crops

²⁷ Of the 54 graduate students supported (2011–18) including 48% women, generated 31 publications, 80% of respondents applied their new skills and knowledge in their work, and 71% could initiate innovation in their work increasing their effectiveness.

and foods, with cross-learning between the two areas of work. The institutional architecture for integrating two of CGIAR's most important cross-cutting themes will need further consideration.

Recommendation #3: Significantly strengthen theory-based working into planning, monitoring, evaluation, and learning. Theory-based working should be integrated into thinking and efforts on transformative change to ensure that there is systematic internal learning on what works in order to inform strategic decisions. Furthermore, theory-based work should be used to document change achieved to communicate externally for purposes of accountability (broadly defined) and learning.

3.5.2 Recommendations for the CRP

Recommendation #1: Synthesize significant outcome areas and evidence to create a credible contribution claim for end of program, to inform internal reflection and adaptive management, and to report externally. This synthesis should include an evidence-based gender-related contribution story and one for capacity development nested within the overall TOC evidence assessment.

Recommendation #2: In the short term, improve OICR reporting to ensure that it enables tracing of evidence to ToC and includes analysis of assumptions.

Recommendation #3: Identify key lessons learned from an integrated program approach and targeted work on climate change as a cross-cutting theme to inform One CGIAR transition.

Recommendation #4: Continue to build the future research agenda over the coming year, identifying root causes of challenges and transformative solutions, including a broader range of levers, questions of political economy, and extension of work on nutrition, pests and diseases, and climate security. Ensure that this work is adequately informed by social science expertise, especially political economy and political ecology, and the food and natural resource sovereignty implications of market-oriented development.

Recommendation #5: Consider expanding engagement at the landscape scale and extending the role of this work in future transformative change agendas. The CSV approach has proved popular and is being scaled up, but in the future, more work could be focused at the landscape scale, recognizing the blurring of rural-urban boundaries and the need for ecosystem-based solutions.

Recommendation #6: A stronger feminist and political science perspective could enable CCAFS to engage more effectively on equity through affirmative measures, including within transformative change thinking.

Recommendation #7: Engage in a systematic manner in the COP26 process and event to capture opportunities to influence decision-makers.

4 Lessons Learned

High-quality science, in the broad sense of research that both generates rigorous evidence and contributes to impact at different scales, is critically important for the increasingly urgent global response to climate change. This review offers several lessons that can inform the design of future initiatives.

First, sustained interactions with decision-makers are critical to ensure the relevance of research, to enable capacity-strengthening support to be provided, and to support uptake of scientific research by policy and investment decision-makers. CCAFS work has demonstrated the importance of building awareness and capacity among decision-makers (public, private, and civic) on the relationship between climate and agriculture.

Second, agility in working across scales enables CCAFS to effectively draw up lessons and perspectives from the field level and to catalyze opportunities that open at one level (e.g., global, regional, national, or subnational) for improving the use of evidence in decision-making at other levels.

Third, institutional arrangements that enable sustained interactions with decision-makers, agile cross-scale work, and strong scientific and science-policy engagement expertise, combined with a clear focus on climate change and strong communications, can deliver a global presence for CGIAR and amplify research impact in policy and practice. To optimize this impact, however, a program requires a cohesive design underpinned by ToC thinking and working, core funding, and flexibility to respond to emerging themes and issues.

Fourth, more transformative approaches rely upon engagement with diverse actors and root causes of challenges. This means diversifying partners and skills, such as drawing in sustainable finance expertise

or engaging with the humanitarian sector. Different types of levers to address root causes of challenges may be required—for example, legislative change has transformative potential. Political economy/ecology expertise may be a gap within climate, agriculture, and food security research and science-policy engagement. A stronger initial diagnosis of the system in which the program is intervening is needed in order to develop strategies and articulate contribution claims.

Fifth, facilitation of South-South engagement can lead to unpredictable but highly valuable outcomes and is worth investing in, under the leadership of regional teams.

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Annexes are available here:

bit.ly/CAAFS-CRP2020-Annex

A 2-page brief is available here:

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