Evaluation of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

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Acknowledgments

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Acronyms

AfDB	African Development Bank
AFOLU	Agriculture, Forestry and Other Land Use
AGN	African Group of Negotiators
AWD	Alternate Wetting and Drying
CCAFS	CRP on Climate Change, Agriculture and Food Security
CCSL	Climate Change Social Learning
CIAT	International Center for Tropical Agriculture Centro Internacional de Agricultura Tropical)
CIMMYT	International Maize and Wheat Improvement Center
CIS	climate information services
COP	Conference of Parties
CRP	CGIAR Research Program
CSA	climate-smart agriculture
CSV	climate-smart village
DFID	Department for International Development
EA	East Africa
ECOWAS	Economic Community Of West African States
ESSP	Earth System Science Partnership
FAO	Food and Agriculture Organization of the United Nations
FP	Flagship Project
G+SI	Gender and Social Inclusion
GACSA	Global Alliance on Climate Smart Agriculture
GRiSP	CRP on Global Rice Science Partnership
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICT	information and communication technology
IDO	Intermediate Development Outcome
IEA	Independent Evaluation Arrangement
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
INDC	intended nationally determined contributions
IPCC	Intergovernmental Panel on Climate Change
IPG	international public good
IRRI	International Rice Research Institute
ISP	Independent Science Panel
ISPC	Independent Science and Partnership Council
JCR	Journal Citation Reports
KEQ	key evaluation question
LAM	Latin America
LANSA	Leveraging Agriculture for Nutrition in South Asia
LDC	Least Developed Countries
MEL	monitoring, evaluation and learning
NAMA	Nationally Appropriate Mitigation Action
NARS	National Agricultural Research Systems
NRM	natural resource management
OECD	Organisation for Economic Co-operation and Development

P&R	Planning and Reporting platform
PMC	Program Management Committee
PMU	Program Management Unit
QoS	quality of Science
RBM	Results Based Management
RP	Regional Program
SA	South Asia
SAMPLES	Standard Assessment of Agricultural Mitigation Potential and Livelihoods
SEA	Southeast Asia
SLO	System Level Outcomes
SRF	Strategy and Results Framework
TLL	triple loop learning
ToC	Theory of Change
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
W1	Window 1 funding
W2	Window 2 funding
W3	Window 3 funding
WA	West Africa

Executive Summary

Background and context

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) was approved in 2011 and builds on a CGIAR Challenge Program on Climate Change. It is led by CIAT and engages all CGIAR centres. CCAFS is one of the largest CRPs, with annual budgets around USD 60–70 million and the largest proportion of Window 1 and Window 2 funding. During the first three years (2011-2014) the total expenditure of the Program was USD 257 million.

CCAFS addresses the challenges of that global warming poses on food security and agricultural producers, production systems, and policies and institutions. The Program goal is to "promote a food-secure world through the provision of science-based efforts that support sustainable agriculture and enhance livelihoods while adapting to climate change and conserving natural resources and environmental services". It is currently organized in four Flagship Projects:

- FP 1 Climate-smart agricultural practices
- FP 2 Climate information services and climate-informed safety nets
- FP 3 Low-emissions agricultural development
- FP 4 Policies and institutions for climate-resilient food systems

In addition, CCAFS has a cross-cutting theme on Gender and Social Inclusion. CCAFS works across five Regional Programs: East Africa, West Africa, Latin America, South Asia and Southeast Asia.

One of the guiding concepts for the implementation of CCAFS activities is climate-smart agriculture (CSA). The intent of CSA is to respond to the challenges of climate change with responses that optimize the balance of three sometimes conflicting objectives: productivity, adaptation and mitigation. CCAFS implements a large proportion of its work on CSA through climate-smart villages (CSV) where CSA interventions are tested through work with partners, and seeks policy influence through FP4 and direct engagement with governments.

Purpose and scope of the evaluation

The principal purpose of the Evaluation was to identify ways to maximize the contributions that CCAFS can make to the goal of future food security in the context of climate change. The main stakeholders in this Evaluation are the management of CCAFS, the members of the Independent Science Panel, all the participating CGIAR research centres, the CIAT Board of Trustees (as lead centre), the CRP's core strategic partners, other partners associated with the Program, and the program donors, the Fund Council and CGIAR's management at the System level.

Evaluation approach and methods

The Program performance was assessed through application of the evaluation criteria of relevance, effectiveness, impact and sustainability of impact. In addition, the team assessed the quality of science and the Program's efficiency and organizational performance including: resource use; priority setting and planning; reviewing and reporting; learning; internal and external communication and relationships; and stakeholder involvement.

Following consultation with the ISP and CCAFS management, the Evaluation addressed four key evaluation questions.

- How well is strategic collaboration and integration both within and outside the CGIAR being achieved?
- To what extent is CCAFS generating unique international public goods for agriculture, food security and climate change?
- How well do the Flagship Projects link together and combine at output and outcome levels in the regions; and, to what extent are successes toward outcomes transferable from region to region?
- How robust are the monitoring, evaluation and learning processes of the Program?

As its main approach, the Evaluation selected nine projects for case studies to address the evaluation criteria and questions at three levels: global Program level, Flagship level and Regional Program level. The methodology also included document review, field visits to all regions, interviews of over 150 stakeholders, survey of CCAFS researchers, identification of exemplary cases of CCAFS work with high impact potential using a triple loop learning analysis, bibliometric analysis and H-index analysis of senior researchers. An independent third-party review team contributed to the evaluation of quality of science by assessing a random sample of journal articles published by CCAFS.

Main findings and conclusions

Program management

CCAFS operates through a Flagship Project – Regional Program matrix. The Program seeks to generate international public goods and pursue local relevance and outcomes. CCAFS has engaged expert staff outside the CGIAR in some of its Flagship Project and Regional Program leadership positions and consequently in the Program Management Committee. This, as also the location CCAFS' coordination unit at the University of Copenhagen, has allowed the Program to take an outward-looking approach to management of its human resource and bring in high calibre expertise. This contributes to CCAFS' comparative advantage and quality of science.

CCAFS management allocates resources competitively, giving it the opportunity to influence the direction and nature of research activities. Different processes and tools in planning, monitoring, evaluation and learning have been put in place to support outcome oriented portfolio management across Flagships and regions. Firstly, the Program has recently trialled results based management and is using the lessons in broader adoption. Secondly, the Planning and Reporting platform is an innovative initiative for monitoring and adaptive management of the portfolio; it could be a model for other CRPs. CCAFS researchers surveyed were positive about the Programs' potential to streamline monitoring and reporting. However, the Evaluation team observed considerable overburdening of staff in the regions, which is a concern.

It is commendable that CCAFS' information management system is in the public domain. However, the Evaluation team considers that the Planning and Reporting platform should be further developed to allow better management decisions and better understanding of the research by outsiders. The team did not find the detail on projects in the platform to be sufficient for research quality management or for managing the input-output sequencing in project planning, while recognizing that

the P&R and its use are evolving and that a balance has to be struck between obtaining adequate project information and the effort required. The functions being put in place need to involve greater attention to impact pathways and specification of more realistic outcome targets than set initially. The Evaluation team found that impact pathways were of variable quality and too often generic. More attention needs to be paid to the robustness of the information entered into the system. Attention should also be given to using the assumptions and risks identified in the theories of change as dynamic concepts to be tested as hypotheses in research.

CCAFS has invested in establishing baselines that serve multiple purposes that the Evaluation team found challenging to converge: to track progress across sites and regions, for example on climate-smart technology adoption, and to serve context specific need for scoping priorities.

One intention is to track policy influence, which is a commendable objective. CCAFS has also commissioned evaluations and reviews at different levels of Program to provide evaluative information for management and evidence on the impact of the Program. The Evaluation team commends these initiatives although it found the studies to be of varying quality and usefulness.

CCAFS understands the importance of validating outputs and outcomes, but as yet does not have a system in place to do this effectively. In general, the Evaluation team found outcome and impact assessment lacking. A number of success stories of outcome cases have been published, but they lack robust evidence of outcomes attributable to CCAFS. Notwithstanding the challenges in impact assessment of climate-related research on livelihoods and policy, including attribution to CCAFS, investment in more rigorous impact studies is needed. There is need for CCAFS to monitor, assess and document the effects of CSA interventions on food security, particularly of the climate vulnerable farming and non-farming populations, normalizing for climate change and other effects.

Quality of Science

The Evaluation team found that CCAFS' research management has aimed at consistent and coherent high quality science. Restructuring the Program for the extension phase was one step towards that. Management and leaders have invested significant resources in a process that is resulting in research designs that are more integrative and systems oriented.

While quality of science is overseen by the Flagship leaders, the regional programs are oriented for outcomes. Science management happens largely at project level and is to some extent dependent upon the project leader's home organization's processes and support for science quality. The Evaluation team found several examples of innovative strategic research in the regions and evidence of good quality across the scale from upstream to adaptive research. In the regions, research needs to be sufficiently grounded in the trajectories of the rapidly changing farming livelihoods realities. However, the Evaluation team questions whether CCAFS' implementation of the CSA conceptual base is broad enough to support this. The team notes that in developing its Phase II proposal, CCAFS has broadened the way it is articulating CSA to include some other agricultural and off-farm livelihood dimensions.

The quantitative analyses of publications and senior research staff scientific outputs showed broad comparability with publishing rate and quality of science leaders in advanced research institutes. Papers were generally judged to be of high methodological rigour (somewhat less so for economics and social science). Regarding originality, CCAFS is encouraged to publish more primary research

papers that address the Program's goal of generating equitable and gender-sensitive technologies and practices. The heavy load under which project and science leaders are operating, reported to the Evaluation team, is a concern.

Program level relevance

CCAFS focused on five Intermediate Development Outcomes (IDOs) developed before the current CGIAR Strategy and Results Framework was adopted. CCAFS contributed to the design of the Framework, and its research on climate mitigation influenced setting the aspirational targets for the CGIAR. Given that climate vulnerability varies across urban and rural poor populations, designing relevant research that contributes to food security of the climate vulnerable is extremely complex. CCAFS treats food security largely as a production and supply driven factor. The Program seeks to achieve the food security IDO by being the "foremost global source of collaborative research" leading to climate resilient strategies. This relates well to the climate resilient productivity component of CSA that is CCAFS' main impact pathway. It was not clear to the Evaluation team whether CCAFS is able to define realistic outcome targets related to equitable institutional investments in climate-smart food systems, and help to deliver on them.

While the gender IDO aims at increasing the control by women and other marginalized groups of assets, inputs and decision-making, the Evaluation team considers that a focus on managing climate risks and building climate resilience of those disadvantaged by social norms would be more relevant and feasible. Assuming that climate and agricultural research can directly contribute to countervailing inequitable power structures is unrealistic. To improve its relevance on policies and institutions, CCAFS should pay more attention to assessing the relevance of policies and the coherence of national policy frameworks for climate resilient agriculture and food security. The CCAFS IDOs on adaptation and mitigation are better framed and the relevance and role of research is clearer in generating information, knowledge and technologies that can enable improvements in the ways that farmers and farming systems are resilient to climate risks, and the ways that, through agriculture, carbon sinks can be increased and better managed, and greenhouse gas emissions controlled.

In the global discussion CSA is loosely defined and meaningful criteria for climate-smartness are lacking. CCAFS can therefore play a highly relevant role by bringing to this arena well-researched, impartial and scientific findings on how best to achieve the objectives of CSA. However, the Program's relevance will improve if CSA in Phase II is placed in a wider climate resilience and livelihoods context taking into account transitions to off-farm and non-agriculture household strategies. Similarly, relevance of CSVs to wider agro-ecologies for meaningful testing of outputs across FPs would benefit from a less village- and more landscape- and territory- level focus.

Generation of international public goods

CCAFS engages in the generation of international public goods (IPGs) in three areas: as a global knowledge producer, as a provider of products and services, and as a repository of institutional capacities for international research on climate change related to agriculture and food security. A review of CCAFS scientific publications showed that the vast majority of the published knowledge has international relevance. This varies across research areas, and climate science publications were found to be most often of local or limited international relevance. The Evaluation team identified several examples of CCAFS outputs that had clear applicability across national borders and high IPG potential. These include the weather index-based insurance system, climate information services (CIS), Web-

based Climate Portal, climate analogues and tools for measuring mitigation benefits in agriculture. While the comparative advantage of CCAFS is in generating these outputs and making them available to intended users and wider audiences, CCAFS is working along the IPG delivery value-chain and collaborating with partners for the promotion and scaling up the outputs. CCAFS has a unique comparative advantage due to its scale and reach, and its capability and foresight to drive research ahead into areas where climate and agriculture intersect.

Program level effectiveness

CCAFS engages in the global and national processes of mitigation and responding to opportunities and risks resulting from climate change by generating evidence from action research, effecting policy and institutional change to support CSA, and rolling out CSA. These activities are, perhaps by necessity, taking place in parallel (rather than in series) due to the nature of policy engagement. The body of evidence to be able to effect policy change may not be complete or certain enough in all areas as yet. However, recognizing that the demands of timely policy engagement often do not award the luxury of achieving sufficient scientific certainty, it is important that CCAFS also clearly communicate the risks and levels of confidence in scientific evidence on CSA. Seeking to roll out CSA on a "no regrets" basis without having a full assessment of not just the productivity advantages and the emissions reduction potential, but also the linked changes in food security of the climate vulnerable poor, is the option CCAFS has chosen to take. As the Program proceeds and additional evidence is generated this tension can be addressed.

Research into the theories of change in policy needs to be strengthened. While the need to reduce the carbon footprint from agriculture worldwide is clear, the evidence of how CSA increases climate resilience and food security, particularly in marginalized smallholder farming systems, may not be enough for policy-makers to see CSA as a priority. In general, the theories of change are not well specified, and it was difficult for the Evaluation team to assess the expected scale of effects. Ambition in the Flagship Project targets at the outcome level varies, and many were judged to lack realism. Furthermore, they lacked critical testing of risks and assumptions through hypothesis driven research.

The Evaluation team considered integration as an important determinant of effectiveness. CCAFS seeks integration at science output level building on component research from within and outside CGIAR and it engages in interdisciplinary research within the framework of CSA. Cross-centre and cross-CRP integration improved considerably in 2014 with introduction of the CCAFS theory of change and impact pathways, which forced stronger alignment and integration of projects and a consolidation from some 300 to about 90 projects. CCAFS also supports the integration of outputs into decision making by next-users to affect change at scale. CCAFS has made good progress in embedding its research in the local context for outcomes. In the Evaluation team's view, effectiveness can be further enhanced by applying more consistently action-research approaches across the CCAFS projects, as the degree to which participatory action research principles are implemented at the project level varies considerably.

To advance its interventions and influencing the changes upon which its effectiveness depends, CCAFS is heavily involved in stakeholder engagement and communication. For this CCAFS is to be commended, as it enhances co-generation and co-ownership of knowledge. However, in some instances the Evaluation team noted that engagement activities risk being perceived as advocacy in promoting one or other action to be taken, potentially undermining CCAFS' impartiality and credibility.

The team assumes three drivers for CCAFS' engaging in advocacy: perceived urgency to reach lower carbon emissions from agriculture; the need to implement climate adaptation to future climate risks that are uncertain; and helping determine CSA and institutional investments in the absence of science basis. The Evaluation team observed that CCAFS' impact documents have often been written from an advocacy rather than impartial outcome analysis perspective, highlighting successes. The Evaluation team suggests that CCAFS retain its strong engagement role based more on provision of impartial assessment of the effectiveness of CSA in supporting food security of the climate vulnerable and scientific evidence for decision-making, rather than engaging in advocacy of what is believed to be right.

CCAFS' likelihood of being effective has been influenced by the CGIAR operating environment—notably uncertainties surrounding budgetary reliability, availability and flexibility—that has resulted in slippage and loss of key partners. As there are input-output relationships between projects, the effects of this slippage on projects that come next in a sequence, have reduced the overall effectiveness of delivery through the portfolio.

Flagship Projects and regional programs

The Flagship Project impact pathways have been driven to a large extent in response to the IDOs and the demand for adaptive capacity, policies for climate resilient agriculture and reduced greenhouse gas emissions from agriculture. The FPs are inter-dependent, FP1 bringing together and testing outputs from FP1, FP2 and FP3. The three FPs feed into FP4 to upscale CSA practices. The Evaluation team observed an increasing level of convergence among the three dimensions of CSA: productivity, resilience and mitigation. However, too many projects still address only one of the three elements.

CSA is an umbrella concept for FP1 research, but its relevance could be strengthened by recognizing some of the non-agricultural strategies that can support farming and local livelihoods, such as off-farm work, micro-enterprises and temporary, or even permanent, migration. A stronger case needs to be made for how the CSV concept contributes to the diverse components of national agricultural development. As stated above, the Evaluation team recognizes that CCAFS in its Phase II proposal is broadening the scope of how it is implementing CSA and how it is operationalizing its research in the CSVs. FP2 contributes information to climate advisors increasing their capability to deliver precise and timely advisories. Its effectiveness depends on resourcing and the financial sustainability of CIS, and this remains highly uncertain where public sector investments in CIS supply are lagging well behind the scale of potential next-user demand. FP3's strategy to work through country and partner priorities helps it mainstream the Program's work and build capacity. The FP research has influenced the development of national mitigation policies in some target countries. FP4 is relevant to stakeholders by bringing research outputs from the other FPs to the attention of policy-makers.

The Evaluation team notes that CCAFS' decision to work with the African Group of Negotiators in the United Nations Framework Convention on Climate Change did not result in special treatment for Africa or a prioritization of agriculture above other sectors in the climate negotiations process. The Evaluation team suggests that CCAFS align itself more directly with the Least Developed Countries group (currently chaired by Angola). This group, officially recognized under by UNFCCC, includes many countries of high priority for CCAFS in Africa and South Asia and has proven to be an effective group in influencing negotiations up to and including the recent 21st Conference of Parties in Paris, December 2015.

In the five regions CCAFS pursues project integration working with its boundary partners. All regions are relevant for CCAFS; CSA research is conducted in all and CSVs have been established to varying degrees and in different ways. The Evaluation team observed progress in all regions. Examples include: the science-policy platforms in West Africa that create fruitful dialogue with stakeholders; national level public sector influence in the East Africa where CCAFS' role in policy has been well received; systems approach framed around CSA in South Asia that is widely and strongly supported; and strong partnerships including engagement with NGOs in Latin America where CCAFS can build on the long history of climate research in some countries and high level of national competence. In South-East Asia activities have started recently, and through wide consultation with stakeholders, CCAFS is ensuring its demand-relevance.

In some regions CCAFS needs to reconsider its country and sub-national priorities. Future relevance could be served by shifting geographic focus. Devolving leadership of some activities to regional and national partners should be considered. For example, in the Evaluation team's opinion, CCAFS' comparative advantage is diminishing for mature, CSA component level research in India where the portfolio is strongly biased towards the more favourable environments in the north-west Indo-Gangetic Plains. Focus should shift to other regions in India, or better still to Bangladesh and Nepal. In Latin America national capacity in countries such as Brazil and Peru is strong, which should be taken into account in CCAFS' strategy and prioritization. The Evaluation team also observed that the village focus in CSV is not appropriate for all contexts. While it may work well in South Asia, it needs to expand to watersheds and landscapes in other regions, particularly in Latin America and South-East Asia.

Regarding progress by CCAFS towards outcomes in the regions, the Evaluation team identified several cases where the Program is being effective, and the IPG value of its research is being realized. Effectiveness and transferability is enhanced by CCAFS' management structure—leaders at FP and RP level—for linking regional and thematic topics.

Cross-cutting issues

Gender and social inclusion were initially a Program Theme but became a standalone research area in the extension phase. The focus has been mainly on gender research, analysis and mainstreaming. CCAFS has a gender strategy and regional gender impact pathways but these are too generic and lack good design. Integration of gender equality issues and, even more so, social inclusion is weak in FPs and across regions. Slow progress on these issues has been at least partly due to discontinuity in leadership (a new coordinator is now in place) and uncertainty in the direction that the gender and social inclusion component should take. The gender and inclusion toolbox is an example of tangible output well appreciated by next-users. It is a collection of participatory action research methods framed for gender equality and climate change application. It has achieved significant uptake among NGOs working on climate and agriculture themes, although less so among other CCAFS FPs. CCAFS has focused on the social learning outcomes from the development of the toolbox. While awareness and training in gender analysis and research is generally appreciated by research staff, there remains much integration to do. Local and regional gender experts, possibly out-sourced, could enable a more active approach to gender mainstreaming in research design and implementation. Further integration is a key next step and can be used to support increased participatory and social differentiation research.

Regarding partnerships, CCAFS has an Engagement and Communication Strategy that, however, is very broad when it comes to defining key strategic partners and strategies for engagement. CCASF works

a lot with centres and other CRPs. In FPs, the level of engagement varies, partly depending on the Flagship Project orientation and project modality. Technology transfer oriented projects engage traditional partners, but better grounding of projects in local needs for local outcome would require more engagement with non-research partners. CCAFS should pay more attention to managing strategic partnerships and engagement, and incentives for partners are needed to enhance effectiveness. The partnership with Future Earth has not materialized so far, and CCAFS may wish to review this association.

It is unclear to the Evaluation team the extent to which capacity enhancement activities are prioritized and the strategically most important targets supported and resourced. Feedback from partners was generally positive and appreciative, but under the reality of budget cuts not all needs can be met. The Evaluation team considers that capacity enhancement within CCAFS staff needs to be addressed covering areas where the combined subject area of climate change, agriculture and food security research demands methodological development in gender analysis, impact pathway and theory of change development, and the use of participatory methods.

Value added by CCAFS

CCAFS is a well managed CRP that in the five years of its existence, building on the initial work of the Challenge Program, has advanced CGIAR contribution to research on climate change and agriculture. With growing importance of climate change as a factor affecting development agendas, the CGIAR has benefited from a Program that has integrated research across the CGIAR and strengthened CGIAR presence in policy arenas and dialogues. While operating at the global level, CCAFS has made efforts to ground its research strategies and implementation in national activities and institutions.

CCAFS has also been exemplary in actively managing a portfolio including more CGIAR centre partners than in any other CRP, improving its strategic focus through consolidation and competitive funding. Thus CCAFS is becoming strategically better focused on development outcomes. It has put in place mechanisms for managing projects, tracking progress and facilitating learning for adaptive management. While these processes are still quite new, CCAFS is moving well into a results-oriented management system.

The Evaluation team identified several success factors that increase the confidence on the Program's ability to deliver results. Through an outward-looking approach to managing the human resource, CCAFS maintains competent researchers and high calibre managers. The matrix management structure that links Flagships with regional programs and forges collaboration among program leaders at these levels has worked well for integration. It has also facilitated transfer of lessons, outputs and ideas from region to region. The Program's communication strategy has driven sharing of information among regions and access to CCAFS' research findings, data sets and methodological innovations. In the regions, CCAFS has built strong partnerships with diverse stakeholders, including policy-makers, and there is good level of understanding of government and public sector procedures. CCAFS is supporting dialogue among partners, for example through the science-policy platforms. CCAFS has balanced well development of science-based knowledge and services for generating international public goods and the pursuit of locally relevant application, adaptation and scaling of the interventions towards outcome.

CCAFS has unique comparative advantage due to its scale and reach, and its capability and foresight to drive research ahead into areas where climate and agriculture intersect. CCAFS' comparative advantage lies in its access to and use of field sites, in its inter-disciplinary nature and the multi-level systems approach framed around CSA. CCAFS can contribute to substantiating CSA into a conceptually and technically grounded integrative framework that has the necessary practical relevance. The Program could focus on more primary research in the field to gather evidence on successful and unsuccessful attempts at climate change adaptation and mitigation, and disseminate this evidence through capacity enhancement activities to organizations involved in CSA and CIS implementation. It also needs to place more emphasis to rigorously and systematically assess and provide ways to enable trade-offs to be made and tested between food security, adaptation and mitigation. Only then should injecting of findings into policy debates take place.

The Evaluation team considers that in the future, CCAFS should prioritize more strongly the areas where it can have the most influence and where it can target most climate vulnerable groups. A strategic process of country prioritization is required, and CCAFS needs to devolve its activities in countries where there is good level of competence and investment. Given the challenging and resource intensive nature of climate change and agriculture research, CCAFS may consider encouraging its project staff through the FP and RP leaders to concentrate on fewer, very high quality knowledge products, and to increase the focus on strengthening components of the delivery systems of IPGs to better achieve the goals of CCAFS research and those of CGIAR. With further prioritization and focus, CCAFS will continue to be a valuable component of CGIAR research agenda, particularly for addressing crucial issues of climate change, livelihoods and sustainability.

Recommendations

The Evaluation team makes a total of 14 recommendations, two of which are addressed to the CGIAR System's governance. The recommendations address relevance, effectiveness, gender, and CCAFS's monitoring, evaluation and learning system.

CGIAR-level

Recommendation 1 CCFAS has the potential to act as an integrating element drawing together research relevant to addressing climate effects on agriculture and food security in the future. On the basis of the Program's relevance, previous performance and potential, the Evaluation team recommends CCAFS to continue to Phase II.

Recommendation 2. The management of the CCAFS for efficiency and effectiveness, its credibility with research partners, and the ways that CGIAR centre researchers engage with the Program are all negatively affected by the unreliability of W1/W2 funding from CGIAR. As a minimum, more timely budgetary decisions should be taken and funding levels should be set clearly by the Consortium Office at the beginning of the annual cycle and maintained for the full financial year.

CCAFS level

Relevance

Recommendation 3. For improving the utility and realism of the Program's impact pathways and accountability framework, CCAFS should adjust the sub-IDOs that the Program targets to make them operational for Program planning and management while responding to the CGIAR level outcome expectations. Furthermore, CCAFS should develop revised targets and indicators that are

commensurate with the global ambition, more specific in the context of each priority country, and more realistic for research on food security, gender equality and social inclusion, climate adaptation and mitigation, and policies and institutions.

Recommendation 4. Taking into account its successes, its response to next-users' and partners' demands, and the potential for progress against system level objectives, and in face of a reduced funding envelope projected for Phase II, CCAFS should conduct a geographic prioritization of its activities refocusing on countries with lower CSA research capability. In rebalancing and focusing its regional portfolio, CCAFS should consider its comparative advantage relative to the strength of national partners, the prospects for influence and impact and the national demand for CCAFS' institutional, policy and technological interventions. It should also consider how to build on and broaden the current strong national partnerships even if its leadership and activities in those countries were to diminish.

Recommendation 5. Other than the largely supply-side and productivity driven approach in CSA, CCAFS has not addressed well issues of climate change effects on food insecurity, particularly on climate vulnerable people. To address this gap under a resourced constrained next phase CCAFS should partner with human nutrition and food security programs in Africa and South Asia that have greater capacity to explore food security issues from complementary perspectives to the CGIAR focus on supply side and food productivity.

Effectiveness

Recommendation 6. In order to enhance its effectiveness, CCAFS would benefit from greater integration within the Program—among projects, FPs and RPs—and with other CRPs. To support better integration, CCAFS should improve coordination and researcher engagement by:

i. improving reward structures to incentivize researchers toward integration so researchers act as champions for transfer beyond their project requirements;
ii. developing means for monitoring and assessing the extent and effectiveness of integration among projects.

Recommendation 7. In CCAFS main impact pathways for FPs and projects have input-output relationships that are insufficiently explicit. In order to maximize the synergistic potential and coherence of its portfolio and to enhance the efficiency of overall results delivery, CCAFS should:

i. optimize the sequencing of the activities in its FPs, and projects within FPs, by careful input-output mapping before projects in activity clusters commence. As part of this, the coherence between FP4 and the rest of the Program should be improved;
ii. tailor the (generic) CSA and CSV frameworks in order to match local conditions in regions, and broaden partnerships to bring in additional skills currently not in the mix such as research organizations more engaged with the socio-economic aspects of food security and human nutrition;
iii. build on the policy engagement processes initiated with a view to focussing the regional programs to achieve greater coherence between FP4 and the rest of the Program. This could include clearer articulation of how projects in FP1, FP2 and FP3 are delivering key inputs into policy processes and upscaling, and reviewing relevance of some of the FP1 regional activities;

iv. better define what "equitable institutional investments in climate smart food systems" are and how to assess moves towards them.

Recommendation 8. CCAFS should broaden its framework for CSA from the Phase I focus, primarily on agricultural technologies, and implementation through CSVs, and build on the buy-in by the boundary partners taking into account**:**

i. the rapidly changing socio-economic context of rural communities and subsequent household level trade-offs that may involve moving out of agriculture as an adaptation strategy;
ii. the need to focus on more holistic livelihoods approach seeking greater social inclusion and addressing equity issues;
iii. the extent to which other scales than village (for example watershed or landscape) are better for implementation in certain contexts;
iv. research required to facilitate CSA out- and upscaling approaches using household typologies and placing greater emphasis on gender and social inequity.

Recommendation 9. In order to enhance both the effectiveness and the relevance of CSA work CCAFS should generate evidence on climate smart solutions at the local level engaging in the following:

i. conduct primary research on adaptive behavior by smallholder farmers in CSA adoption, locally grounded action-research to test the relevance of CSA technologies to different smallholder farmer types, and then promote proven technologies among target communities;
ii. continue work on identifying better criteria to define what is climate smart and developing frameworks to underpin trade-off analysis;
iii. publish in peer-reviewed journal critical reviews and lessons regarding CSVs in regard of their effectiveness to support climate smart solutions;
iv. generate and publish evidence on effectiveness of CSA options, on impact of mitigation options on climate vulnerability, and on mitigation co-benefits from farming practices that aim at increasing climate resilience.

Recommendation 10. CCAFS has had a strong focus on climate risk management through its work on insurance and the development of agroclimate advisories. This should continue. To enhance the effectiveness of this work, CCAFS should strengthen FP2 activities by:

i. conducting research on the determining factors that affect adaptive behaviour and the extent to which weather-indexed insurance provision leads to maladaptive behaviour and increased risk taking;
ii. improving targeting and design of CIS and insurance for reducing negative effects of climate change on the vulnerable, while increasing their food security;
iii. combining climate and agricultural sciences in the design and provision of shock responsive and climate adaptive social safety nets;
iv. conducting economic valuation of CIS provision to generate convincing evidence for national governments of the need to and returns from enhancing CIS.

Recommendation 11. CCAFS can increase its policy informing role – and thereby be more effective in achieving movement along the higher level theory of change by**:**

i. engaging with target countries in the preparation of INDC reviews and NDC preparations focusing in on ways to reduce GHG emissions from the agricultural sector in ways that return co-benefits to adaptive capacity and food security;
ii. engaging with the most effective negotiating groups and their members in the UNFCCC that represent the interest of CCAFS priority countries.

Recommendation 12. CCAFS activities in FP3 on low-emissions agriculture are rather isolated from other FPs and research elsewhere. CCAFS should improve integration of FP3 with the other Flagships and with research done by partners by:

i. using results from FP3 in FP1 and vice-versa for improving knowledge about reciprocal impacts of practices aiming at mitigation and increasing climate resilience;
ii. improving partnerships at the sub-national level, particularly in terms of out- and upscaling of results from FP3;
iii. increasing collaboration with other CRPs dealing with AFOLU, especially Forests, Trees and Agroforestry;
iv. integrating to other research analysis of impacts of deploying bio-energy production systems on CSA, including analysis of the knock-on effects that this will have especially on food security.

Gender equality

Recommendation 13. In order to make progress towards Program objectives in general and the gender-related IDO in particular, CCAFS needs to strengthen both the systematic incorporation of gender inequity issues into its research design and the analysis of the effects of research results on gender relations and social inclusion in next-user and beneficiary populations. CCAFS should address the following:

i. gender equality and social inclusion concerns at the project design stage;
ii. improving the integration of gender relations and social inclusion expertise in regional teams for enhancing gender relevance of regional activities;
iii. identifying opportunities for generating benefits to women through low-emissions agriculture;
iv. identifying areas (components of FPs and projects under RPs) where good GIS research can be conducted and focus the GIS resources on these areas to learn lessons that can then be applied across the Program and by others;
v. gender relations and social inclusion aspects of CSA adoption through inter- and intra-household level research, including generation of gender differentiated data through baselines and monitoring;

Monitoring, evaluation and learning

Recommendation 14. CCAFS should improve its processes for outcome tracking and impact assessment, in order to learn how outcomes and impact happen, to enable better adaptive management, and to provide greater accountability. The Program should:

i. strengthen the ToC related to impact pathways at regional and FP levels by better definition of assumptions and risks and transforming these into hypotheses for testing during Program implementation – this is good theory of change practice outside of CGIAR;

ii. test these hypotheses with the most robust experimental approaches applicable in different contexts, seeking additional resources for this when necessary;
iii. use participatory impact pathway analysis method to generate 'stretch objectives' at project and RP levels and to provide incentives for learning from failures and successes at project, RP and FP levels;
iv. develop long-term monitoring practices for effectiveness of low-emissions agriculture innovations;
v. continue and expand on the efforts on economic valuation of benefits deriving from CSA and CIS;
vi. examine how well national and subnational food system policies take into consideration climate smart practices and strategies, and assess if and to what extent (sub-) national jurisdictions increase their institutional investments in food systems in ways that address climate change effects;
vii. expand training of CGIAR researchers and CCAFS' partners in ToC and impact pathways.
viii. as part of the FAIR information management system roll-out CCAFS should provide the software and capacity enhancement on its use to all CGIAR centres and facilitate adoption in other CRPs.

1 Introduction

1.1 Purpose and audience

This Evaluation Report describes the processes, findings and conclusions of the Evaluation of the CGIAR Research Program (CRP) on Climate Change, Agriculture and Food Security (CCAFS) and makes recommendations aimed at improving the CRP's performance.

The principal purpose of the Evaluation was to identify ways to maximize the contributions that CCAFS can make to the goal of future food security in the context of climate change. The Evaluation seeks to inform decision-making and planning by the CRP management, CRP sponsors, partners and other stakeholders on aspects of program performance and options for the future of the Program.

The Evaluation is one expression of mutual accountability among the Program, its donors and its partners. The main stakeholders in this Evaluation are the management of CCAFS, the members of the Independent Science Panel (ISP), all the participating CGIAR research centres, the International Center for Tropical Agriculture (CIAT) Board of Trustees (as lead Centre), the CRP's core strategic partners, other partners associated with the Program, and the program donors, the Fund Council and CGIAR's management at the System level.

The Evaluation Report (Volume I) is accompanied by a set of Annexes (Volume II). The Evaluation timeline is presented in Annex A, and the Evaluation team profiles shown in Annex B.

1.2 The evolving CGIAR context

Since CCAFS started in 2011, and during the course of this Evaluation, several changes have occurred in the internal context in which the Program operates. CGIAR adopted a new Strategy and Results Framework[1] (SRF) to replace the original from 2011. The SRF sets common goals for CGIAR in terms of development impact (System Level Outcomes — SLOs) [2] and strategic objectives and results in terms of Intermediate Development Outcomes (IDOs) for the CRP portfolio and for individual CRPs (sub-IDOs). The IDOs are intended to help researchers develop contexts in which a CRP's research outputs can contribute to development outcomes. CGIAR also approved extensions to the CRPs for 2015-2016.

The CRPs have developed their IDOs according to instructions from the Consortium, showing the linkage from research activities to the IDOs and SLOs. CRPs were also instructed to articulate impact pathways and Theories of Change (ToC) and develop targets for the IDOs, and indicators for their achievement. In its Extension Proposal for 2015-2016, CCAFS modified its IDOs (see section 3.1), initially agreed at the end of 2013, and presented outcome targets.

The new SRF, the development of which centres and CRPs contributed to, is the guiding document for the development of 2nd cycle CRPs, a process that was launched in June 2015 through a call of CRP

[1] CGIAR Strategy and Results Framework for 2016-2025. May 2015. https://library.cgiar.org/bitstream/handle/10947/3865/CGIAR%20Strategy%20and%20Results%20Framework.pdf?sequence=1

[2] The three SLOs in are: Reduced poverty; Improved food and nutrition security for health; and Improved natural resource systems and ecosystems services.

pre-proposals. In August 2015, CCAFS put forward a pre-proposal for the second phase for 2017-22, which was considered "satisfactory with adjustments" by the Independent Science and Partnership Council (ISPC) with Flagship Project (FP) 1 on climate-smart practices was the only FP ranked with the highest score. At the time of completing this Evaluation, CCAFS has submitted its full-proposal according to detailed guidelines of the Consortium. A new CRP cycle begins in 2017.

The SRF identifies climate-smart agriculture (CSA; see Box 1-1) as one global need on which CGIAR's comparative advantage can be brought to bear. For this, CGIAR will focus on adaptation and mitigation options for farmers and other resource users. Because it spans all three SLOs, climate change is seen as cross-cutting, and the SRF indicates that research and development will focus on adaptation to and mitigation of climate change and thus contribute to resilience to climate shocks. The SRF commits CGIAR to devote nearly two thirds of its research to these issues.

1.3 Global context in climate change research and policy

Adaptation and mitigation in the international agreements

The UN Framework Convention on Climate Change (UNFCCC), agreed in 1992, presents mitigation and adaptation as equally important and complementary ways to address climate change. However, the Kyoto Protocol in 1997 focused on mitigation efforts and the international negotiations within the Convention focused on clarifying the modalities and procedures for mitigation and its flexible mechanisms. Since the Marrakesh Agreements in 2001 a lot has been done for getting back to a balanced treatment of mitigation and adaptation in the Convention's decisions. The 2007 Bali Road Map was a next major step as it includes adaptation and mitigation as key components for addressing climate change in a future agreement. After failing to get an agreement in 2012 in Copenhagen, a new international agreement on climate change was agreed at the 21st Conference of Parties (COP) in Paris in December 2015. In 2015, the global community agreed on Sustainable Development Goals recognising that UNFCCC remains paramount regarding climate change issues. The "Paris Agreement" sets high level ambitions for both adaptation and mitigation. It structures the activities on mitigation around the (voluntary) intended nationally determined contributions (INDCs), and recognizes the need for adaptation efforts at the local, subnational, national, regional and international levels. It contains intended contributions to mitigation from 187 countries. The Paris Agreement further decided that the Green Climate Fund (agreed in 2009), the Least Developed Countries Fund, the Special Climate Change Fund and the Adaptation Fund should serve the agreement and requests the Green Climate Fund to facilitate the formulation of national adaptation plans in Least Developed Countries (LDC) and other developing countries. Modalities and procedures regarding the Paris Agreement are to be negotiated in the following COP sessions and its entry into force depends on the level of ratification by parties.

Understanding of the role of agriculture in adapting to and mitigating climate change

While research on the role of agriculture in mitigating climate change was initially concentrated on the potential in developed countries, this has changed in the past decade. Similarly, the impacts of climate change on agriculture and on food security, especially in developing countries, and the role of agriculture in increasing resilience have become increasingly recognized topics of research. In the latest Intergovernmental Panel on Climate Change (IPCC) report, agriculture is treated as a cross-cutting issue related to food security and food production, human health and adaptation options. The

report addresses the potential of agriculture in mitigation in its chapter on Agriculture, Forestry and Other Land Use (AFOLU) highlighting the need for more research on areas such as the role of sustainable agriculture, high-resolution data on crop production systems, grazing areas, subsistence farming and aquaculture as well as reducing waste, using agricultural waste for bioenergy and improving information on soil. Although CSA is not explicitly mentioned, the report highlights the need to manage the synergies between adaptation and mitigation and to understand the potential trade-offs, as well as the roles that agricultural activities play in both.

Regarding CCAFS, two aspects seem important. Firstly, CCAFS started when agriculture was beginning to be included as a mitigation option for developing countries in the Nationally Appropriate Mitigation Actions (NAMAs), and secondly, the Program was aimed at exploring synergies and trade-offs between mitigation and adaptation. During the lifetime of CCAFS these aspects have gained relevance in the international discussions and are now recognized as central items for addressing climate change in all countries while contributing to achieving several Sustainable Development Goals.

1.4 Overview of the CCAFS Program

Introduction

CCAFS was approved in 2011 and it builds on the CGIAR Challenge Program on Climate Change. It is led by CIAT and engages all CGIAR centres. The ISP is the Program's main oversight body. CCAFS has the highest proportion of Windows 1 and 2 funding among the CRPs.

CCAFS addresses the challenges of global warming and declining food security in terms of agricultural practices, policies and measures. The Program goal is to "promote a food-secure world through the provision of science-based efforts that support sustainable agriculture and enhance livelihoods while adapting to climate change and conserving natural resources and environmental services". In its ToC there are emphases on strategic partnerships, capacity building, communications, open access data, real time monitoring and evaluation, and a focus on gender and social inclusion.

From its inception in 2011 until the end of 2013, CCAFS was structured along four Research Themes: 1. Adaptation to progressive climate change; 2. Adaptation through managing climate risk; 3. Pro-poor climate change mitigation; and 4. Integration for decision making.

In 2014 CCAFS continued working within the four themes and additionally piloted a FP on Policies and Institutions for Climate-Resilient Food Systems. CCAFS management opted to cut the first phase of the program by one year so that the Program's focus could be sharpened in the extension period (2015-2016). CCAFS then introduced a FP structure (following Consortium Office instructions),[3] which also meant shifting some of the major output groups:

- FP 1. Climate-smart agricultural practices
- FP 2. Climate information services and climate-informed safety nets
- FP 3. Low-emissions agricultural development
- FP 4. Policies and institutions for climate-resilient food systems

[3] According to the CGIAR Guidance Note for the Second Call of Proposals (Dec 2014): "Each FP has specific objectives and may produce several outputs and research outcomes in order to achieve in due course two or three Intermediate Development Outcomes or IDOs (rarely more)."

Before 2015, the issue of gender was organized as a body of research under FP 4, and the intention was that it would be mainstreamed throughout the Program. However, in 2014 the Program decided to appoint a "Gender and Social Inclusion Research Leader". This post, starting in April 2015, has the same status as a Flagship Leader (i.e. thematic or content leadership), but with the additional responsibility to ensure that gender is mainstreamed in all other FP activities. Gender is thus a thematic area of work, but is not formally called an FP.

Apart from the FPs, CCAFS is also organized into Regional Programs (RP). Initially (2010-2011) CCAFS focused on three regions: East Africa (EA), West Africa (WA) and South Asia (SA). Two additional target regions, Southeast Asia (SEA) and Latin America (LAM), were added in late 2012. SEA is the least advanced region, rolled out only in 2014, and, as a result of delays in recruiting the RP Leader, full capacity was expected only in 2015.

Table 1-1: CCAFS regions, countries, and priorities for 2015

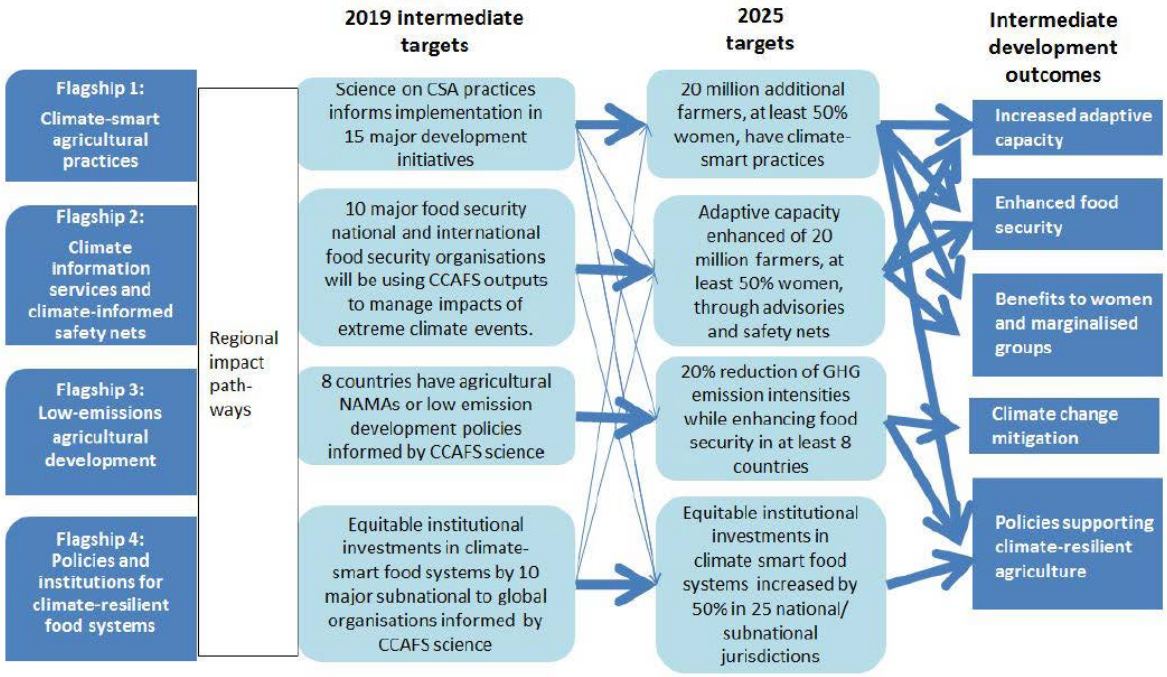
Region	Countries	Priorities for 2015
East Africa	Ethiopia Kenya Tanzania Uganda	• decision tools and business models for scaling out CSA • promote the science-policy dialogues on national adaptation plans in Kenya and Uganda
West Africa	Burkina Faso, Ghana Mali Niger Sénégal	• expand the scaling up of equitable climate services • support the development of country action plans for CSA • conduct pilot tests on CSV models with the Network of Farmers' and Agricultural Producers' Organisations of West Africa
Latin America	Colombia, El Salvador Guatemala Honduras Nicaragua Peru	• gathering evidence from CSVs • focusing on agroclimate and extension services as key components
Southeast Asia	Cambodia Laos Vietnam	• participatory approaches in organizing the CSVs • evaluating CSA innovations from other partners
South Asia	Bangladesh India, Nepal	• developing the evidence base for CSVs • improve crop insurance products • developing decision support tools for national and sub-national adaptation plans

Source: CCAFS Plan of work and budget 2015.

13. CCAFS targets five IDOs: food security, gender, adaptation, policies and institutions, and mitigation.[4] In its Extension Proposal CCAFS outlines Regional impact pathways (for each target region) as well as FP impact pathways. Figure 1-1 illustrates this arrangement.

[4] Note that these IDOs are those agreed in 2014 by CGIAR Science Leaders. A different set is in the new SRF.

Figure 1-1: CCAFS Flagships and targets leading to IDOs



Source: CCAFS Extension Proposal 2015-2016.

Box 1-1: The concept of climate smart agriculture

CSA is a conceptual approach developed by a set of agencies to advocate for changes in the ways that agriculture is practiced and agricultural development is understood in regard of climate change impacts. It involves the optimization of the balance of three sometimes conflicting objectives: sustainably increasing agricultural productivity to support equitable increases in farm incomes, and better food security; adapting and building resilience of agricultural and food security systems to climate change at multiple levels; and reducing greenhouse gas emissions from agriculture (including crops, livestock and fisheries).

FAO coined the term in preparation for the 2010 Hague Conference on Food Security, Agriculture and Climate Change, and CCAFS was an early partner in the development of CSA. The approach asserts that addressing emerging climate risks while reducing greenhouse gas emissions requires new technologies, policies, institutions and investment, and further that the context specific interventions are required.

CCAFS also works at the global level by advancing the CSA concept through Global Alliance on Climate Smart Agriculture (GACSA), by strengthening the influence of regions in global spheres [for example capacity strengthening of the African Group of Negotiators (AGN) in the UNFCCC], and by contributing to the bodies of research reviewed and systematised by the IPCC.

The impact pathways CCAFS has developed involve working in concert with other programs that promote CSA, including the GACSA that is supported by some multi-lateral organizations, donors, players from the private sector and other stakeholders. CCAFS sees its alignment with the GACSA as a

way to act collaboratively and to promote "an overarching global framework for CSA investment". In 2013 CCAFS researchers contributed to a paradigm setting CSA source book.[5]

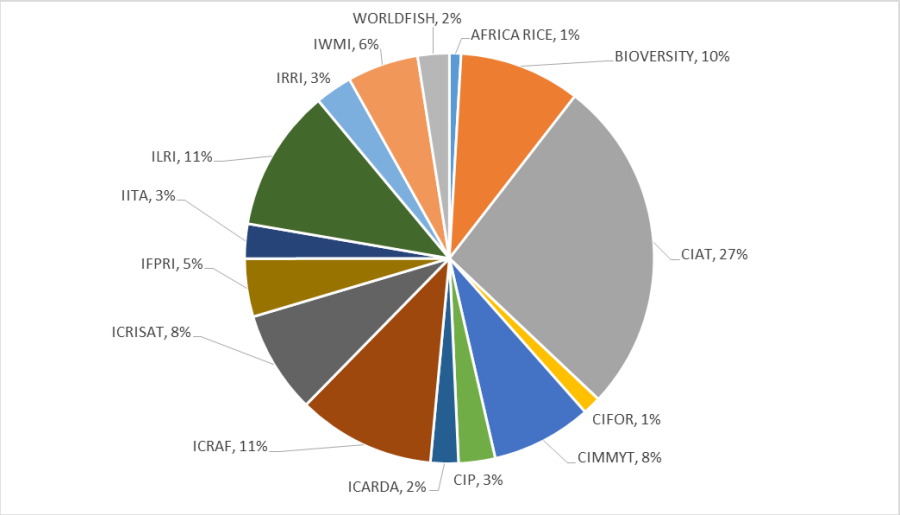
CCAFS budget and expenditure

With annual budgets around USD 60-70 million, CCAFS is one of the largest CRPs. Compared with other CRPs, it has the largest share of Window 1/2 funding as a proportion of total funding (in 2012 this was about 74%). CCAFS was approved for five years (2011-2015). The annual budget was expected to reach USD 90.3 million in 2015, with Window 1/2 funding accounting for about 90% of total funding. In actual finance for 2011-15, 63 % of total expenditure has been funded from Windows 1 and 2.

Until the end of 2015 a total of USD 311.5 million has been spent, of which the largest share has been spent by the lead centre CIAT (27%)[6], followed by ILRI, ICRAF, Bioversity International (with around 10%), ICRISAT and CIMMYT (8%), followed by smaller shares by the remaining centres (see Figure 1-2) . The expenditure rose from USD 56.3 million in 2011 to USD 63.5 million in 2012 to USD 65.8 million in 2013 to USD 68.9 million for 2014. In 2014 the budget included USD 4.1 million for piloting of FP4 results based management (RBM) that will now be part of the next phase of CCAFS.

In 2011-2015, expenditures were highest in Research Theme (later Flagship) 1 on Adaptation to progressive climate change (around 33%) and relatively even among the other Research Themes. Gender accounted for about 9% of CCAFS expenditure. Table 1-2 shows the expenditure and budgets since 2011.

Figure 1-2: Share of CCAFS cumulative expenditure 2011 -2015 per centre



Source: CCAFS Cumulative Expenditures (2011-2015), provided by CCAFS management.

Table 1-2: CCAFS expenditures (2011-2015) in USD thousands

	2011	2012	%	2013	%	2014	%	2015	%
Theme 1/FP 1	25,915	19,838	31%	20,813	32%	19,129	28%	17,862	31%
Theme 2/FP 2	9,343	11,102	17%	9,003	14%	7,983	12%	7,223	13%

[5] FAO. 2013. Climate–smart agriculture. Source book. Rome, 570 pp.

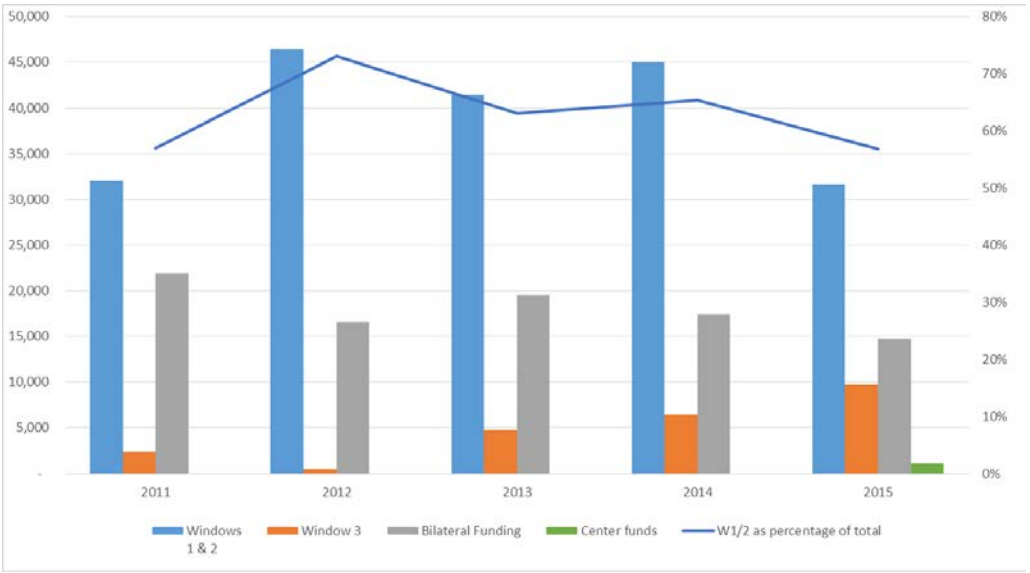
[6] Funding registered under CIAT includes the funding to major partners, such as International Research Institute for Climate and Society, and the Universities of Vermont, Leeds and Copenhagen.

Theme 3/FP 3	8,406	10,526	17%	12,468	19%	10,899	16%	9,918	17%
Theme 4/FP 4	12,597	11,738	18%	13,093	20%	16,340	24%	10,984	19%
Gender		6,850	11%	5,442	8%	9,516	14%	7,134	12%
Management		3,400	5%	4,941	8%	4,993	7%	4,073	7%
Flagship 4 Pilot									
TOTAL	56,261	63,453	100%	65,761	100%	68,860	100%	57,194	100%

Source: Evaluation team, based on Financial Reports. In 2011, CRPs were not requested by the CO to state gender expenses separately.

The budget for 2015 had to be cut twice, since the W1/2 funding was not available to the extent planned. The total 2015 budget was USD 65.5 million after total W1/2 funding cuts of 32 percent. Figure 1-3 illustrates the expenditure development by funding source.

Figure 1-3: CCAFS Expenditures by funding source 2011-2015, in USD thousands



Source: Evaluation team, based on CCAFS Financial Reports.

1.5 Evaluation approach and methodology

The Evaluation examined CCAFS research since its launch, irrespective of funding sources. The Evaluation covered a set of investigative activities that CCAFS and partners conduct to achieve the Program objectives. In addition, the Evaluation considered research for development approaches, whereby CCAFS convenes and facilitates investigative actions by partners and studies these as process phenomena, for example, establishing sub-national agro-climatic roundtables to develop advisories for producer groups.

Program performance was assessed through application of the evaluation criteria of relevance, quality of science (QoS), effectiveness, impact and sustainability of impact. In addition, the team assessed the Program's efficiency and organizational performance including: resource use; priority setting and planning; reviewing and reporting; learning; internal and external communication and relationships; and stakeholder involvement.

Following consultation with the ISP and CCAFS management the Evaluation addressed four key evaluation questions (KEQ) in relation to particular areas of the Program. These were:

1. How well is strategic collaboration and integration both within and outside CGIAR being achieved – termed "looking left and right in the traffic"?
2. To what extent is CCAFS generating unique international public goods for agriculture, food security and climate change?
3. How well do the Flagships Projects link together and combine at output and outcome levels in the regions; and, to what extent are successes toward outcomes transferable from region to region?
4. How robust are the monitoring, evaluation and learning processes of the Program?

The Evaluation used case studies as the main element of its methodology (see 1.5.1) for addressing the evaluation criteria and the KEQs. The CCAFS program is at a stage of early maturity. Therefore, the Evaluation used a balance of summative and formative dimensions to the case assessments. Several current projects have their origin in work started before the CCAFS Challenge Program, and some of this work was subject to summative assessments. Current and proposed future work was assessed from a formative perspective.

Governance and financial management of CCAFS had been examined by other reviews and was therefore not covered in depth. A CCAFS Governance and Management Review7 carried out in 2013 reached positive conclusions as also the IEA commissioned CRP Governance and Management Review of 2014[8]. The ISP commissioned a desk review of the effectiveness of CCAFS' region by theme matrix management.[9] In 2014 CCAFS was subjected to a CGIAR internal audit. For a full list of reviews and evaluations please see Annex C.

Sampling framework

Cases (projects and activities) were selected in each FP and RP from the current research portfolio, taking the genealogy of the portfolio into consideration. In general, the unit of analysis is the major research projects (and in some cases clusters of linked smaller projects) nested within FPs within and across regions. These cases were chosen purposively, to allow assessments of the KEQs and the evaluation criteria at FP, RP and Program levels.

Projects were selected as cases, following extensive consultation with CCAFS management and regional leaders, on the basis of being highly representative of the FPs and being operated in the regions to be visited by an Evaluation team member.

[7] Robinson and Flood, 2013. Governance and Management Review. CGIAR Research Program Climate Change, Agriculture and Food Security.

[8] CGIAR-IEA (2014). Review of CGIAR Research Programs' Governance and Management. Rome, Italy: Independent Evaluation Arrangement (IEA) of CGIAR (iea.cgiar.org).

[9] Ash, 2013. Managing the CCAFS Theme by Region matrix for international public goods and development outcomes. Report on an evaluation commissioned by the CCAFS Independent Science Panel. CSIRO, 102 pp

Table 1-1: Cases selected in each region and FP evidence used to assess KEQs

Region	FP1	FP2	FP3	FP4	Selected cases
SEA	All KEQs				FP1 2014-28 Integrated agricultural technologies for enhanced adaptive capacity and resilient livelihoods in climate-smart villages of Southeast Asia
SA	All KEQs	All KEQs			FP1 2014-25 Developing, adapting and targeting portfolios of CSA practices for sustainable intensification of smallholder and vulnerable farming systems in South Asia FP2 2014-45 CSI India: Enhancing farmers' adaptive capacity by developing Climate-Smart Insurance for weather risk
EA		All KEQs		All KEQs	FP4 2014-6 Influencing and linking policies and institutions from national to local level for the development and adoption of climate-resilient food systems. FP2 2014-51 Develop index insurance for drought-prone maize and bean-based farming systems in East Africa to enhance farmer adoption of climate-adapted germplasm
LAM			All KEQs	All KEQs	FP4 2014-2 Relevant climate change information meets decision-making to influence policy and institutions for climate-resilient food systems. FP3 2014-9 LivestockPlus: Supporting low-emissions development planning in the Latin American sector.
WA		All KEQs			Activity P46A426: Capacitating African smallholders with climate advisories in insurance development
GLOBAL		All KEQs			FP3 2014-22 Improving N_2O estimates. FP4 2014-62 Climate Change and Social Learning Initiative: Community of Practice and Evidence Base of social learning to up-scale climate resilient outcomes FP4 2014-60 CCAFS Scenario-guided policy and investment planning

Interviews and researcher survey

The Evaluation team carried out interviews with around 150 people, including CCAFS management, members from governance bodies, partners and external stakeholders. The interviews were conducted in person during the field visits and through skype. Interviews were complemented by observations of CCAFS researcher interactions during workshops in the field visits. A full list of interviewees can be found in Annex D.

The Evaluation team surveyed CCAFS researchers to collect their assessment and opinions of research and program management issues including aspects of: relevance; QoS and likely effectiveness; effectiveness of management; cross-cutting issues (gender, partnerships and capacity strengthening); and value added by CCAFS. The survey was confidential and conducted on-line through Survey Monkey. It was sent to 407 researchers working on CCAFS projects. The response rate was around 40 % (158 responses were received).The survey results are shown in Annex E.

Quality of science assessment

The QoS conducted by CCAFS was assessed through an independent third-party review of a sample of scientific publication outputs, and by the Evaluation team's assessments of scientific outputs, research staff and research management processes.

The publications review was coordinated by the IEA. CCAFS provided the Evaluation team with a database of 1204 CCAFS outputs, of which 474 were classified as journal articles. The IEA carried out a quantitative bibliometric analysis on all CCAFS publications 2009-2014, and compiled h-index information for CCAFS researchers (Annex F).

Four independent, internationally renowned experts conducted the review of journal articles using an assessment template and providing an overall qualitative assessment of each paper reviewed. The random sample contained about 30% of the 374 papers published in 2012-2014, because better alignment of publications with CCAFS research and objectives was to be expected in the more recent outputs. A summary of the review process and results is in Annex G.

During the visits to regions, interviews with CCAFS researchers and partners, and review of program documentation, the team identified key scientific outputs for assessment and examined the ways that research management, as a key driver of scientific quality, was conducted. The Evaluation team also used stakeholder perceptions of quality, gained through interviews and survey, as complementary evidence. In the cases assessed by the Evaluation team, track record and competence of team leaders, and composition and competence of teams were examined.

Triple learning loop

A Triple loop learning (TLL) tool[10] was used by the Evaluation team to identify cases that satisfied the three stages of the TLL process and therefore were concluded by the team to represent CCAFS' successes. The assessment included how the Program is succeeding by using appropriate research approaches (including high quality research), whether the assumptions and framing of the research strategy was right, and if the Program is taking the context of climate change uncertainties into account in achieving and assessing impact potential. In the third "loop" the team used evidence both from the Program and from what is established knowledge about the climate change context to judge whether the research outputs are likely to be effective and whether CCAFS is reflecting on its experience (continuous learning). The team also considered ways to amplify the success in those cases.

1.6 Deviations from the Inception Report

Regarding the areas of assessment included in the Inception Report, the Evaluation team was unable to conduct a detailed analysis concerning Program efficiency in terms of cost-benefit and assessment of CCAFS impacts from past research. This was due to lack of sufficient data and information on these areas of performance as the Evaluation team's mandate and resources did not allow collection of primary data. Likewise, the Evaluation team was not able to map CCAFS' linkages to non-CCAFS research and development activities related to 'food security and climate change' in the regions, nor

[10] https://organizationallearning9.wordpress.com/deutero-learning/

assess comprehensively CCAFS' comparative advantage in relation to other climate change research providers, although the team considered comparative advantage in relation to national competencies. The schedule as planned in the Inception Report did not hold taking the completion of the final report well into 2016.

Regarding methodology, the Evaluation team did not use the case study approach to the extent envisaged, especially regarding the assessment against the evaluation criteria. The conduct of the case studies was somewhat variable and therefore they are not included in an annex. The conceptual framework which was presented in the IR and which links QoS, relevance and effectiveness, was envisaged to be used to assess projects and activities. However this was not done systematically. Portfolio analysis to assess relevance and coherence was done through sampling rather than through comprehensive assessment of projects.

1.7 Limitations of the Evaluation

Given the broad geographic scope of CCAFS, and the matrix management system including five regions and four FPs, the Evaluation team opted to do its main analysis at the region by FP interface through a small number of case studies allocated to different team members. For the Program level assessment, each team member was allocated one of the four key evaluation questions that addressed the effectiveness criterion specifically. This approach, combined with time restrictions, somewhat limited the comprehensiveness and consistency of analysis at different scales, particularly at the Program level. The TLL approach presented limitations. Given the limited resources and scope of the Evaluation, the assessment of what is good and most correct in the context of climate uncertainty relied to some extent on individual subjective assessment. Furthermore, interaction of the Team following initial evidence analysis was not sufficient to fully employ the TLL approach. Thus, the Team was unable to make a full collective assessment of how successes could be best amplified. Due to the delay in the evaluation, there is a time lag between collecting the evidence on which the assessment is based and finalizing the report. The team acknowledges this in relevant places of the report e.g. where the research has been recently completed, where the Program has already identified improvements and where new strategies have been developed.

2 Program management and quality of science

2.1 Program management

Given that CCAFS' management and governance issues have recently been evaluated[11] this Evaluation focused on aspects that were not addressed in the previous reviews. The CCAFS-commissioned review concluded that both the ISP and the Program Management Committee (PMC) have set up effective mechanisms for strategic decision-making. It also assessed positively the management mechanisms (including at CIAT), which have been put in place to support CCAFS.

This subsection assesses how well CCAFS has been managed in terms of portfolio management through priority setting and fund allocation, delegation of management for key components of the Program; the RBM mechanisms introduced; the monitoring, evaluation and learning (MEL) system; and, the procedures for assessing outcomes. The subsections that follow relate to the KEQ on the robustness of the Program's MEL system.

Portfolio management

Competitive fund allocation

CCAFS has been actively managing its project portfolio by gradually introducing a competitive process to guide allocation of W1/2 funds. CCAFS has increasingly given more attention to the strategic fit of projects within the portfolio experimenting with various mechanisms to distribute funds. The Evaluation team used the ISP meeting minutes and the work and budget plans of CCAFS to gain understanding of how funds, especially W1/2, have been allocated by the Program Management Unit (PMU).

The 2011 budget was largely based on the approved Proposal and, as with other CRPs, based on historic budget allocations. The initial portfolio consisted of projects that centres chose to map to CCAFS on basis of perceived relevance to climate change. In 2012 budgeting continued as earlier, but with reduced W1/2 funding available, CCAFS started to consider the strategic fit of the research proposed and the bilateral funds raised in making decisions on W1/2 fund allocation. At that time it was also noted that centres made requests for W1/2 for capital investments, which had to be further justified so that the PMC could make a decision.

In 2013, the first step into a more performance based allocation of core funding was taken. This involved evaluating the centres' performance against ten weighted variables. The rating system is shown in Table 2-1.

[11] CCAFS Governance and Management Review 2013.

Table 2-3: Criteria and weights used for CCAFS fund allocation decisions in 2013

Variable		Weight
Strategy	Strategic fit of activities	0.20
	Degree of representation in CCAFS portfolio	0.09
Reflection of CCAFS principles	Gender: activities and reporting	0.07
	Partnership budget	0.05
	Communicating CCAFS	0.06
	Inter-centre synergies	0.08
Ambition	Bilateral percentage	0.06
	Ambition of activities and deliverables	0.12
Admin efficiency	Reporting of outcomes	0.25
	Timelines	0.02

Source: Minutes of CCAFS 3rd ISP meeting.

For 2014, CCAFS decided to use the 2013 allocation to centres as basis (and also allocate a budget for the FP4 trial) and only 6% were re-allocated on basis of the performance system depicted above. The rationale was that centres were "rising to the challenges and so major differences are no longer justified."[12]

CCAFS used the opportunity to apply for an extension phase to implement a major change. Although the Program was initially approved for 5 years, including 2015, CCAFS prepared the Extension Proposal for 2015-2016 in order to organize the research portfolio anew. W1/2 funds were allocated using a competitive process in which centres were asked to submit concept notes. In shaping the new portfolio, CCAFS management relied therefore not only on strategic fit but also on past performance. This resulted in changes in the strategic directions of the FPs, and major shift in funding to individual centres, with some increasing their W1/2 share and other losing projects.

A competitive process as used for the CCAFS extension phase has advantages and disadvantages. If there is clarity in the selection criteria and steps as well as on the "rules of the game", a competitive process can help to make the portfolio more coherent and can replace an *ad hoc*, or historically based system for allocation of resources. However, a risk of such a competitive process is to lose space for experimenting with new research areas that are not yet recognized to be the highest priority but could be relevant in the future.

The interviews indicated that at the beginning most researchers supported the competitive process because it was perceived as a good means for streamlining the portfolio in an objective manner. The researcher survey, however, shows that some questioned the fairness of W1/2 funding allocation. Also interviews with individual CGIAR researchers and some evidence from researcher survey indicated a perception of lack of clarity on how final decisions were reached. This seems to have negatively affected the perception of several researchers about the success of competitive process. As part of the competitive process, CCAFS management provided selection criteria and guidance for the preparation of concept notes and proposals, but some (few) researchers' perception is that the decision-making process could have been more transparent. On balance, the Evaluation team

[12] CCAFS Business Plan 2014

concludes that the process has contributed to achieving greater coherence in FP and regional portfolios.

Flagship Project-Regional Program Matrix management

CCAFS has used a matrix management approach where the four FPs are implemented in the four regions with leaders both at FP and RP level. In 2013, the ISP commissioned a review to assess the effectiveness of theme by region matrix for international public goods (IPG) and development outcomes.[13] The review came to the conclusion that the matrix structure is positive for the delivery of results and should be maintained. The review recommended further strengthening of the regional functions, which it saw as essential in facilitation of activities and delivery of results.

On basis of its observations and interviews during field visits and through case studies, the Evaluation team confirms the review's assessment in support of the CCAFS matrix management structure. The team saw the dynamic regional teams and close engagement with national partners, which would unlikely have been as evident through only globally managed FPs.

'Outsourcing' of components to be managed by other partners

CCAFS is formally led by CIAT and is a collaboration among all the 15 CGIAR research centres. Due to an arrangement dating back to the Challenge Program, the CCAFS coordination unit is hosted at the Faculty of Science of the University of Copenhagen where the Program Director is based. Several members of the CCAFS PMC are based in non-CGIAR organizations.

CCAFS has taken advantage of its ability to 'outsource' the management of key components of the Program to non-CGIAR specialist organizations, and by so doing to bring into CCAFS specialists in key fields of climate-related science. It has done this through partnership with leading organizations, and two of the four FP leaders are based in non-CGIAR centres. The FP3 leader is from the Gund Institute for Ecological Economics of the University of Vermont, and FP2 leader from the International Research Institute for Climate and Society of Columbia University. Both are part of the CCAFS PMC. FP management includes defining and communicating strategic direction, managing staff, administering management and partner research funds, overseeing research activities, developing partnerships, capacity enhancement, contributing to research, reporting, communication, and resource mobilization.

Another example of partnering and in effect 'outsourcing' component development and management has been the Future Scenarios project[14]. CCAFS identified the need to provide policy-makers with tools to support medium-term decision-making that factored in climate change. The Program established a team at the University of Oxford's Environmental Change Institute that then developed the scenarios project under FP4. This project now informs climate, agriculture and socio-economic development policies in seven countries. Other partners in this work include the UNEP World Conservation Monitoring Centre, FAO and Oxfam. The project out-sourced management through delegating responsibility for running the work in LAM priority countries to the Universidad para la Cooperación

[13] Andrew Ash, CSIRO (2013): Managing the CCAFS Theme by Region matrix for international public goods and development outcomes

[14] https://ccafs.cgiar.org/scaling-out-scenario-guided-policy-and-investment-planning#.VsMtN-Yv305

Internacional in Costa Rica. This delegation to regional centres allows CCAFS to operate closer to the next-user policy-maker constituency in appropriate languages and with the proximity necessary to be responsive to emerging windows of opportunity to influence policy developments and outcomes. Targeting of the recent INDC process in Costa Rica[15] is a case in point.

The coordination unit's location and broad distribution of management, in addition to the program management capability to hire expertise from an international field of potential collaborators, has enabled CCAFS to take an outward-looking approach to managing the human resources available to the Program for maintaining comparative advantage and to bring in high calibre managers in key positions.

Results-based management

During 2014-2015 CCAFS was one of five CRPs to trial RBM. This was done under FP4 and in conjunction with the development and initiation of the Planning and Reporting platform (P&R). Additional staff were brought in to facilitate and support these innovations. The P&R platform plays the role of linking MEL to Program management across RPs and FPs.

The RBM trial covered six projects. Criteria were set against which successful projects were allocated bonus resources (10% of the total cost of the six projects). The weighted criteria were: progress towards outputs and outcomes, movement along impact pathway, quality of partnerships, communications, and gender issues, and project responses to changes in context and ability to adapt.

The trial revealed that significant adjustments and simplification of the RBM and related processes were necessary to ensure sets of harmonized projects in the regions. CCAFS leadership and the authority of the Program Director were needed to drive the initial RBM process forward. CCAFS research staff report that the introduction of RBM has led to adjustments in project plans, greater focus on outputs and better investments towards delivery of outcomes. However, an anonymous on-line survey of the RBM project trial participants highlighted that the RBM version was perceived overly complex and time-consuming. The RBM trial revealed the necessity to have concise, timely and consistent information on planning, budgets and reporting for all projects.

The RBM application has been conducted using an impact pathway approach rather than the traditional logframe. The elements of the RBM now employed across CCAFS include targets and target indicators comparable across the regions, and regional impact pathway specification. CCAFS is investing sensibly in making the RBM system simple with low transactions costs. The RBM and the P&R platform are aimed to help harmonize monitoring and evaluation so that evidence can be aggregated at higher levels and across regions. A clearer communication and external understanding of results is also sought. While the Evaluation team commends the progress, it emphasizes the importance of streamlining.

The RBM experiment has shown that the expected outcomes set at the project level are often too ambitious, and achieving them requires different partners and partnerships. An internal CCAFS assessment of the RBM initiative concluded that: "… CCAFS management may need to develop appropriate mechanisms to modify regional and FP portfolios so that outcome targets can indeed be

[15] https://cgspace.cgiar.org/rest/bitstreams/65429/retrieve

achieved; this may require gap filling, shifts in activities, and projects having access to different or modified skill sets, for example."[16] The Evaluation team notes that while achievement of outcome targets depends on many other actors than just CCAFS, the Program needs coherent, complete and contextually relevant outcome pathways.

This is compounded by the fact that at the project level, the information (e.g. impact pathways) entered into the P&R platform is very variable, and in the case studies analyzed, tended to be formulaic and in some cases lacking in sufficient detail to obtain a clear picture of what was being done and why, and why certain boundary partners had been selected (or not) to achieve the planned outcomes. This casts some doubt as to how robust the information really is for planning, design and MEL purposes. It also raises the question where in the process of project selection FP and RP leaders obtain the necessary information to judge the scientific rigour of the projects.

The Evaluation team found that the RBM and associated ToC and impact pathway innovations in program management increased responsibility and accountability of project leaders. The RP leaders now have a greater project oversight role. It has been necessary to devote time by senior and support staff to align projects within regions and to achieve strategic engagement by CGIAR centres. For the RBM system to work as a positive incentive structure that acts to increase effectiveness, behavioural change in researchers is needed, which in turn needs investment in an evaluative culture that rewards learning from failures as well as successes, and thereby enhances effectiveness. Such changes were observed in SA and LAM regions among CCAFS researchers. CCAFS' partners also identified appreciatively in interviews that CCAFS brought a more outcome-oriented approach.

Monitoring, evaluation and learning

In this section the Evaluation team addresses the KEQ on the robustness of CCAFS' MEL system.

Developing a system to understand the evolution, performance and impact of a program with the scope and scale of CCAFS is a complicated and large task involving a range of stakeholders. As noted in the subsection on the RBM, CCAFS management has found that the development of a Program evaluative culture has been necessary. However, while two thirds of CCAFS researchers surveyed consider that their projects do have explicit impact pathways, half consider that they have not received adequate training in ToC and impact pathway development. The Evaluation team found that project information in the P&R platform is often lacking in specificity, which indicates that project level ToCs and impact pathways have not been sufficiently well developed. Nearly 80% of the survey respondents agree that CCAFS has the potential to help streamline monitoring and reporting.

The basic components of a MEL system are baselines, monitoring mechanisms, assessment of outcomes and impact with attention to counterfactuals, attribution (or contribution that may be more realistic) and impact pathways, and use of independent evaluation. Each of these is assessed below.

Baselines

CCAFS has conducted baseline surveys at household, village and organization levels across its five target regions using common templates. Collection of baseline data happened in two phases: 2010/11

[16] The CCAFS Flagship Program 4 Trial on Results-Based Management Progress Report.

in SA, WA and EA and 2014/15 in LAM and SEA. Importantly, the Program has invested in making the baseline data and surveys public through the Dataverse website[17].

A tension the Program encountered is the trade-off between aiming for methodological consistency across all baseline sites and catering for the location and context specificity of the regions, which would require a more nuanced survey design. In addition, baselines in some regions needed to meet multiple objectives (baselining *sensu strictu* versus determining key issues and scoping research priorities).

The baselines at smallholder farmer level have been recorded at the CSVs and these can be used to track, for example, the impacts of CSA technology adoption on livelihoods and the farming systems. However, the data collection templates have developed over time, and, as a result of the above tension between baseline consistency and accounting for social and environmental context, they have changed. The way that gender aspects are examined has improved, while the CSV level surveys were extended to include the broader landscape dimension (e.g. SEA). The trade-off is that the comparability across CSVs baselines in some areas has become a bit more limited.

The baselines at national and regional levels include keeping stock of policies, processes and the flux in the international climate regime that is being supported by CCAFS. This is a challenging task, but it is strongly in the interest of CCAFS to do to be able to demonstrate how the Program influences policy development.

Planning and Reporting platform

The CCAFS P&R platform is an ambitious and innovative initiative to bring about the collation of information and evidence for adaptive management of the Program at different levels. CCAFS, to its credit, is investing in a 'FAIR' – findable, interpretable, accessible, and re-useable – information management system[18] that sits in the public domain. The information management package that operationalises the P&R platform includes processes for self-correction and calibration of results. The platform is linked to other data and information repositories in the public domain.

The P&R platform and the information management package demonstrate both CCAFS' focus on validated outputs and outcomes, and interest in MEL. The system covers all research irrespective of funding. Over 80% of CCAFS researchers surveyed agreed with the statement that the P&R platform is useful to support them in planning research. However, researchers commented that the P&R platform was extractive and required time to engage with. Given the risk of overburden, it was positive that some commented that after redesign the P&R platform works and could be used more widely than just CCAFS.

Furthermore, the P&R platform does not explicitly recognize which project outputs are inputs to which other projects. The Evaluation team thinks that it is very important that more project planning take

[17] https://dataverse.harvard.edu/dataverse/CCAFSbaseline
[18] Presentation by David Abreu CCAFS Knowledge and Data Sharing Coordinator: https://prezi.com/o0tetbubplke/knowledge-and-data-sharing/

place before a project starts, so that the documentation in the P&R platform gives a clearer picture of linkages, which can then be better monitored and understood.

The Evaluation team concludes that the P&R platform has more potential for project management, including sequencing, and prioritization than has been realized so far. The team recognizes that a balance has to be struck between obtaining adequate project information and the effort required. The team is confident that as the P&R matures, CCAFS researchers will more fully see the value of the platform and less time will be required for information inputs.

Using impact pathways in learning

Impact pathways (see section 3.1) have led to increased attention on impact and on MEL as a way of validating attribution of influence and impact across CGIAR researchers involved in CCAFS and the program's partners.

However, interviews with key CCAFS staff and research partners showed that work on ToCs (see section 3.2) related to the impact pathways at RP and FP levels needs to be taken through to help establish more robust MEL frameworks. For example, those assumptions and risks that are researchable need to be translated into hypotheses for testing during project implementation. Similarly, although the participatory impact pathway analysis[19] used to develop the regional impact pathways is designed to generate what are called 'stretch objectives' that provide incentives for learning from failures and successes, there is little evidence that the impact pathways have been taken this far. Recognizing that this extra step requires additional inputs, the Evaluation supports an ongoing effort by CCAFS to strengthen adaptive learning processes.

Use of evaluation in CCAFS

CCAFS management and governing bodies use evaluations and reviews for gaining evaluative information of the Program at different levels. These are commissioned by the ISP and CIAT Board and the FP and RP leaders. In addition, donors have commissioned reviews, and CCAFS has been subject to the systemwide review of governance and management.

The consistent effort in evaluations by CCAFS management is in line with CGIAR's Evaluation Policy. CCAFS has followed the IEA guidance for conducting CRP commissioned external evaluations. Evaluations including strategic areas for future evaluations are discussed both at the ISP and PMC meetings, and evaluation ToRs and related documents are presented to the ISP. ISP (or CIAT Board) also prepares a Management Response to CCAFS-commissioned evaluations.

The Evaluation team had access to a variety of reviews, which were used as inputs into this CRP evaluation (Annex C). The team noted some variability in coverage and depth among the evaluations and reviews. Many involved only one reviewer and relied mostly on desk research with little possibility for triangulation. This does not necessarily mean that the findings and recommendations of such reviews are not valid, but they may not be as solid as they could be. The team didn't find all reviews equally informative regarding analysis. For example, the capacity enhancement review was largely

[19] https://cgspace.cgiar.org/bitstream/handle/10568/33649/11.5%20Participatory%20impact%20pathway%20analysis.pdf?sequence=1

limited to counting the number of activities. Likewise, the report on CGIAR citations in IPCC reports was limited, without any qualitative assessments.

Despite these observations, the team was impressed by CCAFS' attention to self-assessment through independent, external studies as a tool for Program management and oversight, and for learning. The mix of major reviews (such as the CCAFS Governance and Management Review and review of Research Theme 3) and smaller pieces of analysis seems to reflect Program needs at different levels of operation. Since CCAFS places a lot of emphasis on its geographical focus, it is surprising that no geographically focused evaluations have yet taken place.

Impact assessment

The issue of attribution

In CCAFS counterfactuals are being set according to characterization of technology use and policy frameworks before CCAFS interventions, inputs CCAFS provides, and the resulting changes in different domains. For example, there has been examination of technology adoption data before and following climate analogue exchange visits by famers groups.

Addressing national climate change response priorities creates challenges for monitoring and then being able to attribute influence to CCAFS research. Most such activities are embedded in countries' or partners' priorities and initiatives and are subject to many internal and external influences. Results are at the level of policies, for example from the project on Low-emissions Development Strategy in Colombia and from agricultural and forestry NAMAs in Kenya and Colombia (see section 3.4.3). In addition, many FPs' activities are derived from previous experience and networks of CCAFS partners. The value of mainstreaming CCAFS' work into the priorities of the countries and partners and using existing installed capacity and knowledge is obvious. It necessarily follows that it is difficult to define how much of the impact (if any) is attributable to CCAFS interventions and research. A possible solution to this is to conduct contribution analysis (for which there are various methods). Contribution claims can be made if, following the intervention, the expected outcomes occur and the assumptions are verified, and if rival explanations are taken into account. In the Evaluation team's view, this has not been done in a level of detail that allows contribution claims to be made.

Assessment of outcomes and impact validation processes

CCAFS uses a combination of methods to examine the results and outcomes of its work. The Climate Change Social Learning (CCSL) initiative[20], and the reflective methodology developed, has allowed CCAFS and partners to make effectiveness assessments of research and development processes and to learn lessons[21]. To quote "CCSL is … an attempt to fundamentally change how CGIAR scientists and the communities they work with and for, communicate their shared knowledge and experience and

[20] https://ccafs.cgiar.org/publications/archive?keys=climate+change+and+social+learning&field_type_tid=All&field_themes_tid=All&field_regions_tid=All&language=All&field_year_ref_tid[]=16973&field_year_ref_tid[]=18287

[21] See for example: https://ccafs.cgiar.org/publications/dilemma-participatory-selection-varieties#.Vs1UNuYv1A4

learn together". Reports from the CCSL work provide useful insights on the learning achieved and the constraints to achieving impact.

Recently baseline, monitoring and project data have been used for assessing the effectiveness of interventions[22]. CCAFS results are presented as a series of outcome cases[23] wherein CCAFS support to initiatives related to CSA are presented as summary, key facts, lessons and links to research outputs. Currently two dozen outcome cases are featured on the CCAFS website. The role of CCAFS is explained but, as discussed above, robust evidence of contribution, let alone attribution of outcome to CCAFS is lacking.

Outcome validation by external assessments has been used in a few cases (e.g. research into policy assessments in Colombia, Kenya and Sri Lanka[24]; and assessment of laser-levelling technology in India[25]). They have so far provided largely qualitative checks on the results from research into processes, plus material and evidence for adaptive management of the program. CCAFS provides management responses to these. Some of the outcome validation reports, for example the 'Validation report outcome stories for CIAT-CCAFS projects in Colombia during 2014[26], have failed to generate robust evidence of the extent to which CCAFS' interventions have contributed to outcomes and impact. This is in part due to the timing of the third party outcome validation work coming too early, and in part due to the problems of making attribution to single sources of influence when many factors are at work (see discussion above). In CCAFS management response to this report it is stated that although the Program had influenced the design of a NAMA in Colombia no formalization nor implementation had occurred. This report also highlighted the difficulty for a research program to have all the procedures in place to track influence in convoluted policy processes.

While CCAFS is taking outcome and impact monitoring challenges seriously and investing in both methodological developments and resourcing processes, further improvements are required. Technology adoption impacts on livelihoods of farming households and influence on policy outcomes pose significantly different impact assessment challenges. A key to assessing climate adaptive changes in farming systems is the normalization of performance data by evidence of climate challenges – for example normalizing yields using meteorological data.

The 10km x 10km CSV are being used to assess adoption of CSA technologies. CCAFS researchers have shown interest in establishing randomized control trials within the CSV locations to enable more robust assessment of factors influencing adoption. Randomized control trials (and other experimental methods) suit best testing of specific technologies, such as varieties. However, practical and ethical issues need to be considered in leaving people out as control groups. Adequate impact assessments will require choices of methods that are appropriate in different contexts and for different purposes. Contribution analysis could be used for challenging assumed causality regarding knowledge transmission, forecasts and policies that require different methods than assessing the impact of

[22] See for example: Winowiecki, L. et al. 2015. Increasing Food Security and Farming System Resilience in East Africa through Wide-Scale Adoption of Climate-Smart Agricultural Practices.
[23] https://ccafs.cgiar.org/research/results
[24] https://cgspace.cgiar.org/rest/bitstreams/56556/retrieve
[25] https://cgspace.cgiar.org/rest/bitstreams/51774/retrieve
[26] https://cgspace.cgiar.org/bitstream/handle/10568/65221/Validation%20Report%20CIAT.pdf?sequence=1&isAllowed=y

agricultural practices. Furthermore, impact assessment will require more resources than currently planned.

Economic valuation of benefits arising from CCAFS research and research outputs is necessary to substantiate impact assessments, and the Program management recognizes that this is an area for further work. In the FP call for proposals in 2014, FP calls 1.2 and 1.3 requested proposals that included cost benefit analysis to identify promising practices and technologies, and to help plan climate adaptation at local to national scales. The IFAD-CCAFS call in 2015 sought to attract proposals containing novel economic approaches to evaluate climate adaptation options.

There are some examples of the use of economic analysis emerging using a range of methods in different intervention areas. Tools used include standard methods such as contingent valuation e.g. willingness to pay, cost benefit analysis, linear programming and net present value, and internal rate of return. CCAFS has also used more innovative methods such as Participatory Social Return on Investment, which is an analytical costing framework that provides a structured framework for multi-stakeholder adaptation planning, including selection and valuation of appropriate adaptation pathways[27].

Examples of how different economic assessments are helping to establish the value of outcomes and impact of CCAFS research are shown in Table 2-2. These assessments have examined farmers' demand and willingness to pay for CSA and climate information systems (CIS) technologies, to identify CSA options in given circumstances, and to assess returns on technology research investments. Economic valuation of CIS provision will be taken forward in FP2. The evidence arising from this valuation could be vital in convincing governments to invest in CIS provision. The trend toward economic assessment of Program and research outcomes needs to continue and be expanded.

[27] See for example: https://ccafs.cgiar.org/research/projects/support-participatory-social-return-investment-psroi-pilot-studies-vietnam-and-lao#.VsQqf-Yv1A4

Table 2-4: Economic assessments conducted by CCAFS

Brief description	Scale of application	Links to further information
Cost-benefit Analysis of adaptation options at local scale with farmers	Practice/ plot	http://www.ifpri.org/sites/default/files/publications/ifpridp01337.pdf
Climate-Smart Agricultural Prioritization (CSAP) toolkit enables policy-makers to make investment decisions for the short, medium, and long term, taking costs and benefits into consideration.	National/ prioritization	http://ccafs.cgiar.org/blog/new-toolkit-climate-smart-agriculture-can-help-policy-makers-make-better-decisions#.VRrwCPnF8k0
CCAFS has developed a tool for prioritizing investments in CSA, and with the support of the World Bank, a pilot program is being developed in Guatemala, with subsequent similar work in Vietnam and Mali also underway.	National/ prioritization	http://ccafs.cgiar.org/blog/creating-learning-centre-agricultural-development-guatemala#.VRsfOfnF8k0
Cost benefit analysis and IRR Calculations for laser-assisted precision land levelling	Practice	Gill, G. 2014. An Assessment of the Impact of Laser-Assisted Precision Land Levelling Technology as a Component of Climate-Smart Agriculture in the State of Haryana, India
Cost Effectiveness Analysis and Cost-benefit analysis of mitigation/adaptation options for pasture systems, rice, fruits, rubber and soybean in Colombia.	National/ prioritization; Practice	http://aclimatecolombia.org
Participatory Social Return on Investment pilot studies in Vietnam, Lao PDR, Nepal and Ghana	National/ prioritization	https://ccafs.cgiar.org/research/projects/support-participatory-social-return-investment-psroi-pilot-studies-vietnam-and-lao#.Vs1isuYv1A4

Source: Extracted from a table provided by CCAFS management in July 2015.

Conclusions

CCAFS has established complementary processes for managing the strategic coherence of the portfolio and Program performance. These include the competitive process for allocating W1/2 funds that have formed major part of CCAFS budget, piloting and further development of the RBM system, use of evaluative studies at different levels of management, and setting up the P&R platform. The P&R platform represents a good start at gathering valuable management information and demonstrates the Program's commitment to validated outputs and outcomes and to MEL. This platform could be a model for other CRPs. It should be further improved to allow managing project sequencing and assessment of proposal quality (see section 2.2).

CCAFS has engaged expert staff from international field in some of its FP and RP leadership positions and consequently in the PMC. This, as also the location CCAFS' coordination unit, has allowed the Program to take an outward-looking approach to management of its human resource and bring in high calibre expertise.

The Evaluation team considers that the MEL framework would better support the results orientation of the Program if in using the ToCs as dynamic decision support tools, the most central researchable

assumptions and risks are tested as hypothesis in the research process to better understand and adjust strategies for impact achievement.

In general, the Evaluation team found outcome and impact assessment lacking. A number of success stories of outcomes cases have been published, but they lack robust evidence of CCAFS contribution to outcomes. Notwithstanding the challenges in impact assessment of climate-related research on livelihoods and policy, including attribution to CCAFS, investment in more rigorous impact studies is needed. Adequate impact assessment, particularly of CSV sites, may require greater resources than is currently planned. In particular, there is need for CCAFS to monitor and document the effects of its CSA interventions on food security under climate change, differentiating climate effects from other effects. CCAFS has done some economic valuation of benefits arising from CSA, and the Evaluation team encourages further work in this area.

2.2 Quality of science

In this section the Evaluation team presents main results from its assessments of quality of research management processes, quality of scientific staff and of scientific outputs. The assessment is primarily based on interviews, case study projects, analysis of the staff survey results and review of key outputs provided by FP and regional leaders, particularly in SA and SEA. The assessment of quality of scientific publication outputs was supported by an independent peer review (as explained in section 1.5.3).

Review of research process and practices

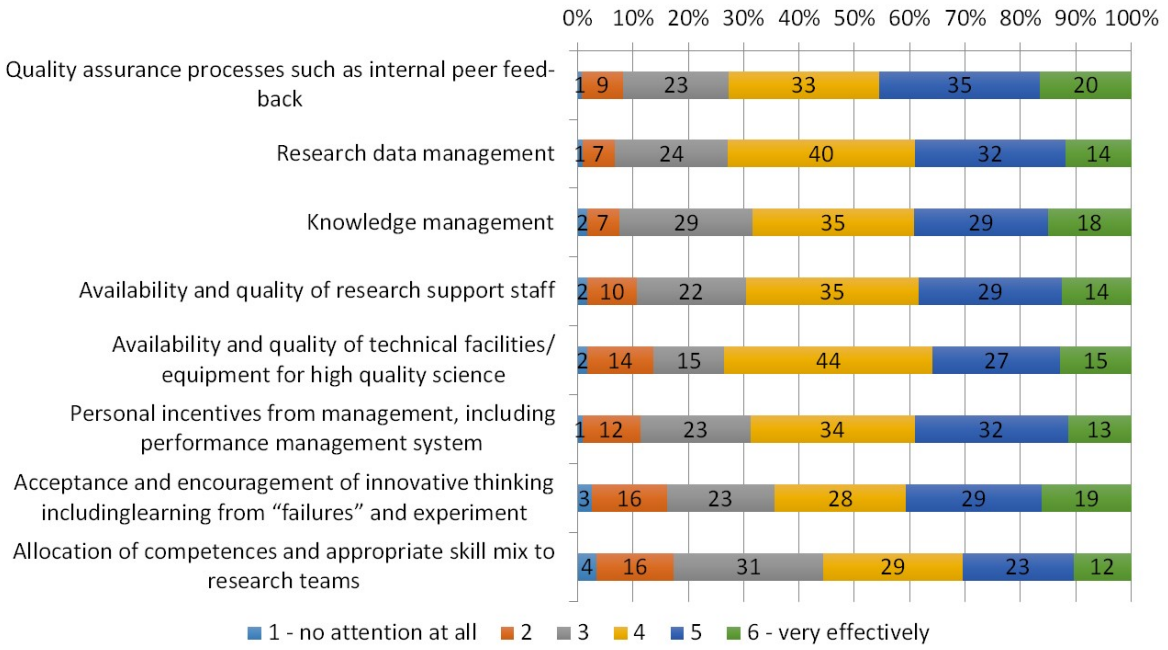
The Evaluation team's assessment is that CCAFS' research management aims at consistent and coherent high quality science. Initially, this intent was constrained by the legacy nature of centre projects mapped into CCAFS. However, in the Extension Phase and after the restructure of the Program, CCAFS research leaders were to a greater extent able to influence aspects of QoS such as greater research integration (see section 3.3.3) and a more systems-based approach to research, by referring back to the Program's ToC and impact pathways. Evidence for the degree to which the use of W1/W2 funding was also instrumental in influencing QoS (in addition to Program coherence and effectiveness) is mixed. In the researcher survey, two activities related to QoS, namely integration and competitive allocation, were considered among the most important purposes of W1/W2 allocation (50% and 40% of respondents, respectively, scored 5 or 6).

Research prioritization originates from the FPs' impact pathways, and is then interpreted according to FP and RP leaders' defined needs and their concomitant allocation of W1/W2 funds. Conversely, the choice of scientific methods used is more the prerogative of the project researchers. In terms of research management and control of QoS, there is a distinction of roles between the FP and RP leaders (see discussion of matrix management in section 2.1.1). The former are primarily responsible for QoS oversight and synthesis, while providing RP leaders freedom to operate to drive program coherence in regions to maximise probability of achieving outcomes. Both levels of CCAFS leadership have less control over actual projects (except those they lead directly) and therefore science management at the project level. QoS at the project level is determined by the calibre of project leaders, and also by the respective host CGIAR centres' procedures and support infrastructure.

In the researcher survey a third of respondents considered that their own assessment of the scientific knowledge gaps influenced FPs' choice of research. A similar percentage of researchers considered that they contributed to CCAFS' production of science-based IPGs. When asked how effectively the

researcher's centre or CCAFS support assured high quality research, informants reported a high level of satisfaction with the quality assurance, research support and facilities available to them (see Figure 2-1).

Figure 2-4: Researcher survey responses on management of science quality



Source: CCAFS researcher survey.

However, individual researchers did comment that internal review of the processes and research is insufficient because of the pressure to produce more papers instead of research with real impact. Half of the respondents did not find that sufficient attention is given to personal incentives. The respondents scored CCAFS most positively (scores 4-6) on encouragement of innovative thinking and learning.

The Evaluation team also assessed research processes and practices in the RPs. In the regions, most projects across all FPs comprise a component of innovative strategic research. In SA examples include projects designing and evaluating the next generation climate-smart farming systems using permanent drip irrigation and precision agriculture concepts; innovative concepts of storing 'surplus' flood water in aquifers (spanning the technical aspects of injecting water into aquifers coupled with social and institutional research to design storage maintenance and water sharing); and crowd sourcing approaches to identify hotspots for germplasm conservation and crop improvements. However, there is a risk that some of this innovative research in all of these projects is too science driven and not sufficiently grounded in the trajectories of the rapidly changing farming realities in SA.

Rigour of scientific methods was assessed in more detail in SA. The field research observed in India is being conducted rigorously, making appropriate use of partners in Indian Council of Agricultural Research and other institutions. Modelling, which constitutes a core component in FP2 and FP4 is robust and well established. However, extrapolation of CSA practices in FP1 could benefit from a stronger link to farming systems or household modelling that would require additional modelling skills and partnerships that allow cogeneration of knowledge with the farmers. Evaluation of GHG emissions

from CSA practices using the DeNitrification-DeComposition model is less robust and requires a greater deal of local validation to be more credible.

In SEA, where many projects are too early to clearly distinguish what strategic science and journal papers will emanate, there has been some strong prior component science done by individual centres [e.g. work by the International Rice Research Institute (IRRI) on Alternate Wetting and Drying (AWD) as a mitigation strategy in irrigated rice systems; work by the International Water Management Institute on ground water resources in Laos]. The most innovative emerging strategic research is the question of 'what processes can facilitate adaptation, resilience, mitigation?' i.e. the 'science of delivery' or social learning, as opposed to 'what techniques can be developed and deployed to underpin adaptation and mitigation'. The science of scaling is also a domain worthy of deepening by CCAFS, as presently out- and upscaling approaches are still uncertain and contested amongst the projects and across the Program.

Research activities in WA are delivering increasingly accurate information on climate change risks and their link to food production at the local level. Downscaling climate information is done rigorously and steps towards climate data generation and validation are included in the portfolio. The research strategy creates a knowledge bridge between FP1 and FP2, while science-policy platforms at different levels allow cogeneration of knowledge with impact on policy design (FP4). In LAM one of the most innovative research areas is the transdisciplinary science-based design of INDCs, where the Program is a pioneer in the region.

The P&R platform was not helpful in assessing QoS, as the proposals did not have clearly articulated methodologies, lacked detail in research design and there was little or no referencing of prior research. This raises the question of what tools FP and RP leaders use (beyond those in place within individual centres) to assess scientific rigour of proposals submitted into the P&R platform (see discussion in section 2.1.3).

Staff

The results of the bibliometric analysis of lead scientists in CCAFS and associated centres are provided in Table 2-3 and Figure 2-2. The sample consisted of 26 individuals, selected within three categories. The median H index of CCAFS science leaders is 24 and is commensurate with H indices of science leaders in advanced research organisations (e.g. the Commonwealth Scientific and Industrial Research Organisation). Their rate of journal publication, with a median of 16 papers over 5 years (2010 - 2014), is high and comparable to advanced research institutes. H indices and publication rates for RP leaders and centre contacts are lower (although there are notable exceptions with a few individuals in both categories achieving H indices of 28 and 39, respectively), but this is to be expected in the case of the RP leaders, as their focus is much more on delivery and outcome generation.

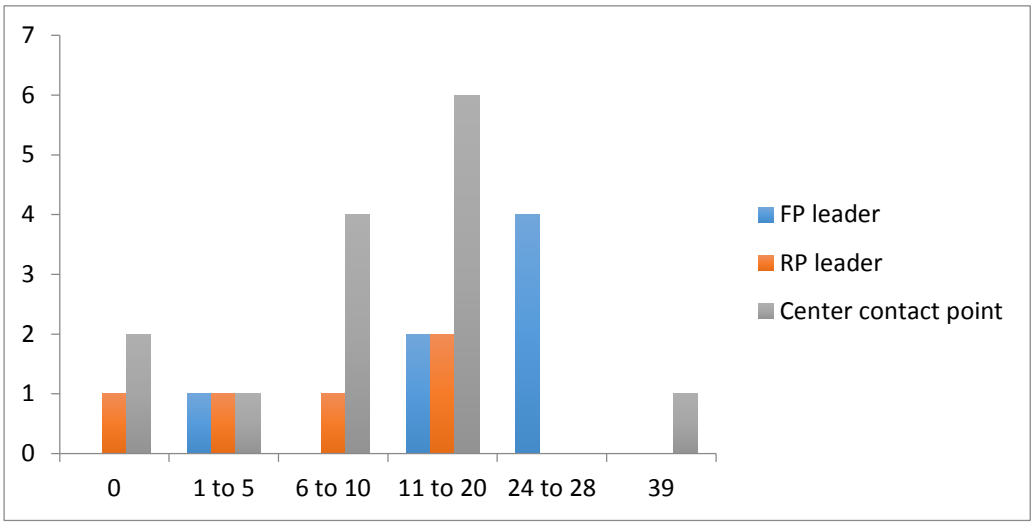
While the H index is a useful measure of academic productivity and scientific impact, it does not capture dimensions of thought leadership expressed through research design and mentorship of younger scientists. These attributes however were observed in multiple interactions with a wide cross-section of project leaders and senior researchers, as well as FP and RP leaders. The latter group in particular were seen to have a significant role in research design and mentorship, both with CGIAR scientists and with scientists in the National Agricultural Research Systems (NARS).

Table 2-5: Summary results of H index analysis

	N	H Index (Scopus)		No. of journal articles	
		Median	Range[1]	Median	Range
CCAFS management and FP leaders	7	24	4 - 28	16	6 - 36
CCAFS RP leaders	5	9	0 - 20	7	0 - 24
Centre contacts / thought leaders	14	11	0 - 39	4	1 - 10

Source: Evaluation team based on Scopus H indices.

Figure 2-5: Distribution of h-index by groups of research leaders



Source: Evaluation team, based on Scopus H indices.

Based on metrics such as H index, and observations made during interviews of CCAFS scientists the Evaluation team regards the scientific competence of individual scientists as generally high. However, in the Evaluation team's view some project teams might been strengthening in their mix of disciplines, for example in the area of social science and agricultural systems modelling. This is the case in particular with regard to the need to broaden the CSA concept to include other livelihood dimensions (see section 3.3.2) and extend it beyond climate-smart cropping or livestock production.

One issue of concern arising out of many interviews was the heavy load under which project and science leaders are operating. This results from a significantly increased frequency of transactions across the Program and centre matrix, but also across the science to impact continuum. The Evaluation team observed individuals who could be considered close to burnout. In other instances the Program is reliant on key individuals with a unique mix of scientific experience and deep networks to policy-makers and the private sector, leaving the Program vulnerable should they leave the Program.

On basis of the researcher survey, the team concludes that perceptions on research infrastructure, data management and other factors of research quality management are very centre specific and seen by many respondents as the centre responsibilities. With 15 participating centres, the satisfaction on how well these factors have been managed varied a great deal. Several respondents noted a difference between the home centre and CCAFS in management for quality.

Quality of science outputs

The Program produces a wide range of outputs, including scientific publications such as papers, books, chapters and research reports; technical manuals on methods and certification protocols; information and communications technology (ICT) based products such as farmer agro-advisories and weather forecasts; crop insurance products; climate-smart crop production practices; web-accessible databases; and policy briefs and blogs. In the following we focus on the quality of scientific publications, while some of the other outputs are discussed in section 3.4 in terms of IPG generation, or are covered in Section 2.1 in the context of outcomes and impacts.

Table 2-6: Overview of publication outputs generated by CCAFS

Publication category	2010	2011	2012	2013	2014	Grand Total	Frequency
CCAFS briefs, info notes	1	23	16	5	21	66	5%
CCAFS report	1	5	3	4	6	19	2%
CCAFS working paper		12	23	23	13	71	6%
CCAFS manual, strategy, program docs		3				3	0%
Conference		38	24	38		100	8%
Journal article	35	65	101	165	108	474	39%
Book and book chapter	9	26	24	32	16	107	9%
Policy brief	6	18	5	18		47	4%
Report	1		41	13		55	5%
Working paper	3	6	11	7		27	2%
Other	4	114	13	57	47	235	20%
Grand Total	60	310	261	362	211	1204	

Source: CCAFS publications lists from CCAFS Annual Reports.

CCAFS provided the Evaluation team with a database of 1204 CCAFS outputs (Table 2-4), of which 474 were classified as journal articles. This is a large number compared to other CRP evaluations (e.g. Policies, Institutions and Markets = 167; Aquatic Agricultural Systems = 214; MAIZE = 238; WHEAT = 291[28]). However, a rapid appraisal of the list indicated that there were instances of doubtful attribution of papers to CCAFS, which indicates that the total count is an overestimate; a problem CCAFS shares with other CRPs.

The sample size of scientific papers used in the independent review of quality of scientific publications was 115 (out of 474), split into four thematic domains (Table 2-5). The sample was deemed to have a good mix of papers using different methodologies, including model-driven approaches, surveys and qualitative assessments. This diversity of approaches enriches the overall quality of the knowledge generated.

[28] Roth and Zimm, 2016. Synthesis and reflections from five CRP Evaluations. IEA Report.

Table 2-7: Sample size for the QoS publications review by article category

Domains	No of journal articles assessed
Agriculture, crop production (AGR)	34
Climate change issues (CC)	33
Economics and social sciences (ECO)	16
Natural resource management (NRM)	32
TOTAL	115

Source: Evaluation team.

The results of the assessment of methodological rigor and coherence of data analysis are presented in Table 2-6. Overall, nearly three quarters of the papers were rated as good or excellent, with some variation across thematic categories, and the economics and social science domain showing a notably lower rating.

Table 2-8: Methodological rigor and coherence of the data analysis

Ratings	AGR	%	CC	%	ECO	%	NRM	%	TOTAL	%
Poor		0	2	6%	5	31%	1	3%	8	7%
Mediocre	8	24%	9	27%	3	19%	5	16%	25	22%
Good	14	41%	15	45%	6	38%	11	34%	46	40%
Excellent	12	35%	7	21%	2	13%	15	47%	36	31%
TOTAL	34		33		16		32		115	

Source: Evaluation team.

Fewer than 10% of papers were rated as very original analytically or conceptually (Table 2-7). However, 40% of papers were rated as rather original, and the climate change domain stands out with 18% of papers being rated as very original. Publications rated as having limited originality were considered to use established rather than cutting edge methods and often the messages were found to reinforce good practice rather than present novel approaches. In the economics and social sciences domain a large proportion of the papers were found to summarise the literature or prior work on policy. While not original, these 'opinion' pieces contribute to development of policy.

Table 2-9: Originality and innovativeness

Ratings	AGR	%	CC	%	ECO	%	NRM	%	TOTAL	%
Not applicable		0%	2	6%	1	6%		0%	3	3%
No originality		0%	1	3%	5	31%	2	6%	8	7%
Standard methods, established knowledge	17	50%	18	55%	6	38%	8	25%	49	42%
Rather original	17	50%	6	18%	4	25%	18	56%	45	39%
Very original, new research, analytical or theoretical concepts		0%	6	18%		0%	4	13%	10	9%
TOTAL	34		33		16		32		115	

Source: Evaluation team.

In general, the standard of referencing used (whether it was up to date, balanced across relevant disciplines, and indicated that the publication took into proper account earlier work) was rated as good or excellent in 76% of the cases, but again with similar variation across the four domains, the economics and social papers rating less favourably (Table 2-8).

Table 2-10: Standard of referencing

Ratings	AGR	%	CC	%	ECO	%	NRM	%	TOTAL	%
Referencing is poor	2	6%		0%		0%	2	6%	4	4%
Referencing is limited	6	18%	4	12%	8	50%	5	16%	23	20%
Referencing is good	16	47%	22	67%	6	38%	14	44%	58	50%
Referencing is excellent	10	29%	7	21%	2	13%	11	34%	30	26%
TOTAL	34		33		16		32		115	
Source: Evaluation team.										

Most of the papers are written by multiple authors from various disciplines. Such strong interdisciplinarity can improve the overall quality of the papers. Analysis of co-authorship showed that CCAFS has a strong body of partner researchers from non-CGIAR organizations in developed and developing countries. This is commendable. However, all reviewers noted that formal acknowledgement of CCAFS in the papers was often lacking.

Reviewers commented that the subject matter of some of the papers was hard to identify as fitting within CCAFS research objectives (perhaps a reflection of misattribution?). Many of the papers provide perspectives instead of primary research findings. Also many of the papers were deemed to be conceptual, often discussing problems related to climate change and agriculture rather than concrete solutions for mitigation and adaptation to climate change within agriculture. Those papers that do present potential solutions do not provide data or results of working solutions. The Evaluation team encourages CCAFS to publish more primary research papers that address CCAFS' goal of generating equitable and gender-sensitive technologies and practices. It would be preferable to have fewer but more relevant papers, rather than papers that are interesting but tangential to CCAFS' central mission.

Table 2-11: Number of citations for articles and book chapters published between 2010 and 2014

	2010	2011	2012	2013	2014	Total	Frequency
0 citations or not found	2	16	16	31	32	97	12%
1 to 10	13	30	60	98	72	273	47%
11 to 20	3	16	23	40	14	96	17%
21 to 30	6	12	12	9	1	40	7%
31 to 50	6	9	8	12	5	40	7%
≥51	14	8	6	7	0	35	6%
TOTAL	44	91	125	197	124	581	

Results from the citation analysis are presented in Table 2-9. Roughly 20% of the papers have been cited >20 times within a year, which is comparable to or better that other CRPs. CCAFS publications have relatively rapidly made their way to subsequent research as shown by citations results for 2013 and 2014. .

CCAFS authors have published their papers in a very wide range of journals, the bulk of which can be grouped into the agricultural sciences domain (Table 2-10). The majority of the journals are top tier journals in their domain, but only a small number are open access. Some papers have been published in Science and Philosophical Transactions of the Royal Society Series.

Table 2-12: Main journals (>5 papers) in which CCAFS papers are published

Journal	No of articles published	Journal Impact Factor[29] (JCR 2014)	Category (Web of Science)
Environmental Research Letters	27	3.906	Environment/Ecology
PLoS ONE	15	3.234	Multidisciplinary
Global Environmental Change	14	5.089	Social sciences, general
Water International	13	0.686	Engineering
Field Crops Research	12	2.976	Agricultural sciences
Agricultural and Forest Meteorology	11	3.762	Agricultural sciences
Agriculture, Ecosystems and Environment	11	3.402	Environment/Ecology
Climatic Change	11	3.43	Geosciences
Current Opinion in Environmental Sustainability	10	3.491	Environment/Ecology
Nature Climate Change	10	14.547	Social sciences, general
Regional Environmental Change	10	2.628	Social sciences, general
Agriculture and Food Security	9	0	
Global Change Biology	9	8.044	Environment/Ecology
Agricultural Systems	8	2.906	Agricultural sciences
Food Security	8	1.495	Agricultural sciences
Mitigation and Adaptation Strategies for Global Change	8	2.669	Environment/Ecology
Experimental Agriculture	6	1.079	Agricultural sciences
Crop Science	5	1.478	Agricultural sciences
Geoderma	5	2.772	Agricultural sciences
International Journal of Agricultural Sustainability	5	1.659	Agricultural sciences
Plant and Soil	5	2.952	Agricultural sciences

Conclusions

CCAFS is generally endowed with a strong cadre of high profile (and in some cases world leading) scientists, including expert staff of non-CGIAR specialist organizations. However, CCAFS management is very dependent on some key leaders, constituting a vulnerability.

Senior CCAFS researchers are consistently producing high quality scientific publications in high profile outlets. Compared to other CRPs, CCAFS ranks favourably in the amount of publication outputs produced, and a notable number of papers have been cited very soon after being published. Some of

[29] Journal Citation Reports (JCR) of the Web of Science.

the papers, while interesting, are tangential to CCAFS central mission. More primary papers on CCAFS work to generate equitable and gender-sensitive practices would be an improvement.

Overall, the current CCAFS balance between strategic and applied (development outcome focused) research is appropriate, and based on the case study projects evaluated, the quality of the research at each end of this spectrum is robust. However, there is a need to broaden the mix of disciplines, in particular with respect to broadening the CSA concept.

Management and leaders have invested significant resources in a process that results in research designs that are more integrative and systems oriented. However, at the project level, assurance of science quality is largely the responsibility of project leaders from centres, adhering to centre cultures and practices, and Program management role in assuring QoS may be remote. The P&R platform could also serve QoS management and assessment of the scientific rigor or research proposals if it contained information on research design, methods and context with regard to prior research.

3 Relevance, effectiveness and sustainability

3.1 Program level relevance

Global demand-side drivers

CCAFS responds to global drivers of demand for research on climate change, agriculture and food security. These drivers include the climate negotiations process under the UNFCCC, the climate change research review processes under the IPCC, and the integration of climate change research by CGIAR. Of course, the UNFCCC and the IPCC are related in as much as the IPCC reports to the UNFCCC, and its technical assessment reports are feedstock for negotiations. Being inter-governmental and multi-lateral bodies the IPCC and UNFCCC are not without political influence and thus what gets included in final IPCC publications and allowed as negotiations themes under the UNFCCC are not predominantly science-driven.

To date, CCAFS has analyzed, and fed into, the UNFCCC processes through three main entry points. Climate negotiators are considered as a set of next-users of CCAFS outputs and part of the CCAFS communications strategy has been to tailor outputs to make them useful and accessible to climate negotiators. For example, immediately prior to the COP21 in Paris in 2015, CCAFS published a study claiming that a "vast majority of country level climate plans prioritize agriculture, despite (the) sector's slow progress at UN negotiations". CCAFS made a preliminary assessment of the available INDCs and found that mitigation action was flagged for the agriculture sector in most of them. The report and associated blog then opined that the sector remaining absent from the main draft text of the official UNFCCC negotiations signaled a major disconnect between national level planning and global level policy-making.

CCAFS has also provided training for members of country delegations from LAM and African countries. Many developing countries have a high turnover in the delegations they send to the annual COP events, and often delegates need orientation to understand not only the technical issues being negotiated but also the complexities of the negotiations processes. CCAFS has sought to fill this niche. By doing so the Program is able to assess what this group of stakeholders demands in terms of information and knowledge. But CCAFS is also able to put the material the Program decides should be available directly into the hands of these negotiators. Thus CCAFS makes itself relevant to the climate negotiators' demands for information and induces their interest in what the Program assesses to be relevant at this level.

Thirdly, CCAFS has established dialogue and support functions with a particular regional negotiator group – the African Group of Negotiators (AGN). CCAFS' objective has been to work with policy-makers who have UNFCCC focal point roles to "effectively articulate the African position on agriculture and climate change through CCAFS Science" to ensure that agreements under the UNFCCC help promote CSA. Here again the Evaluation team finds that the Program is both striving for relevance to the climate negotiations process, but also opening opportunities to interject information and knowledge it deems relevant. However, the Program's strategy of supporting the AGN and advocating for agriculture to be singled out for attention in the climate agreement text was not successful at COP21. The AGN did not get special treatment for Africa in the Paris decision, and agriculture was not prioritized above other sectors (see also section 3.4.4).

CCAFS has been very active in engaging with the scientific community. From the thematic perspective CCAFS is conducting research that can help to reduce the knowledge gaps as expressed, for example, in the latest IPCC report (see 3.4 for detailed analysis of FP3). Further examples of this engagement in 2015 are the high level of citations in CCAFS publications in the latest IPCC report and the visibility of CCAFS scientists in key scientific meetings.

Alignment of the Program within the CGIAR objectives.

In determining CCAFS' high level relevance to CGIAR, two issues are important and could determine outcomes. First, has CGIAR defined objectives and outcomes that are relevant to addressing climate effects on and of agriculture and food security. Second, has CCAFS oriented itself well in terms of impact pathways and targets to be able to deliver research outcomes that contribute to CGIAR objectives. The relevance of the former drives the relevance of the latter.

CCAFS Phase I FP3 outputs informed the CGIAR aspirational target for mitigation through agriculture. As discussed in subsection 3.1.3, the CGIAR System's comparative advantage is bringing about CSA through the development of climate adaptation and mitigation options for farmers and other resource users. This demand driver is substantiated with the SRF commitment to allocate two thirds of CGIAR research resources to these issues.

The current SRF specifies one climate change IDO, paraphrased as "mitigation and adaptation achieved", while the sub-IDOs provide clearer demand for research outputs that CCAFS can provide in terms of reduced agricultural emissions, increased carbon sequestration, improved climate forecasting, better ability to deal with climate risks and extremes, and greater climate resilience.

The Program focusses on five IDOs stated in the CCAFS Extension Proposal, derived from SRF 2011. Table 3-1 presents the IDOs and the Evaluation team's comments on their utility from a ToC and impact pathway development perspective, as this determines achievement and assessment relevance to a large extent.

Table 3-13: Commentary on the IDOs CCAFS is working towards

IDOs	Comments
IDO I. Food security: Increased and stable access to food commodities by rural poor.	Demonstrating increased and stable access to food despite the effects of climate change requires assessments before and after interventions and this requires the normalization of climate and other effects. To date CCAFS has not attempted this.
IDO II. Gender: Increased control by women and other marginalized groups of assets, inputs, decision-making and benefits.	Attribution, and even contribution, assessment will be very difficult as the causal chain from research to empowerment is indirect at best and this makes the development of robust ToCs difficult.
IDO III. Adaptation: Increased capacity in low income communities to adapt to climate variability, shocks and longer term changes.	Changes in adaptive capacity are tangible, but require better metrics for assessment than are currently available. Information on relative climate challenge (from observed weather data) will be required to normalize parameters used as proxies for changes in adaptive capacity.
IDO IV. Policies and institutions: supporting sustainable, resilient and equitable agricultural and natural resources management developed and adopted by agricultural, conservation and development organizations, national governments and international bodies.	Policy relevance and coherence with national policy frameworks would be a better way for the Program to frame and address this IDO.
IDO V. Mitigation: Increased carbon sequestration and reduction of greenhouse gases through improved agriculture and natural resources management.	Reduced emissions and increased sequestration are the clearest impacts on the list of IDOs. They have the best metrics for measurement of achievement.

Source: Evaluation team.

Climate vulnerability varies significantly across the populations of rural and urban poor, and therefore the task of designing relevant research that contributes to food security of the climate vulnerable is extremely complex. Access to food is treated by CCAFS largely as a supply-side (productivity) factor and this therefore, from the perspective of internal coherence and relevance, relates well to the climate resilient productivity component of CSA. CCAFS seeks to contribute to the achievement of the food security IDO by being the "foremost global source of collaborative research" leading to climate resilient strategies. CCAFS is relevant to the CGIAR objective to increase access to food from the perspective of seeking climate resilient supply. To address the IDO better and more efficiently CCAFS could consider linking with organizations and initiatives that focus on demand-side aspects of food security and nutrition of the poor. One such organization is Leveraging Agriculture for Nutrition in South Asia in SA[30]. However, it was not clear in the Evaluation if CCAFS is able to define and help to

[30] This program focuses on: improving knowledge and perception of undernutrition and its links to agriculture, on the part of agricultural policy-makers and program managers; generating system-wide incentives for decisions and actions to become more pro-nutrition; developing transparent systems of accountability for nutrition-relevant action throughout the agriculture sector, through linking timely and actionable data and evidence with incentives; and, cultivating and strengthening leadership and capacities at different levels, underpinned by adequate financing. http://www.lansasouthasia.org/

deliver “equitable institutional investments in climate-smart food systems” the FP4 target (see Table 3.2).

Research on gender dimensions of climate resilience in agriculture and food security involves focusing on people’s different relationships to the natural environment and their access to resources and assets. To be relevant gender research in this domain should focus on how to manage climate risks and how to build the climate resilience of those disadvantaged by social norms in particular gender-based inequalities. The gender IDO sets the achievement bar for research impossibly high and this challenges its own relevance. Participatory research processes can facilitate the recognition, engagement and benefit distribution from research activities and outputs to women and marginalized groups. But to anticipate that climate and agricultural research directly contributes to countervailing inequitable power structures is unrealistic. CCAFS has struggled to achieve relevant gender research (see section 4.1) and this relevance is not helped by the framing of this IDO.

The wording of the policies and institutions IDO denotes a lack of understanding of geo-political economy in the ways that nation states respond to climate challenges. National governments and the other stakeholders mentioned in this IDO are often in competition or conflict as regards to climate and natural resource management policies and institutions. Assessing the coherence of national policy frameworks in response to climate challenges to agricultural production and food security would be a better way for the Program to frame and address this IDO and would improve Program relevance in this domain.

The framing of the adaptation and mitigation IDOs makes these more relevant to the role of research in generating information, knowledge and technologies that can enable improvements in the ways that farmers and farming system are resilient to climate risks and the ways that through agriculture carbon sinks can be better managed and carbon emissions controlled. The availability of metrics to measure emissions means that IDO achievement can be more easily assessed.

The high level impact pathway that the Program originally identified to reach the IDOs set by CGIAR was contingent on the outcomes of the climate negotiations and global institutional changes, which CCAFS had little influence in and no control over. Having said that, COP21 generated an ambitious high level framework for a future CCAFS Program to align with.

The development of CGIAR’s IDOs was in flux when CCAFS developed its ToCs and impact parthways. Subsequently, no mapping of the ToCs or impact pathways onto finalized IDOs took place. CCAFS is mapping its Phase II proposal onto the new SRF. The tables below set out the impact pathways for each FP and RP and the targets set for reaching the IDOs in 2019 and 2025.

Table 3-14: Flagship impact pathways and targets for 2019 and 2025

Flagship	Impact pathways	2019 intermediate targets	2025 targets
FP1 CSA practices	Adoption of CSA technologies and practices by 20m smallholder farmers will enhance their adaptive capacity and food security, and reduce their GHG emissions. Adaptive capacities supported through networks for information, skills, inputs, markets, investments and institutions. New technologies to be developed with national partners; need to be context specific and incorporate local knowledge. Information and technology access for women emphasised as they manage household food security. CSVs linked to development initiatives and scaling-out and -up strategies to be used	Science on CSA inform 25 major development initiatives & 15 incentive/business models	30m additional farmers, at least 12 million women, have climate-smart practices
FP2 Climate information and climate-informed safety nets	20m farmers reached by (i) building the capacity of meteorological services to provide tailored climate information for different stakeholders; (ii) seasonal forecasts to enable farmers to invest in production during favourable years and to protect assets at less favourable times; (iii) climate information to public, private and civil society actors at national and regional levels to act on climate shocks to food security	15 major new climate-informed services+15m USD of new investment, with inputs by CCAFS science	30m farmers, at least 12m women, have higher adaptive capacity via advisories and safety nets
FP3 Low-emissions agriculture development	Decision support for elaboration of climate responses requires robust measurement techniques and data on GHG emissions from smallholder farmers, and tools for integrated trade-off and synergy assessments. Linkages of finance and investments to mitigation strategies and innovation will be key. Analysis and information provision at subnational, national and regional levels.	8 low-emissions development policies and 4m ha for low-emissions agriculture, informed by CCAFS science	15% reduction of GHG emissions intensities while enhancing food security in at least 8 countries
FP4 Policies and institutions for climate-resilient food systems	Create enabling environment for large-scale adoption of CSA technologies and practices by farmers supported by multiple stakeholders. Main focus at national level for which tools and decision-support mechanisms will be designed, tested and scaled-up. Analysis of existing policies relevant to climate responses conducted and promoted. Learning alliances and capacity development will improve decision making. Global level partnerships for wider influence	Equitable climate-smart food system policies by 15 subnational/national governments and 10 international bodies informed by CCFAS science	Equitable institutional investments in climate-smart food systems increased by 50% in national/ subnational jurisdictions

Source: Adapted by Evaluation team from CCAFS Extension Proposal 2015-2016.

Table 3-15: Intermediate development outcomes and CCAFS regional impact pathways

IDOs		RPs	Regional impact pathways
Increased carbon sequestration and reduction of GHG through improved agriculture and natural resources management		LAM	CCAFS outputs incorporated in projects that implement CSA best bets. Market etc promote CSA practices along value chains. CCAFS outputs used in CIS provision to rural communities. Increased investments in CIS development for agriculture and food security. CCAFS science informs low-emission strategies adopted by many farmers over extensive land areas. Food systems policies use CSA practices and strategies. CCAFS science used in food systems investments
Policies supporting climate-resilient agriculture		SA	Evidence and outputs from CSV used. GOs, industry etc. increase investment in CSA. Public and Private sector use business models to promote CSA along value chains. Seasonal forecast and early warning system used in crop agriculture. ICT based CIS meet needs of users. Food security planning tools available and used. Insurance products and processes developed with minimum basis risk. GOs cite low-emissions studies. Database on emission for agriculture and food security. CSA practices and strategies inform policy development. Investments, credit and infrastructure for CSA and CSV. Regional and Global organizations use CCAFS outputs
Benefits to women and vulnerable groups		SEA	Initiatives and public institutions use CCAFS CSA best bets. Business models and incentives used to promote CSA along value chain. CCAFS outputs in CIS development and investments. Food system policies use CSA. Increased investment in CSA by food systems institutions
Enhanced food security		WA	CCAFS outputs incorporated in projects that implement CSA best bets. Market etc. promote CSA practices along value chains. CCAFS outputs used in CIS provision to rural communities. Increased investments in CIS development for agriculture and food security. Food system policies enacted and use CSA
Increased adaptive capacity		EA	CCAFS outputs incorporated in projects that implement CSA best bets. New business models and incentives used to promote CSA along value chain. CCAFS outputs used in the design and improvement of CIS provision to rural communities. Increased investments in CIS for agriculture and food security. CCAFS science informs low-emissions strategies adopted by many farmers over extensive land areas. Food system policies enacted and use CSA. Regional and Global organizations use CCAFS outputs

Source: Adapted by Evaluation team from CCAFS Extension Proposal 2015-2016.

The FP impact pathways have been driven largely by the IDOs and related demands for increases in adaptive capacity, policies for climate resilient agriculture and reduced GHG emissions from agriculture. The FPs' impact pathways do not address as directly the gender and food security IDOs.

While acknowledging that the RP impact pathways are less mature than those for the FPs, the Evaluation team found that the RP impact pathways mirror those for the FPs in terms of relative emphasis of addressing adaptation, climate resilient policies and mitigation IDOs directly and the gender and food security IDOs indirectly.

The consultative process that CCAFS has embarked upon to develop RP impact pathways is going in the right direction. Engagement with still more diverse stakeholder groups in impact pathway definition and development and testing of ToCs needs to continue. In these ways CCAFS should be able to develop impact pathways, ToCs and targets that are relevant to next-users and to the challenges that climate change poses to agriculture and food security in priority countries. As has happened already in the way that CCAFS research on mitigation has helped shape the current SRF, CCAFS research on the other two pillars of CSA – resilience and productivity – may be able to help develop and improve the CGIAR IDOs on adaptation, gender, food security and policies and institutions in the future.

Climate-smart agriculture as main impact pathway

The CSA framework attempts to reconcile the three dimensions of productivity, resilience and mitigation. It has gained international prominence and is being strongly advocated for by FAO and GACSA. However, the concept is incipient. What constitutes 'climate-smart' has not yet been clearly defined or systematically underpinned by science. This vagueness of the concept and the lack of a rigorous framework to determine trade-offs between the three dimensions opens it to multiple interpretations. Hence, despite gaining international prominence and some organizations seeking to make it become mainstream, the concept remains debated.[31] CCAFS aims to provide an impartial scientific grounding for CSA, which is a relevant role for it to play as part of the GACSA.

However, irrespective of the general relevance of CSA for CCAFS, there are a number of weaknesses in how CCAFS at the project level has gone about the technical underpinning of CSA, both in terms of relevance (discussed in this section), as well as in relation to effectiveness (see section 3.3.2).

CSA adoption is envisaged to take place through development initiatives, projects and favourable changes in the policy enabling environment. The outcome targets set by CCAFS imply a ratcheting-up like process whereby CSA practices are adopted incrementally by increasing numbers and types of farmers. Evidence on farmer adoption of new technologies indicates that these processes are seldom incremental, and often highly differentiated and temporary (i.e. often short-lived). [32] Climate effects are likely to exacerbate these known tendencies. Therefore, the relevance of CSA to climate vulnerable farmers and farming systems would be improved by placing CSA technology adoption in the wider context of climate resilience of local rural economies and the adaptive strategies being employed by climate vulnerable households involved in agriculture. The new conceptual framework on agriculture by the UK Department for International Development (DFID) states "building resilience to shocks and climate change and raising productivity incrementally to improve food security and build household assets there needs to be a strong focus on creating off-farm job or wage labour opportunities. Despite the rich historical experience and diverse pathways of (such) … transitions in developed countries, there appears to be relatively little knowledge and expertise on how best to

[31] See http://www.theguardian.com/global-development-professionals-network/2014/oct/17/climate-change-agriculture-bad-isnt-good and http://www.iddri.org/Publications/Collections/Syntheses/PB0315.pdf. A list of signatories to a letter of concern provides examples of the organizations do not subscribe to CSA, see: http://www.climatesmartagconcerns.info/rejection-letter.html

[32] Brown et al. 2014. Barriers to adoption of products and technologies that aid risk management in developing countries. Background paper. World Development Report 2014.

facilitate such transitions and limited experience integrating agriculture programs with broader interventions aimed at promoting growth and jobs in other sectors. There is a need for new research and learning to inform future practice". [33]CCAFS has so far not taken on board non-agricultural aspects and drivers of CSA adequately.

Advances in CIS and CSA are linked and the targets imply a coupling of CSA adoption and CIS access by target groups. All the impact pathways imply that the outscaling of CSA and CIS technologies necessary to reach the outcome targets will depend upon recognition of the benefits from the use of what are referred to as best-bet technologies by next-users, and then investments in CSA and CIS from public and private sector sources. CIS development and improvements in meteorological services are conceptualized to be driven by investments in capacity development and access to technological advances. This 'precipitation' type impact pathway places research at the initiation of the process. It is unclear from the evidence available to the Evaluation team how promotion of CSA practices occurs along value-chains and also how in these processes CSA and CIS adoption renders gender equitable benefits distribution and food security benefits for the climate vulnerable.

In Phase II addressing the food security IDO, primarily through whatever succeeds FP4, should be done with better defined objectives. What is meant by "equitable investments in climate-smart food systems" needs to be made explicit, preferably following consultation with regional and national stakeholders so that the context specificity of the definitions is ensured and impact pathways toward achieving these equitable investments are better mapped out. The underlying assumptions, risks and hypotheses in the CCAFS approach that relate CSA to food security need to be developed and documented. At the same time this needs to be underpinned by a more holistic approach to evaluate the trade-offs between production, resilience (adaptation) and mitigation. Both will require additional effort in integration (see section 3.3.3) and a move to an even greater level of inter- or transdisciplinary research than currently the case.

Advocacy of CSA as the unequivocal path to food security has led to a simplistic and optimistic formulation that also permeates the concept of CSVs. CSA practices have been developed to fit the six pillars criteria (weather, water, carbon, nitrogen, energy and knowledge smart) but with insufficiently explicit consideration of trade-offs between productivity, resilience and mitigation, and without placing them into context of livelihoods (see also section 3.3.2). Where mitigation or resilience are not feasible, productivity alone is considered to be sufficient to ensure food security. Field visits to the CSV sites showed a variety of CSA practices that did not always convincingly address climate change or food security in the area.

Conclusions

CCAFS responds to both global demand of climate change research related agriculture and food security, coming from international negotiation and review processes, and the CGIAR high level goals, and to users demand at national and regional level. CCAFS has both influenced the CGIAR level strategies and targets, and is aligning its impact pathways with the SRF.

[33] See: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/472999/Conceptual-Framework-Agriculture2.pdf

The evidence available suggests that CCAFS is not working in domains where other organizations or research networks are more advanced. The systems approach and greater outcome focus of CCAFS was seen by some boundary partners as a clear comparative advantage of CCAFS.

The five CCAFS IDOs were developed in parallel to the current SRF and alignment of CCAFS' impact pathways through IDOs to SLOs is planned for the next phase. CSA is a main impact pathway, particularly for the IDOs on food security and policy and institutions, and pursued in impact pathways of all five regions. Given that the CSA concept is still debated and evolving, the Evaluation team considers that CCAFS has a very important role in generating science-based, impartial and credible findings for addressing CSA objectives. However, the CCAFS relevance would improve from placing the CSA work in a wider climate resilience and livelihoods context, than was done in Phase I, taking into account off-farm and non-agriculture related strategies. Similarly, relevance of CSVs for the wider agro-ecologies for testing outputs across FPs would benefit from a less village-based focus.

Despite the Evaluation team's concerns as to the relevance of current CSA concepts to the needs to the climate vulnerable and poor, the team considers that CCAFS is relevant to the three IDOs on adaptation, mitigation and policies and institutions (largely from a climate resilient supply-side perspective). Regarding the IDOs on policies and institutions and gender especially, CCAFS impact pathways are somewhat simplistic and lack realism. CCAFS would address its policy IDO in a more realistic and relevant manner by assessing the climate response coherence of national policy frameworks. CCAFS relevance to enhanced food security IDOs is also less certain. In part this is to do with the framing of the IDOs and the conceptual basis of research as a precipitator of socio-economic and cultural change, but also to do with a lack of clarity in the Program of how research can contribute to equitable institutional investments in climate-smart food systems.

In Phase II objectives for the food security IDO, primarily through whatever succeeds FP4, should be better defined. What is meant by "equitable investments in climate-smart food systems" needs to be made explicit, preferably following consultation with regional and national stakeholders so that the context specificity of the definitions is ensured and impact pathways toward achieving these equitable investments are better mapped out. The underlying assumptions, risks and hypotheses in the CCAFS approach that link CSA to food security need to be developed and documented. All sub-IDOs need to be more realistically and robustly designed and defined, considering their evaluability.

3.2 Generation of international public goods

The advent of significant international and global externalities, including climate change effects, requires collective action across borders to generate the public goods necessary to avert loss, damage and impaired wellbeing. Collective action through government intervention, agreements between private agents or a combination of both, is a major policy concern regarding the provision of national and international public goods related to climate change.[34]

In this section the Evaluation team addresses the KEQ2 on the capacity of CCAFS to generate unique IPGs. The Evaluation team considered in its assessment the extent to which CCAFS generates outputs that are available to anyone, that generate opportunities for improving welfare through collective

[34] Ostrom, 2010. A Polycentric Approach for Coping with Climate Change. Background Paper to the 2010 World Development Report. World Bank, Policy Research Working Paper 5095.

action, and are not available from other sources, with the intention of them being relevant across country boundaries and beyond local contexts for generating wide-scale impacts.

The assessment consists of two parts. The first draws on the independent peer review of a random sample of journal articles and its results on the IPG-value of the published research. Secondly, the team provides an analysis of a set of CCAFS outputs that in the team's judgement have major IPG potential that is evident in the way these outputs are designed and aligned in CCAFS' ToCs. The outputs were selected from lists provided by CCAFS and identified in case studies.

The team also comments on the extent to which these outputs illustrate CCAFS' unique role and capability as a provider of IPGs. The extent to which CCAFS has the comparative advantage to facilitate and is facilitating the delivery, uptake and scaling-out of these outputs for the realization of their IPG potential is also discussed. The main analysis of CCAFS' role in the downstream part of the impact pathway is addressed as part of the analysis of effectiveness and mechanisms of transfer at the FP and RP level (see sections 3.4 and 3.5).

As part of CGIAR, CCAFS engages in IPG generation in three areas: as a global knowledge producer, as a provider of products and services, and as a repository of institutional capacities for international research on climate change related to agriculture and food security.

International public good value of CCAFS' published knowledge outputs

The assessment of CCAFS as a global knowledge provider is based primarily on the third-party review of published journal articles. Publishing in peer-reviewed venues serves a purpose of both quality control and reaching scientific audiences. In the sample article review, the extent to which the knowledge has broad applicability and relevance to agriculture and climate change was used as a proxy for the IPG value of that knowledge.

As reported in section 2.2, CCAFS' scientific outputs considered in the publication review were judged as generally good, both in terms of quality and quantity. For assessing the IPG value, the reviewers used a 4-point scale ranging from "no apparent applicability" to "significant international applicability" (see Table 3-4 for the results).

About a quarter of the publications reviewed showed significant international applicability in the assessment by the independent team. The comments by the reviewers in these cases revealed, for example, direct global scope and relevance, high level of relevance of findings beyond context where the research was done, broad applicability of research approaches and methods used, or explicit discussion of adaptability of findings.

The majority of the published outputs were judged to present broader applicability (35%). The peers identified cases of intended relevance of results and generic nature of conclusions even if the applicability was not always explicitly described in the output. Some articles that concerned locally conducted research nevertheless included appropriate inference to the broader context. About a quarter of the articles were judged to have potential IPG value although they lacked evidence and explanation of the broader applicability of the results and approaches. Only a small part of the published research was judged to have purely local relevance. Acceptance by reputable peer-review journals is of itself a proof that the article is of generic interest to the researcher community.

Agriculture related papers were rated best in terms of their IPG value; none were judged to have solely local relevance. The category of climate change, on the contrary, had the highest number of papers with only local relevance, which is consistent with spatial variability and specificity of climate impacts.

Table 3-16: Independent peer reviewers' assessment of the IPG value of knowledge outputs in published articles

RATINGS	AGR	%	CC	%	ECO	%	NRM	%	TOTAL	%
No broader applicability (local relevance only)		0%	9	27%		0%	2	6%	11	10%
Potentially broader applicability, but not spelled out	9	26%	16	48%	3	19%	4	13%	32	28%
Broader applicability is presented	11	32%	4	12%	9	56%	17	53%	41	35%
Significant international applicability	14	41%	4	12%	4	25%	9	28%	31	27%
TOTAL	34		33		16		32		115	

The Evaluation team considers that CCAFS is fulfilling its role as an IPG scientific knowledge generator. In its communication strategy, CCAFS supports open access publishing. Researchers are encouraged to pursue open access to peer reviewed journal articles through alternative routes and payment for access is included in CCAFS research budgets. The efforts that CCAFS has made to put into the public domain not only its research findings but also data sets and methodological innovations (e.g. CCAFS baseline data and templates on the Dataverse website) is also important and enhances CCAFS status as an IPG generator.

CCAFS' outputs with major international public good value

Interviews with CCAFS staff and researchers revealed that most think that CCAFS is not exclusively producing but rather 'contributing' to the generation of unique public goods and services for climate change, agriculture and food security. The scientists are aware that the types of outputs and public goods that are required to fulfil the objectives of CCAFS require partnerships with organizations involved in IPG delivery (the complementary component[35]). These partners work in parallel or in series with CCAFS. The collaboration with other actors, such as private sector insurance and ICT, is illustrative of the approach to strengthen the IPG delivery. The CCAFS portfolio includes promotion of CSA practices and support to upscaling CIS to farmers in all regions. These activities require development of context specific outputs and viable transmission of outputs to achieve impact.

Unique IPGs generated by CCAFS have, in most cases, the following qualities: they address both climate change and food security concerns and they provide widely applicable principles while also providing contextualised local solutions. FP1, FP2 and FP3 generally produce IPGs that can be delivered directly through next-users and agents (including private sector when suitable to business models). Effective delivery requires favourable environments for adoption and use. FP4 therefore works on the policies, institutions and capacity needs to facilitate IPG delivery through public sector actors. FP1 and FP2 outputs have potential for wide-scale impact through increasing agricultural

[35] Sagasti and Timmerer, 2008. An Approach to the CGIAR as a Provider of International Public Goods. Contribution to CGIAR Independent Review Panel.

production as they focus on primary crops. CIS and tools for forecasting and supporting climate resilient food security policies have the potential to expand impacts on food security among the most climate vulnerable.

CCAFS' globally relevant knowledge outputs, particularly those published for scientific audiences and data, have multiple impact pathways through further research and policy influence. The Evaluation team selected a small set of examples of CCAFS outputs that demonstrate high IPG value. The examples presented here were chosen for the direct relevance to CCAFS' impact pathways towards its IDOs on adaptation and resilience, food security, mitigation and equity of benefits. In these examples, CCAFS has put emphasis on the use and application of the knowledge, in addition to generating the research-based outputs. Broad international applicability combined with local relevance illustrate CCAFS' unique role in generating the IPGs.

The web-based Climate Portal. CCAFS has invested in the development of this tool that facilitates access to and the dissemination of outputs. The Climate Portal enables the querying of a climate projections database and downloading of downscaled data for use as inputs in modelling, map generation or other purposes. To date, data from the portal has been used by and cited in >300 journal papers, theses and reports since it was first launched in 2010. Access is free at the point of use but of course considerable technical capacity is required in the use and interpretation of the data available.

Weather index-based insurance schemes. In India the CCAFS is engaged in research on constraints to weather index-based insurance by small-farmers. It is also working with the private sector to help design insurance schemes that are well suited to farmers' needs in different locations. CCAFS is using novel, science–based methods for developing products that aim at increasing farmers' satisfaction with crop insurance. Using weather data and crop modeling, CCAFS is developing triggering mechanisms for different crops that insurers can use for improving the performance of index-based schemes. The insurance products developed in India have major application potential in the State of Maharashtra where implementation has begun. The improved triggering mechanisms represent a unique IPG by CCAFS that can be applied regionally and globally by tailoring the mechanisms to the context specific needs. There are effective partnerships that CCAFS has cultivated with state governments, insurance companies, farmer organizations and NGOs at the delivery end. These transmission mechanisms help improve the effectiveness of the products and increase their scaling potential.

Climate Information Services. CCAFS has generated scientific information for the development, improvement and testing of a set of unique locally applied public goods and subsequently developed broad principles for scaling-up CIS approaches and methodologies. CCAFS has the comparative advantage to provide scientific knowledge and help develop specific products needed by agencies that provide CIS. The aim is to inform farmers' decision-making for reducing weather and climate-induced risks. Each country and location specific advisory is different and uses different modes of transmission, but CCAFS has generated globally applicable knowledge on how to develop such services. Next-users of CCAFS outputs include agro-meteorologists, researchers, meteorological services, and development organizations interested in seasonal climate prediction, climate services and agricultural advisory services targeting smallholder farmers. CCAFS has demonstrated use of innovative partnerships, capacity enhancement of next-users and coordination between the meteorological and agricultural services for successfully reaching farmers. The regional toolbox can be used upstream for

policy planning and estimating climate risk for the design of climate insurance products. CCAFS should continue exploring innovative partnerships and facilitating them. For example, partnership with private cell phone companies allows co-financing of the service by the private sector. Meteorological offices and NARS usually do not have additional financing for such services, nor effective coordination mechanisms to manage the transmission of agro-advisories to farmers.

Resulting from work on mitigation, three *tools for measuring mitigation benefits from agriculture* have major IPG value. The Small-Holder Agriculture Mitigation Benefits Assessment too allows calculating mitigation benefits from soil carbon and other agricultural soils. It is linked to "Plan Vivo", an international accepted standard.[36] The Mitigation Options tool for agriculture is work in progress and will allow comparison of mitigation benefits from different agricultural options and management options.[37] The beta version is user friendly. Part of the data in the model is new and has been gathered through CCAFS activities (including new data on N_2O emissions). The *Ex ante* carbon-balance tool allows comparing mitigation benefits from agriculture and livestock activities. It has been developed in collaboration with several partners including FAO. The model allows initial calculations using data information either available at the project level or in national or international data-bases.

Standard Assessment of Agricultural Mitigation Potential and Livelihoods (SAMPLES)[38], supports comparable measurements of GHG from agricultural options and its results have broad relevance. The project includes results that can be used broadly, including the measurement guidelines and the emissions data, which are key for improving local information and for generating default values useful in other regions worldwide.

Climate analogues. Using global climate models, climate and rainfall projections for a particular site are matched to places with similar conditions at present. This provides farmers, researchers and policy-makers with tangible evidence on what can be expected from climate change. Next-users can then determine adaptation options based on the 'real' model of how their location will change.[39]

The CCAFS regional *agricultural forecasting toolbox*. The tool can be used to estimate near-term future yields of various crops. It uses historical databases of weather and crop yields and current weather observations. Next-users including governments and scientists can develop processes to anticipate impacts of climate variations on crop production for agricultural and food security management decisions.

Conclusions

CCAFS has produced a number of outstanding IPGs and is continuing to provide a range of outputs that also have a high likelihood of becoming IPGs. CCAFS in all FPs is identifying ways to work on components of IPG delivery systems. There is awareness raising in key stakeholder groups, influence on policy decisions relevant to climate agriculture, contributions to the UNFCCC, networking among

[36] http://www.planvivo.org/
[37] https://ccafs.cgiar.org/mitigation-options-tool-agriculture-0#.VcTGgS8d79
[38] http://samples.ccafs.cgiar.org/
[39] https://ccafs.cgiar.org/tool-climate-analogue-tool#.VcTJEi8d79o

institutions involved in CSA, and contracts and agreements with national and local organizations related to CSA, CIS and low-emissions agriculture delivery.

Having assessed the intention of CCAFS research for broad applicability, the availability and reach of the knowledge and outputs generated and the engagement of delivery partners, the Evaluation team concludes that CCAFS has capability to effectively generate and support the delivery of IPGs. Investment in partnerships for last mile delivery of IPGs is instrumental in achieving the welfare outcomes of the research outputs and improve the scope of their sustainable provision. CCAFS has demonstrated through the examples above its capability to contribute to the production of public goods needed for climate change and food security through research. The uniqueness of CCAFS comes from the Program's ability to produce knowledge at global scale for context specific local application and outreach, and its capacity to drive interdisciplinary research where climate and agriculture intersect.

3.3 Program level effectiveness

This section assesses the extent to which CCAFS is enhancing its effectiveness and impact through theory based implementation of research and integration of the program components both at the ToC level and operationally. The Evaluation team also analyzed the role that CCAFS gives to advocacy for promoting its concepts and enhancing its influence and impact. Assessment of effectiveness and achievement to date is provided at the FP and RP sections that follow.

Evolving theories of change

Subsections under 3.1 above set out the Evaluation team's assessment of the ways that the Program is addressing the need for research on the ways that climate change is and will affect agriculture and food security, and how CCAFS is working toward CGIAR defined IDOs. These strategies combined with the FP and RP impact pathways are relevant to the overall and more detailed theory based processes of change that the Program seeks to inform, influence and bring about.

At different junctures CCAFS has made explicit the changes its research contributes to and how it expects to achieve impact. These 'theories of change' have evolved over the course of the Program. The Program Plan 2011 was followed by Business Plans for 2012, 2013 and 2014. These were superseded by the ToC in the 2015 Extension Proposal 2015-2016, which relates upwards to the CGIAR SRF 2015-2025. Further revision to the CCAFS ToC has taken place for the Phase II proposal.

While recognizing that the CCAFS ToC is an evolving target, the Evaluation team made a formative assessment of the ToC and impact pathways that CCAFS worked toward in the period immediately before and during the extension period. The processes used to develop regional impact pathways, and to meld a project portfolio under the FPs and RPs, which take forward and test the ToC, were assessed as part of the key evaluation question on the robustness of the MEL system. The findings are relevant to the proposed ToC for the second phase.

The current CCAFS ToC is set out in the Extension Proposal[40]. It correctly recognizes the dual context of gathering momentum at the global[41] and national levels toward climate action — largely but not entirely mitigation focused — and the fragmented, often *ad hoc* and short-term nature of local responses to emerging risks and opportunities resulting from increases in global warming and climate variability. In the Extension Proposal, CCAFS envisaged three broad ways to engage in these change processes by: generating evidence from action research; effecting policy and institutional change to support CSA, and; rolling out CSA. Care has to be taken where these processes by necessity run in parallel, that the evidence generated to effect policy engagement is couched in the necessary caveats of uncertainty.

The changes at the high outcome level CCAFS projects to achieve under the current ToC are largely aspirational in nature. These outcome targets to be achieved do not have great definition or differentiation and they are not well linked to the lower level milestones reported annually. Therefore assessment of the expected scale of change impacting end-users and the environment is difficult. Ambition levels vary across the Program. CCAFS staff have commented that, for example, the FP1 targets of farmers adopting CSA (not yet an outcome) could be achieved in one of two states of India alone, but this would miss the point of CSA being of benefit to smallholder farmers facing climate challenges in all continents. The contributions of FP1 and FP4 (the more cautious level of targets withstanding) to the accomplishment of the envisioned change appear more concrete and achievable than those of FP2 and FP3, recognising that there are few if any scientific ways to assess changes in adaptive capacity other than through longer-term impact evaluation with normalization for climate change. It is anticipated that the experience of phase 1 will allow the Program to develop a more realistic, more context specific (disaggregated to countries), and better specified ToC for phase 2.

Each FP contributes to the Program ToC in ways reflected in the FP impact pathways toward outcomes. A more granular assessment of the work of FPs toward Program outcomes is presented in section 3.4.

Effectiveness of climate-smart agriculture

Recognizing that CCAFS' shift to use the CSA framework has been fairly recent, good progress has been made in some aspects of the way CSA is being operationalized across the Program. As discussed in section 3.3.3, the CSA framework has been a useful tool to achieve better integration across projects and help drive change across centres participating in CCAFS. In this way the CSA framing has helped improve coherence of the individual FPs, and to some degree across the Program as a whole. Work has also started on developing criteria to help answer the question of what constitute CSA practices (e.g. the work on 'certification' in FP1 in SA). In some cases, CSA has also been a useful communication tool with boundary partners, although as discussed in 3.3.4, this is not without risk.

Despite these achievements, the Evaluation team's view is that scientifically substantiating the CSA concept needs further work. There are several areas of weakness discussed below that require significant attention as CCAFS moves into the next phase.

[40] CCAFS Extension Proposal p. 2 and summarized in Fig. 1 on the same document. See: https://ccafs.cgiar.org/publications/ccafs-extension-proposal-concept-note-2015-2016#.VnajQL8elA4

[41] as exemplified at the UNFCCC COP21 in Paris December 2015.

The CSV concept may have been popularized by CCAFs, but it still lacks good definition. CSVs imply that the resident communities follow agricultural practices that are resilient to impacts of climate and effectively manage such risks to secure their nutritional and food requirements. Knowledge on how to achieve such villages through CSA practices would be instrumental for replication in other climate vulnerable localities and would constitute a unique IPG. CCAFS does not yet fully capitalize these opportunities.

CSVs are not now unique to CCAFS, and stakeholders from multi-lateral agencies, to donors and governments are touting them. CCAFS, being one of the pioneers of the concept and with the requisite science to support it, is in a good position to take the concept forward into practical implementation for others to follow. The Evaluation team suggests that more strategic partnerships outside the CGIAR System at this level will greatly help identify and tailor CSVs appropriate for each unique case[42]. The new partnerships with NGOs in Nepal and Colombia show promise.

The CCAFS framing of CSA at the time of this Evaluation, and its operationalization through CSVs did not recognize sufficiently and explicitly that increasingly, non-agriculture related livelihood strategies (off-farm, micro-enterprises, temporal or permanent migration) are valid and important alternative adaptation options. There has been failure to recognize the diversity of livelihoods of rural households—wider than just cropping[43] and livestock production—that include migration and the option of exiting agriculture altogether as climate adaptation strategies. The household level trade-offs involved in opting for some of these pathways impinge on the attractiveness and feasibility of the CSA practices being developed and promoted by FP1, and need to be taken more into account by CCAFS researchers to magnify effectiveness (see section 3.4.1). Phase II is an opportunity to address these issues.

In addition to the need to ground the CSA concept in a livelihoods context and sharpen the way it targets the most vulnerable of rural households, in some regions the 'village' focus is also not appropriate and the CSV approach needs to be more watershed or landscape oriented – this was the case in SEA and LAM in particular. In general, the Evaluation team questions how representative CSVs are of their agro-ecological hinterland. In any assessment of impact, adjustment is needed for the residual effects of other interventions such as those from previous CGIAR programs at these sites. Indeed, questions can be raised about how well the CSV concept fits into and contributes to national agricultural development, other than being a special case of high-investment interventions. As a result, in SEA and LAM the CSV concept is being broadened to encompass climate smart landscapes and watersheds. The Evaluation team regards this as both pragmatic and positive.

A further challenge, noted in interviews with the SEA and LAM RPs, is that while the concepts of CSA are generally accepted, translation of the terms 'smart' and 'climate' is not always straightforward (e.g. in Vietnam), raising the question how effective the concept is in other cultural settings.

[42] "Success factors include participative and locally driven vulnerability assessments and tailoring of adaptation technologies to local contexts, mapping local institutions and working in partnership across institutions." Wright et a. 2014, Farmers, food and climate change: ensuring community-based adaptation is mainstreamed into agricultural programs, Climate and Development, 6:4, 318-328

[43] For example, most of the CSA practices being researched in SA are at best climate smart cropping systems.

Irrespective of the above problems of a too narrow framing of CSA, achieving coherence across the three dimensions of production, adaptation and mitigation is also challenging but the rewards available from synergies make it worthwhile to pursue. Reasons for this are that there is very little support in either national plans or the UNFCCC negotiations for a cross-sectoral approaches; tension remains despite some progress as discussed in the introductory section 1.3.2. Mitigation and adaptation remain separate within UNFCCC negotiations; the IPCC maintains three different working groups and many climate funds will support either adaptation or mitigation but not both. Policy design for agricultural development and much of the research methodologies that inform policy-making likewise tend to consider only a single entry point.[44]

The Evaluation team identified positive examples of convergence, and also research activities that address only one, or at most two, of the three tenets of CSA. These are candidates for convergence with research addressing the reciprocal areas of CSA. The Evaluation team suggests that research activities that look at synergies and trade-offs be strengthened in the future. Further, much CCAFS research in support of NAMAs, INDCs or adaptation plans[45] remains single sector in its approach, without much consideration of the impacts on other components of holistic climate responses. The Mitigation Options tool, the *Ex ante* Carbon Balance tool[46] and the Climate Analogues tool aim either at mitigation or adaptation and their relation to food security; thus greater integration is needed. Achieving FPs convergence needs changes in both defining research topics (i.e. research questions that explore convergence) and methodology (i.e. how to do research that enhances convergence). It also requires behavioural change by different stakeholders including researchers, policy-makers, farmers and actors involved in the value chain.

Notwithstanding such difficulties, the Evaluation team notes that CCAFS has made some progress toward understanding synergies between adaptation and mitigation[47] as well as on links between adaptation and food security,[48] and between mitigation and food security.[49] Stronger convergence is apparent in projects in SA, LAM and EA, while in SEA and WA FP1 is working toward coherence. In WA, CCAFS has achieved some convergence in CSVs, thanks partially to the science-policy platform led by the Ministry of Agriculture in Senegal, but unfortunately low-emissions agriculture is not

[44] Ecker and Breisinger, 2012. The Food Security System. A new conceptual framework. International Food Policy Research Institute (IFPRI), Development Strategy and Governance Division; Ericksen et al. 2009. Food security and global environmental change: emerging challenges. Environmental Science & Policy 12, 373–377. Galaz et al., 2012. "Planetary boundaries" — exploring the challenges for global environmental governance. Current Opinion in Environmental Sustainability 4, 80–87.

[45] National adaptation plan is a UNFCCC instrument that allows identifying medium- and long-term adaptation needs and developing and implementing strategies and programs to address those needs. See http://unfccc.int/adaptation/workstreams/national_adaptation_plans/items/6057.php

[46] https://ccafs.cgiar.org/ex-ante-carbon-balance-tool#.VcTIbi8d79o

[47] Ogle et al. 2014. Reducing greenhouse gas emissions and adapting agricultural management for climate change in developing countries: providing the basis for action. Global Change Biology 20, 1–6.

[48] Vervoort et al. 2014. Challenges to scenario-guided adaptive action on food security under climate change. Global Environmental Change 28, 383–394; Wright et al., 2014. Farmers, food and climate change: ensuring community-based adaptation is mainstreamed into agricultural programs. Climate and Development 6, 318–328.

[49] Powlson et al. 2014. Limited potential of no-till agriculture for climate change mitigation. Nature Climate Change 4, 678–683; Valin et al. 2013. Agricultural productivity and greenhouse gas emissions: trade-offs or synergies between mitigation and food security? Environmental Research Letters 8, 035019.

included consistently in the region. Converging approaches include the study of mitigation and adaptation synergies in coffee production[50] (an important crop in Colombia, Peru and Central America), and developing regional scenarios for cross-scale research.[51]

On balance, the Evaluation team sees CCAFS moving in the right direction here, but in order to fully capitalize on its comparative advantage, CCAFS needs to place additional effort into approaches that more rigorously and systematically assess and provide ways to enable trade-offs to be identified and tested between food security, adaptation and mitigation prior to injecting findings into policy debates.

Integration

This section draws on the assessment of interview responses to KEQ 1. This KEQ cuts across the evaluation criteria of QoS and effectiveness and provides an additional lens through which Programs effectiveness can be evaluated. Integration is important if CCAFS is to produce high quality science and bring about tangible outcomes and impacts (see also section 2.2.1). In response to the CGIAR reform agenda, CCAFS has made significant progress in operationalizing integration to a greater degree.

The Program seeks integration at two levels. It brings together and builds on relevant component science outputs from other CRPs and outside of CGIAR, which requires CCAFS to undertake interdisciplinary research; CSA as an integrating framework facilitates this. CCAFS also seeks to integrate science outputs into decision making by next-users to affect change at scale. The Evaluation team believes that this level of integration requires greater emphasis in Phase II on a transdisciplinary approach, by which we mean the co-development of science-based and non science-based[52] knowledge involving science and non-science actors. This is distinct from interdisciplinary research, which only integrates different science disciplines while remaining essentially science driven.

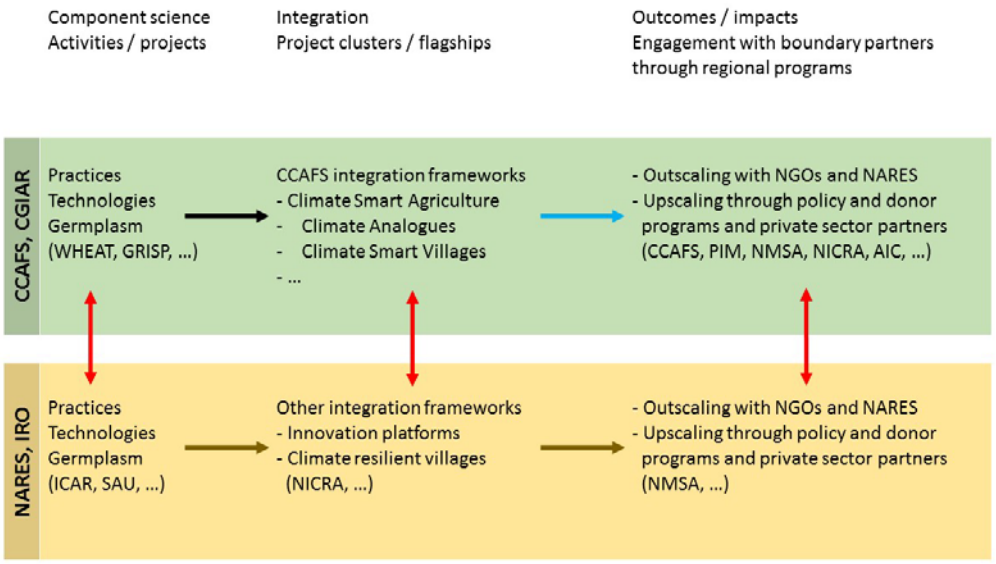
In assessing integration, the Evaluation team generally considered three levels: integration of component science in projects and activities; syntheses that take place in the FPs and some of the larger projects; and, integration with boundary partners to achieve outcomes and impact, mostly in the RPs. This is diagrammed with reference to SA in Figure 3-1.

Assessing project level integration, the Evaluation team draws a distinction between projects led by CGIAR centres (and usually funded bilaterally or through W3) and those commissioned by CCAFS. The former depend more on project leaders than on CCAFS core team members, and because CGIAR centres had a strong hand in which legacy projects were initially included in CCAFS, projects tended to be smaller, more narrowly focused and less connected. Projects that had a longer history pre-CCAFS, those closer to dissemination that drew on a wider range of boundary partners, and those where donors had a stronger influence on project scope, showed greater integration across a spectrum of issues and partners. Overall, integration and cross-centre and cross-CRP linkages were insufficient in Phase I. Integration was relegated to a 'meta' level, through synthesis of individual

[50] Rahn et al. 2013. Climate change adaptation, mitigation and livelihood benefits in coffee production: where are the synergies? Mitigation and Adaptation Strategies for Global Change 19, 1119–1137.
[51] Thornton et al. 2012. The role of regional scenarios in CCAFS cross-scale research, planning and action toward improved food security, environments and livelihoods. Internal note for CCAFS PMC.
[52] Non science-based knowledge is derived from experiential learning and other forms of inquiry that do use scientific methods for knowledge creation.

project-based work at the theme level. This changed in 2014, when several changes were implemented, in particular the introduction of the CCAFS ToC and impact pathways, which forced stronger alignment and integration of projects towards impact pathways and a consolidation from ~300 to ~90 projects. Large projects and clusters of projects are better linked in the extension phase and more integrative, particularly within regions.

Figure 3-6: Analytical framework for assessment of integration



Source: Evaluation team.

In general, the Evaluation team notes that integration in projects depends upon the project leader management style and this can be strongly influenced by the culture prevailing in the CGIAR centre where the leader is based. Some of the team leaders of cases assessed during the Evaluation do not have the necessary skill required for good integration. As a result, linkages and integration were both more variable and much less coherent in Phase I (2011-2014) than in the current portfolio.

Aside from project management style, the Evaluation team noted three other constraints to integration at this level. Firstly, while CSA and CSV have helped to drive integration to some extent, the Program needs to broaden its roll out of the CSA framework (see critique of narrow CSA framing in 3.3.2, and 3.5 for region-specific assessment). Secondly, the input-output relationships between projects need to be more explicit (see section 2.1 for assessment of the P&R platform as a management tool). Finally, the CGIAR operating environment—notably uncertainties surrounding budget amounts, availability and flexibility—results in slippage and loss of key partners, with knock on effects on projects that come next in a sequence, and therefore on overall effectiveness of delivery through the portfolio.

In conclusion, the Evaluation team considers that measured against the integration potential inherent within the CCAFS research portfolios, and comparing its practice against some other international organizations, more integration and linking is required.

Advocacy

To a large extent contributions to achieving the changes envisioned in the Program ToC through the FPs (particularly FP1 and FP4) requires advocacy (communication of research findings that promote one or other action to be taken[53]) of CSA technologies to next- and end-users, and the promotion of and advocacy for investments in climate smart policies and institutions. In part the need for advocacy is due to the perceived urgency in the need to move agricultural production toward lower carbon emissions to contribute to the UNFCCC ambition of global warming below 1.5°C, while noting the parity given to adaptation in the Paris Agreement. But there is also the need for advocacy for designing and implementing climate adaptation to future climate risks where the risks can only be explained in probabilistic terms. Here the Program faces 'implicit discount rates' in the ways that policy-makers and others offset costs of climate effects to the future. Advocacy is also necessary because the definition of what are CSA and institutional investments are neither based upon unequivocal science nor agreed among stakeholders. So the Program finds itself having to advocate what is believed to be right. The Evaluation team differentiates advocacy when it is aimed at engaging partners in joint action-research from advocacy of CSA as providing solutions to climate vulnerability. The latter kind of advocacy is unfamiliar territory for agricultural and climate scientists, and partnerships with organizations better suited to this role are required.

Much of the impact assessment material available from CCAFS is written more from an advocacy rather than impartial outcome analysis perspective. This may be because CCAFS sees its success as being able to convince governments to implement CSA policies and practices in agricultural sector policy development. The CGIAR incentive structure that can be characterized as "impact/ success at all levels" has meant that CCAFS wants to see the adoption of CSA as a way to frame and substantiate moves toward climate responses in the agricultural sector. CSA can be advocated for but it is difficult to prove and attribute adoption to single influence or drivers.

If CCAFS promoted technologies and practices as being climate smart it should also communicate the remaining questions where science-based evidence is still to be generated. Recognising that the demands of timely policy engagement often do not award the luxury of achieving sufficient scientific certainty, the team considers it important that CCAFS also clearly communicate the risks and level of confidence in scientific evidence on CSA. Thus the Evaluation team considers that CSA and CIS need more impartial assessment of effectiveness particularly in relation to supporting food security of the climate vulnerable. The Evaluation team therefore is not convinced that CCAFS should be involved in advocacy given the low level of scientific deliberation and the lack of consensus of what constitutes being climate-smart in agriculture and food security.

There is a risk that rolling out CSA without first having more systematically assessed not just the productivity (farmer income based) advantages and the emissions reductions potential, but also the linked changes in food security of the climate vulnerable poor, is perceived as being pre-emptive. As pointed out later in this report, the mitigation imperative for agriculture to reduce its carbon footprint worldwide is clear. To be effective, the research into policy ToC needs convincing research aimed at

[53] The CGIAR Fund Council in minutes of a meeting in 2014 where CCAFS made a presentation note that: "Regarding CCAFS' CSA strategy, it follows a three-thirds principle: one-third research, one-third engagement, and one-third communications." Communication involves components of advocacy.

information needs of policy-makers. The Evaluation team concludes that evidence from applied testing (not just modelling and simulation) of CSA in terms of the climate resilience of both smallholder farmers systems and local food security will be needed to convince agricultural development policy-makers that CSA is a priority. [54]

Conclusions

CCAFS has worked on the theory-based processes of change it seeks to bring about in the period leading to the extension phase and during it. While the changes are aspirational, the ToC reflects well the global and national climate action focusing largely on mitigation and the short-term local responses to climate challenges. There is alignment of FP level ToCs upstream with the Program, and downstream with impact pathways but this can be further improved for monitoring. Further work is also needed for improving the realism in the ToCs and their country context specificity.

The CSA framework has been a useful tool to achieve better integration across projects and coherence of individual FPs. However, scientifically substantiating the CSA concept needs further work. The Evaluation team highlights two main areas of weakness. Firstly, feasibility of CSA depends on broader framing of CSA and implementation at CVSs to include non-agriculture livelihood strategies as adaptation options. Secondly, targeting and the CVS focus need to better address issues faced by the most vulnerable in sites suitable to local contexts. CCAFS is moving in the right direction here, but in order to fully capitalize on its comparative advantage, CCAFS needs to place additional effort into approaches that more rigorously and systematically understand trade-offs between food security, adaptation and mitigation to be determined prior to injecting findings into policy debates.

CCAFS has also made progress in operationalizing integration for enhancing effectiveness. It has brought together component science outputs from other CRPs and elsewhere and sought to integrate outputs to decision making. Considerable alignment and integration was achieved in consolidating the Program in the Extension phase, which addressed the disperse agenda of CCAFS commissioned and centre driven projects. Combining scientific knowledge and local experiential learning in transdisciplinary approached would enhance likelihood of outcomes on the ground.

The Evaluation team considers that measured against the integration potential inherent within the CCAFS research portfolios, and comparing CCAFS with other international organizations, more integration and linking is required. The team notes with concern that budget uncertainties regarding level, reliability and flexibility of funding have negatively affected the necessary sequencing of projects and consequently the overall effectiveness and delivery.

Responding to perceived urgency to address carbon emissions from agriculture, and with the aim of paving way for adoption and influence of its results CCAFS promotes CSA technologies to users, including policy-makers. This has also affected the orientation of CCAFS' impact reporting. The Evaluation team cautions against advocacy and calls for impartial assessment of CCAFS results including CSA, particularly in relation to supporting food security of the climate vulnerable. CCAFS needs to assess all of the following: the productivity advantages, emissions reductions potential and

[54] The global paucity of information on wider political, institutional and policy-related challenges relating to the agriculture-nutrition nexus is identified in Gillespie et al. 2015. Leveraging agriculture for nutrition in South Asia and East Africa: examining the enabling environment through stakeholder perceptions. Food Sec. 7:463–477.

changes in food security of the climate vulnerable poor. For policy to be effective, research needs to respond to policy-makers' information needs and policy recommendations need to speak to national development objectives.

3.4 Flagship Projects: relevance, effectiveness and sustainability of impact

The Evaluation team considered the relevance, effectiveness and sustainability of impact of the FP components of the Program. We do so bearing in mind some of the difficulties associated with both CSA and CSVs (see sections 3.1.3 and 3.3.2). Other considerations include that relevance is related not only to what a FP can contribute, but also the uniqueness of the contribution: comparative advantage is integral to relevance. The assessment of FPs blends summative assessment of what the FPs have done with formative assessment of what is being done.

Flagship Project 1: Climate smart agricultural practices

The FP1 vision is that "by 2025, public agencies and civil society organizations at national and sub-national levels are working with the private sector to promote equitable climate smart agriculture adoption by 30 million farmers, at least 40% of whom are women, to strengthen their adaptive capacity and food security".[55]

Achieving the vision, through the FP1 outcome statement (see Table 2-1), is understood by the Program to depend upon leveraging sufficient investment for CCAFS research and on the dissemination of knowledge of the advantages of CSA practices, including costs and benefits. In addition, financial, economic and technical incentives for next-users are seen as necessary. To achieve this impact FP1 will "test and scale up technologies and practices to build adaptive capacity, profitability and food security, and to cogenerate mitigation co-benefits".[56]

Relevance

FP1 addresses sustainable agricultural intensification, while contributing indirectly to increasing adaptive capacity (FP2) and mitigation (FP3). FP1 has been the main vehicle through which CCAFS established CSVs, with the intention of bringing together and testing outputs from FP1, FP2 and FP3. Together with FP2 and FP3, FP1 feeds into FP4 to upscale CSA practices, making it integral to the overall CCAFS design. FP1 is thus relevant both globally and within CCAFS itself.

The intent of FP1 is to select, evaluate and promote CSA practices that reconcile the CSA dimensions of productivity, resilience and mitigation. This requires a multi-scale and systems approach. CCAFS is well positioned to provide this in some regions, giving FP1 and CCAFS a comparative advantage. The work of FP1 should help CCAFS contribute to substantiating CSA into a conceptually and technically grounded integrative framework that has practical relevance.

The Evaluation team considers that the coherence of the current FP1 project portfolio and the priorities set from 2014 are an improvement over Phase I. The compromise between top-down priorities aligned with CCAFS impact pathways, and the projects proposed by CGIAR centres need to

[55] https://ccafs.cgiar.org/themes/climate-smart-agricultural-practices/about
[56] CCAFS. 2014. 2015-2016 CRP Extension Proposals: CCAFS.

be managed such that the projects come into line with the current impact pathways. This was also discussed for project integration in section 3.3.2.

FP1 research has a high potential relevance to all RPs because all will experience significant climate challenges to agriculture and food security. However, the relative balance of opportunities and regional priorities means that the importance of FP1 in each region will vary. Nevertheless, the need to find CSA practices and technologies that offer synergies (or at least viable trade-offs such as stable productivity with reduced emissions) between productivity, resilience and mitigation is generic across all CCAFS regions and offers scope for IPGs and technology transfer.

Effectiveness

Within the confines of the narrow framing of CSA as discussed in 3.3.2, FP1 has achieved reasonable coherence, but coherence of projects within regions varies. The regional project portfolios in FP1 are being aligned to the FP1 ToC and outcome statements. Targets are aggregated up through the regions and build upon a legacy of achievements under Phase 1.

There is some mismatch between the project activities and the FP1 ToC, which reduces effectiveness. One difficulty is a lag in FP1's adoption of the higher level reorientation of CCAFS towards a results-based approach, which started in 2014. Evidence from researcher interviews suggests that this change coincided with a significant shift in mind-set by researchers involved in CCAFS toward an outcome-oriented approach. While CCAFS has made good progress, particularly given that it deals with all the CGIAR centres in a shift that is culturally demanding, the Evaluation team notes that translation of the FP1 ToC and impact pathway into project level ToCs and impact pathways were still poorly executed and project design lacking, diminishing FP1 effectiveness. Our assessment of the FP1 case studies in 2015, and a rapid appraisal of all FP1 project proposals for SA and SEA in the P&R platform, indicates that the rigour with which the hypotheses underpinning change assumptions are formulated in project proposals (if at all), the granularity with which boundary partners are identified, and detail on engagement and partnership modalities all decrease as one drills down to the project level and activities within projects. This results in project targets that seem overly ambitious and in some cases not credible, leading to unrealistic outcome targets at the level of FP1.

Current research activities in CSVs are centred on six pillars of "smart" practices: weather, water, carbon, nitrogen, energy and knowledge smart. This is an effective way to integrate productivity, adaptation and mitigation dimensions of CSA practices in research. However, it is also a very technology driven approach that fails to accommodate the diversity of livelihood activities of agriculture dependent people in a given socio-economic context, and can fail to amount to more than climate smart cropping[57]. Rural communities are transitioning rapidly, responding to more immediate drivers than climate change, such as economic development, urbanization and resource scarcity. Some community segments hang in, others step up, or step out of agriculture. As discussed in section 3.3.2, the CCAFS framing of CSA and CSVs had, at the time of the evaluation, not yet sufficiently and explicitly taken into account that increasingly, non-agriculture related livelihood strategies (off-farm,

[57] E.g. P25-FP1-SA on CSA practices

micro-enterprises, temporary or permanent migration) are valid and important alternative adaptation options.

At the CSV scale, some recent papers cover component science (e.g. reports on individual CSA practices[58]), but as yet there is little published by way of critically evaluating the learnings and effectiveness of CSVs. This could in part be due to the fact that CSVs have only been conceptualized and implemented in the past 2-3 years and research on out- and upscaling of CSVs and CSA practices is also work in progress. While the calibre of individual CCAFS scientists is generally good, team compositions and skills mix in CCAFS scaling projects in FP1 to conduct rigorous institutional and social research underpinning scaling are not uniformly good. In some instances new partners have been brought in to fill the main skills gaps[59], in other cases some scaling projects would need a broadening of team composition.[60]

Sustainability of impact

In general terms, sustainability of impact from FP1 research is being driven through the RPs. Prospects for FP1 sustainability are strongest in India (see section 3.5.3). Through the legacy of previous CRPs, the FP1 projects in India are well aligned with the National Initiative on Climate Resilient Agriculture and a lot of the on-ground research is done through linkages with the Indian Council of Agricultural Research. Accelerated uptake of some CSA practices (e.g., dry direct seeding of rice; zero-till planting; residue retention; laser levelling) is being promoted through the national initiative and a range of sub-national/ state level initiatives, primarily in Haryana, Punjab and Bihar. Earlier work in Research Theme 1 in SA resulted in the establishment of a seed consortium linked to private seed companies taking maize hybrids tolerant to climate stress to market. Strategic use of local partners for last mile delivery will add sustainability to CSA development and become a part of the exit strategy in all locations.

Flagship Project 2: Climate Information Services and Climate Informed Safety Nets

The FP2 vision is that "livelihoods of farmers across Asia, Africa and Latin America are supported by effective climate information services, and protected by timely and well-targeted food security safety nets." To achieve this FP2 seeks to links climate and agricultural scientists with regional and national meteorological services in order to develop better agro-climate advisories and climate-informed safety nets. To deliver the agro-climate advisories to end-users (mainly farmers) CCAFS is teaming up with different next-users; supply-side actors including private sector companies that provide agricultural inputs and weather-indexed insurance, NARS and NGOs that take on capacity building and dissemination of climate related information.

FP2 has used a supply-push approach to develop and achieve its ToC. Priority has been given to the dominant crop systems to ensure a wide audience for the services in both agro-climate advisories and weather indexed insurance instruments.

[58] Aryal et al. 2015. Impacts of laser land leveling in rice–wheat systems of the North–western Indo-Gangetic Plains of India. Food Security, 7: 725-738

[59] E.g. Wageningen University in P25-FP1-SA on CSA practices

[60] E.g. project P53-FP1-SEA

Relevance

FP2 addresses directly the IDOs on food security and adaptive capacity. Research is focused on inputs for CIS products including early warning of extreme climate events, climate information, forecast and advisory services, insurance mechanisms based on weather indices, and climate informed food security safety nets. Agro-climate advisories are made available through radio, cell-phone texts and voice messages directly transmitted to the end–user. The precision and timeliness of this information service determines its relevance and probability of impact on next-user decision-making.

Evidence from the Kenya and Colombia evaluation visits indicates that next-users consider the CIS they access to be relevant and useful, for example, forecasting onset of rains and advice on sowing times, and seasonal assessment to inform decisions on what crops and crop varieties to sow. Field visits and the case study in India revealed that the State of Maharashtra was highly interested in using CCAFS improved indexed based insurance[61]. There are currently 30 million farmers who have agricultural insurance and this provides a huge potential for adoption by improving food security impact of the insurance.

Relevance of CCAFS outputs is related to both the expertise of the research organizations brought in to manage the FP, the research partners that assist in the development of outputs, and partners identified in the delivery of outputs to next-users. These aspects determine also the effectiveness of FP2 discussed below. CCAFS has out-sourced FP2 management to IRI of Columbia University – a centre of international repute on CIS in developing country circumstances. The development of agro-climate advisories in Kenya is being carried out with Reading University, again a centre of excellence is this thematic area. Further development of dissemination of CIS in Kenya is in partnership with a national university and NGOs. In India FP2 has linked into the private sector to ensure the market relevance of outputs.

Improving the triggering mechanisms for weather-indexed insurance in India involves using climate information and projected crop performance to assess probability of crop failure and to trigger payouts. So, the relevance in this case cuts two ways – farmers invest in insurance to offset costs of crop failure, and insurance companies want to provide insurance services profitably. Given the evidence in India of crop farmer crises (and suicides) and the market power of insurance companies, the outputs of FP2 in this case are highly relevant to both livelihoods and markets. Both early warning and insurance can be instrumental in reducing climate-induced risk to agriculture and food security.

The Evaluation did not find evidence of FP2 outputs being relevant for climate-informed safety nets. However, for those who cannot be reasonably safeguarded through risk reduction strategies based on insurance, climate-based safety nets can be effective in reducing food insecurity and abject poverty.

The strategic knowledge on research and development derived from generating and providing agro-climate advisories and services through ‘value-chains’ of next-users to the end-users is relevant to

[61] Personal communication with Additional Chief Secretary of State of Maharashtra 21, May 2015

many of the countries where FP2 operates and more widely. However, public sector investment in CIS lags well behind next-user demand in many parts of the developing world.[62]

Relevance of FP2 outputs will be determined not just by reaching but also effectively supporting food-insecure climate vulnerable farmers and those who depend upon them. Here the evidence on the relevance of FP2 is not so clear. For example, the needs of food-insecure climate vulnerable women who are often outside the dominant crop domain could be served by improved access to CIS. FP2 relevance to the gender IDO could be enhanced if the CIS products were better targeted at vulnerable groups taking into account their farming choices, for example regarding crops.

Effectiveness

Agro-climate advisories (disseminated through ICTs, radio and television) and the related delivery mechanism through sub-national roundtables in Colombia and Senegal[63], are potentially highly effective due to the large numbers of people that can be reached. The early success of climate information provision in Senegal, which was documented in the CCAFS-commissioned study of CCAFS' climate services[64], has been reinforced by work elsewhere. The study made several useful observations on effectiveness and also provided suggestions for improving the performance of climate services. The main issue noted was the lack of a strategy for scaling up to national and regional levels. Several suggestions were provided in this regard and are summarized as follows: (a) focusing on core information that need not be contextualized to reduce processing of climate information; (b) involving international financing institutions, and also private sector for scale up; (c) reaching policy-makers by generating evidence of success; and (d) leapfrogging innovation by learning from other experiences. This Evaluation team agreed mostly with the previous assessment. Contextualization of CIS greatly improves relevance of information and targeting to those who need it the most, and national partners are best positioned for this working closely with CCAFS.

In India advisories are being provided at scale and are well received, including weather-indexed insurance to improve the triggering mechanisms for payouts based on weather data[65]. A blog post reports that 50,000 farmers have already benefitted from index-based insurance. In Senegal 2 million people receive 10 day forecasts. [66] In East Africa, products are still under development with partners, and prospects look good; during its field visit the Evaluation team observed very high demand and interest of farmers. CCAFS can link to other programs managed by national meteorological services that provide similar services. For example, CCAFS plans to link weather-indexed insurance with

[62] Tall A, Hansen J, Jay A, Campbell B, Kinyangi J, Aggarwal PK, Zougmoré R. 2014. Scaling up climate services for farmers: Mission Possible. Learning from good practice in Africa and South Asia. CCAFS Report No. 13. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).
[63] CCAFS. 2015. The impact of Climate Information Services in Senegal. CCAFS Outcome Study No. 3. Lo and Dieng 2015. Impact assessment of communicating seasonal climate forecasts in Kaffrine, Diourbel, Louga, Thies and Fatick (Niakhar) regions in Senegal: Final Report for CCAFS West Africa Regional Program
[64] Feinstein and Llovet 2014. CCAFS /Climate Services Assessment Report.
[65] https://ccafs.cgiar.org/blog/improved-index-insurance-benefits-more-50000-farmers-india#.Vs8SBumkBTp
[66]https://cgspace.cgiar.org/bitstream/handle/10568/35595/11_CCAFS_WA_Scaling%2520up%2520seasonal%2520forecasts%2520to%2520over%25202%2520million%2520users%2520in%2520Senegal.pdf?sequence=5

improved seed supply to support the adoption of maize-bean cropping systems. This could benefit from the experience of agro-climate advisories in forecasting crop performance.[67]

One measure of effectiveness is the appreciation of CIS expressed to the team in the countries visited. Smallholder farmers in Senegal who receive seasonal forecast information supported by CCAFS use it and change their sowing times[68]. On a field visit to Kenya, farmers in Kisumu were not only very interested in the timing of the rains, but were also using inexpensive equipment to collect rainfall data, which will help FP2 to calibrate its models for this part of EA. The Evaluation team also learned that the time for generating CIS has been greatly reduced by learning from and building upon earlier experiences.

Sustainability of impact

Sustainability depends on several factors, most of which are beyond the control of the Program. Meteorological services need sufficient numbers of adequate level personnel (with climate science background and computer modeling proficiency) to be trained and retained to produce and improve such products. There are a few such professionals (see section 3.5.2 on EA),and yet they are needed to scale up the accessibility of CIS services. At the same time, the running costs and the technology required for such CIS services have been difficult to resource through national governments (for example in Africa - despite the availability of funding through the ClimDev program run through the African Development Bank, United Nations Economic Commission for Africa). Most national climate services in developing countries face the dilemma of either restricting data sharing to be able to generate income from paying clients, or allowing free access and having to find resources to subsidizes the creation of this public good. The sale of CIS and weather observation data seldom covers the cost of collecting and maintaining it in developing countries. CCAFS supports national meteorological offices by providing tools, methods and training. CCAFS avoids fostering dependency on meteorological and other national partners, whose, but long-term financial sustainability is uncertain. . This does not mean that CCAFS should not continue to research CIS provision. It means that CCAFS should invest in generating economic valuation evidence of the value of CIS investments by national governments. It is noted that CCAFS has recently decided to place a researcher in United Nations Economic Commission for Africa to develop work in this area.

The Index-Based Livestock Insurance project led by ILRI (not initiated as part of CCAFS) has been successful. CCAFS has supported its expansion to Southern Ethiopia and has used it for knowledge sharing. Collaboration with other international agencies with similar interests, such as World Bank, IFAD and bilaterals like DFID, could ensure that national meteorological departments continue to get financial and institutional support to scale CIS efforts. While increasing the capacity of these departments remains a challenge, partnering with the private sector for upscaling of CIS and weather-indexed insurance services is a route to effectiveness. The experience of partnering with the private

[67] FP2 2014-51 (CIMMYT) Develop index insurance for drought-prone maize and bean-based farming systems in East Africa to enhance farmer adoption of climate-adapted germplasm.

[68] CCAFS. 2015. The impact of Climate Information Services in Senegal. CCAFS Outcome Study No. 3. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Lo HM, Dieng M. 2015. Impact assessment of communicating seasonal climate forecasts in Kaffrine, Diourbel, Louga, Thies and Fatick (Niakhar) regions in Senegal: Final Report for CCAFS West Africa Regional Program.

sector mobile service providers in India, where agro-advisories are included as value-added services for selling sim cards, is a good example. Further efforts on involving private sector can help overcome some of the capacity and financial constraints.

The economic sustainability of crop insurance currently depends upon the willingness of governments to subsidize the costs as a public welfare effort. Where this is acceptable, for example in India, and there are institutional incentives (such as the protection of agricultural loans through insurance), the services will be sustained. However, the evidence available on the kinds of adaptive behaviour that weather-indexed insurance access will promote among the insured is as yet insufficient[69]. The Evaluation team considers it difficult to find a self-sustaining business model in the private sector that enables poorer and climate vulnerable farmers to sustainably access weather-indexed crop insurance without some sort of subsidy or clubbing of financial and agricultural products. The issue of subsidies for index-based insurance for smallholder farmers merits further investigation.

Flagship Project 3: Low-emissions agricultural development

The FP3 vision for 2025 is "that agricultural development options for food security and poverty alleviation provide mitigation co-benefits without compromising other targets." The FP focuses on the GHG measurement challenges in small-scale farming systems, the trade-offs and synergies amongst adaptation, incomes, food security and mitigation, and the necessary incentives, institutions and policies for low-emission actions.

The FP3 target for 2025 is to achieve a 15% reduction of GHG emissions intensities, relative to 2015, while enhancing food security, in at least eight countries in Africa, Asia and LAM. To a lesser extent FP3 is working in SA, but the Flagship was not included for WA.

FP3's outputs aim to clarify the feasibility of low carbon scenarios in the agriculture sector. Examples include CCAFS work on improving data on N_2O emissions and research on reducing the intensity of livestock emissions.

Relevance

FP3 seeks to contribute directly to CGIAR SLO 4 on more sustainable management of natural resources, for example through research on linking forest and food production in the REDD+ context[70], research on sustainable fuel wood and research on livestock practices (for instance in Colombia, Honduras and Costa Rica). The latter also indirectly addresses the IDO on food security through increased meat production per unit area. FP3 is directly relevant to two IDOs – mitigation and policy and institutions — by informing national formulation of NAMAs and INDCs. FP3 is also internally relevant in CCAFS by contributing to the development of reduced GHG emissions from crop and livestock agriculture, one of the objectives of CSA. In providing insights into the scientific challenges of low-emissions agriculture and informing the current international policy discussions, FP3 can be

[69] Greatrex et al. 2015. Scaling up index insurance for smallholder farmers: Recent evidence and insights. CCAFS Report No. 14 Copenhagen: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).
[70] The UN-REDD Programme is the United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation (REDD) in developing countries.

globally relevant. CCAFS further promotes standardized measurements that increase efficiency and reduce costs of emissions measurement.

The relevance of FP3 in the regions is related to the policy priorities of the countries where CCAFS operates. In South East Asia FP3 investigates mitigation potential in rice systems, while in EA and LAM the focus is the livestock sector. CCAFS research has provided relevant scientific inputs for establishing national mitigation policies like the dairy NAMA in Kenya and the INDCs targeting the livestock sector in Colombia. Research priorities in India are on agroforestry systems. The strategy of following regional and national priorities is in line with one of the key assumptions for FP3, namely that developing country partners see low-emissions agriculture as a priority. This assumption has been successfully tested through participatory strategy development in, for example, Honduras, Costa Rica, Guatemala and Colombia.[71]

FP3 research is relevant to international climate forums, especially to the treatment of agriculture as a means for mitigation in developing countries[72] and to the research gaps identified by the latest IPCC Assessment Report. These international processes also highlight the need to understand better the trade-offs between mitigation, adaptation and production in different farming systems. Relevant FP3 research issues, addressed in several activities, include cost-effective options for measuring the contribution of smallholder farmers to reducing GHG emission; and the potential contributions of sustainable agricultural intensification of the livestock sector, rice and cereals crops to climate change mitigation, without compromising the sustainability of food production.

In addition, FP3 contributes to the relevance of CCAFS through its ability to identify and answer scientific questions that match national and global policy priorities. Instead of competing with other international players that deal with mitigation and agriculture, CCAFS management has created strategic partnerships with global players such as FAO and the University of Aberdeen. However, the Evaluation team observed that bioenergy has not been considered as a specific topic in FP3. In IPCC, bioenergy is considered one of the most relevant mitigation options in the sector dealing with agriculture, forestry and other land use options (AFOLU). Furthermore, the latest IPCC Assessment Report highlights the need for understanding the potential impacts of bioenergy on several aspects of sustainable development, especially on food security. Nevertheless, the Evaluation team also recognizes that including bioenergy in FP3 could go beyond the scope of CCAFS and therefore refrains from recommending that it be included. CCAFS could give consideration to impacts of bioenergy production to food security in contexts where it is highly relevant.

Mitigation issues in the AFOLU sector are relevant not only for CCAFS, but also for other CRPs, such as Forests, Trees and Agroforestry CRP and the Global Rice Science Partnership (GRiSP). From the

[71] Evidence from the regional process is documented in a) Alvarez et al., 2014. Lessons in Theory of Change from the introductory training on Theories of Change, Impact Pathways and Monitoring & Evaluation. CCSL Learning Brief No 10; b) Schuetz at al. (2015*)* Lessons in Theory of Change from a series of regional planning workshops. CCAFS Workshop Series Report (final draft); and c) CCAFS (2013) Informe de Sistematizacion: Taller Internacional, construccion de la estrategia CCAFS para America Latina.

[72] Since the 17th session of the COP in Durban in 2011, discussions on the role of agriculture and climate change (mitigation) have been included in the UNFCCC. The approach used in the EU Common Agricultural Policy, that combines the need for mainstreaming climate adaptation while ensuring links to productivity, sustainability and mitigation, has served as an important guide in the UNFCCC discussions.

scientific perspective AFOLU mitigation options require a wide range of questions, some of them addressed from the commodity perspective (as in GRiSP) and others needing an approach that CCAFS can offer.

Effectiveness

CCAFS is making progress towards its target that by 2019 eight countries have agricultural NAMAs. The key contributions from CCAFS to setting INDCs in Colombia Costa Rice, Vietnam and Tanzania as well as to designing NAMAs in Kenya and Colombia are evidence of effectiveness of CCAFS.

FP3 adjusted its outcome target regarding reduction of GHG emissions to a lower level than initially, recognizing, as the team learned from its interviews with the CCAFS management team, the structural challenges that low carbon development pathways face. These include time lag between setting and enforcing low carbon policies and the delays in appropriating and upscaling low carbon technologies. The Evaluation team considers these adjustments realistic.

In FP3 CCAFS is using GHG intensity[73] as a target indicator for progress towards food security and mitigation outcomes. In its reporting the indicator is decomposed to account for changes in absolute emissions. In several interviews policy-makers commented that this approach facilitates discussion on mitigation options across sectors, which speaks to the likely effectiveness of FP3. Although the effectiveness will only become fully evaluable once mitigation policies are in place and enforced at national level, the Evaluation team considers that the approach used in FP3 already increases efficiency. This is because it uses complementarity with inputs from other projects in the countries, and it bridges scientific knowledge from the international level with policy development at the national level. The Evaluation team supports the recommendation in the CCFAS-commissioned evaluation that indicators for proving future effectiveness be developed.[74]

The Evaluation team considers that developing methods for consistency in securing data will increase robustness of GHG measurements in agriculture. These CCAFS activities also demonstrate progress in responding to the 2014 evaluation recommendations 2 and 5. Most activities in this area are embedded in countries' or partners' priorities through current initiatives. The Evaluation team believes that this strategy increases likely effectiveness and sustainability because this way CCAFS' work is mainstreamed into the priorities of the key decision makers and because it increases the installed capacity and knowledge within important stakeholders. Interviews with national governments reviews of NAMAs, and observation of COP21 preparation (INDC proposals) provided evidence of influence of FP3 research on national mitigation policies in several countries including Kenya, Vietnam, Colombia and Honduras.

As discussed in section 3.2 of major IPGs from CCAFS, FP3 has made progress in providing guidance on how to account climate mitigation in the agricultural sector in developing countries, for instance through SAMPLES. Such guidance can have a long-term positive impact on realizing the mitigation

[73] The IPCC Fifth Assessment Report defines carbon intensity as "the amount of emissions of carbon dioxide (CO_2) released per unit or another variable such as gross domestic product (GDP), output energy use, or transport" (see Glossary of the Fifth Assessment Report).
[74] Smith 2014. CGIAR Climate change, Agriculture and Food Security Program. Theme 3: Pro-poor climate change mitigation, currently named: Theme 3 Low emissions agriculture. Evaluation 2011-2013

potential of the sector worldwide, and it increases likely effectiveness of FP3 in improving decision support tools for climate responses. More examples with a similar impact include guidance for planning GHG mitigation in agriculture,[75] guidance on the advantages and disadvantages of different types of fertilizers[76] and guidance on cost-effective measurement of GHG emissions in the agricultural sector.

Sustainability of impact

Sustainability of FP3 outcomes is based on two main strategies. One is the strategy driven by the RPs, which combines addressing national priorities with creating strong partnerships with decision makers at several levels. The strategy is to incorporate FP3 findings to long-term policy decisions. Prospects of sustainability are very strong in countries where policy-makers and representatives of the private sector are involved in FP3 activities, like in Colombia, Honduras and Kenya.

A second strategy is to contribute to a change in international rules on accountability for GHG emissions in agriculture. In this strategy, FP3 scientists engage with the scientific community, for example by attending the CSA scientific conference in 2015 in Montpellier and the scientific meeting prior to COP21.

Flagship Project 4: Policies and Institutions for Climate-resilient Food Systems

The FP4 vision is that "by 2025, 20 national and subnational jurisdictions have increased their institutional investments in climate-resilient food systems".

The FP impact pathway depends on the development of "better, more equitable policies and institutions that support the integration of climate change into agricultural policies and vice versa." Consultation with stakeholders within and outside CCAFS showed that definitions of what constitutes investments in equitable policies and institutions with respect to climate-smart food systems are hard to come by, and consensus on definitions even harder. How to assess equity in this instance is not resolved, and what makes a food system climate smart is not well enough specified to use this as a category for assessing achievement.

As CCAFS outputs do not as yet address these issues, progress towards objectives for FP4, while they do have quantitative targets for milestones in 2019 and 2025, could be difficult to assess. However, the Evaluation team believes that it would be feasible to examine how well national and subnational food-system policies take into consideration climate adaptation and mitigation practices and strategies, and whether regional and global organizations use CCAFS outputs to inform their institutional investments in climate resilient food systems. it would also be feasible to judge whether

[75] See FP3 output: Wilkes et al. 2013. *National integrated mitigation planning in agriculture: a review paper*. Mitigation of Climate Change in Agriculture Series 7.

[76] See the following FP3 outputs: Nyamadzawo et al. 2014. Combining organic and inorganic nitrogen fertilization reduces N_2O emissions from cereal crops: a comparative analysis of China and Zimbabwe. Mitigation and Adaptation Strategies for Global Change, 1–13; and, Sapkota et al. 2014. Precision nutrient management in conservation agriculture based wheat production of Northwest India: Profitability, nutrient use efficiency and environmental footprint. Field Crops Research 155, 233–244.

national and subnational jurisdictions increase their institutional investments in food systems in ways that address climate change effects.

Relevance

FP4 grew out of CCAFS Research Theme 4 that in 2011-13 included developing regional scenarios to guide policies, investment and institutional change. Moving to FP4 provided an opportunity to identify what previous research was most relevant to the FP objectives.

To ensure greater relevance, FP4 objectives were developed in part through consultations with demand-side actors, such as stakeholders in policy agencies and institutions, and at regional impact pathway workshops. To the extent that key research stakeholders were present in these workshops and researchers were able to respond in demand-led ways, FP4 is indeed relevant.

Elements of FP4 relevance include: access to, and the ability to develop, policy-relevant information related to the current and future climate risks to agricultural sectors; the capability to engage directly with key policy-makers to help develop climate-related policies and strategies, and; the capacity to identify and contract local and national partners that can contribute to the implementation of the research. The project case studies examined under FP4 exemplify these findings.

For example, the project "Relevant climate change information meets decision-making to influence policy and institutions for climate resilient food systems" in Guatemala, Nicaragua, Costa Rica, Colombia and Peru has been opportunistic in its involvement with and contributions to evolving national climate and agriculture policy frameworks. Maintaining good relations with national policy agencies (despite discontinuities of staff), being selective on entry points and levels of interventions and developing an understanding of "policy incidence"[77] have contributed to local and regional relevance.

Another example is the project "Influencing and linking policies and institutions from national to local level for the development and adoption of climate-resilient food systems" in Tanzania and Uganda, which seeks to influence and link policies and institutions from national to local level in order to develop and adopt climate-resilient food systems. Again, relevance comes from identifying opportunities for research to inform the emerging national climate and agriculture policy frameworks and debates. In Tanzania, the project worked with the Vice President's Office and Ministry of Agriculture to develop the climate-resilience component of the agricultural development plan. In Uganda the project took a more pragmatic bottom-up approach, analyzing national adaptation program of action projects and supporting the development of guidelines for mainstreaming climate change.

Effectiveness

FP4 has found entry points and ways to inform national level climate and agriculture policy development. Outputs to date target different levels of next-users and include tools, scenario methods, communications for awareness raising, national mitigation and food security strategies in

[77] This phrase is a direct translation from the Spanish term "incidencia politica" that describes well the opportunistic approach that CCAFS takes to achieving policy influence.

agricultural sector, and analytics for multi-lateral organizations. CCAFS has supported the Colombian government in designing a NAMA for reconverting pastures into fruit crops, to develop investments in adaptation and mitigation for the agricultural sector, in the development of a strategy for CSA in the national development plan 2014-2018, and in the diagnosis and proposal development for adaptation in the 2015-2025 strategy. In addition, FP4 has supported the development of the climate risk management component of the Honduran food security system. Support has been given to "Shamba Shape Up" a communications and extension service in EA. The Gender and Inclusion toolbox developed under the forerunner of FP4 was co-designed and is used by various research partners. In Cambodia, the FP4 scenarios project supported policy development used in the Cambodian climate change priorities action plan for agriculture. Finally, institutionalizing the use of the IMPACT model of the International Food Policy Research Institute (IFPRI) in OECD global and regional policy analysis has been supported by CCAFS.

Interviews with next-users in government agencies showed high levels of appreciation of work and outputs related to FP4, which reflects well on effectiveness. Notwithstanding the issues on the robustness of outcome-validation work (see section 2.1.6), it was not difficult to corroborate the findings of the outcome validation reviews in EA and Colombia, which found evidence of effective influence in agricultural policy and strategy development focused largely on climate-proofing productivity. In the case of Colombia, Honduras, El Salvador and to some extent Uganda and Tanzania, FP4 is supporting institutional investments for farming to be more climate smart and market-oriented, for example, in coffee, maize, rice and beans production. Apart from the case of FP4 support to the Honduras Food Security and Nutrition Strategy, FP4 influence on national level food security institutional investments was not apparent. CCAFS-supported work by Bioversity International on coarse grains is relevant to the Indian government's promotion of climate resilience through its new food security bill, but the evidence available to the Evaluation did not permit us to attribute direct policy influence.

Effectiveness of FP4, particularly in LAM, has been enhanced by CRP strategic management, notably in the competitive allocation of resources. An important element in this success has been the willingness of researchers from CGIAR centres and partners to identify with the Program and to join a CCAFS 'culture'. CGIAR researchers tend to relate most closely with their host centre and therefore to report through centres rather than CRPs. CCAFS in LAM is changing this attitude and various interviewees during the Evaluation referred to the Program as their main point of reference and source of support. There are just three CGIAR centres involved in FP4 implementation across LAM and this too has helped make coordination of FP4 activity easier and more effective. Related to this is the way that coordination of the Future Scenarios project has been delegated to the Universidad para la Cooperación Internacional in Costa Rica, which allowed a respected institution in the region to assume leadership and in so doing gained greater acceptability for the initiative in policy circles. [78] Finally, CCAFS and CIAT have invested in additional staff to form a collaborative research group that provides CRP to centre linkage and support. This has been an effective move, in many ways integral to the working of FP4.

[78] The success and level of delegation can be seen from https://ccafs.cgiar.org/blog/future-scenarios-work-informs-climate-and-agriculture-policies-seven-countries

Projects such as the CCSL Initiative, and the science–policy platforms (see section 3.5.1 for WA) have provided the opportunity to link local knowledge into national policy. Methods to increase the transfer of local knowledge into national and international policy and strategy decisions should be further developed.

Sustainability of impact

FP4 takes the outputs of other FPs to the policy interface, which implies that the sustainability of FP4's impact depends to a large extent upon the relevance and utility of outputs from FP1, FP2 and FP3. For example, the influence of FP4 on the development of Kenya's national climate change action plan and the subsequent national adaptation plan actions are closely related to the implementation of the EA RP. We can say that policy and institutional outputs of CCAFS have achieved direct influence in Kenya and that this influence is institutionally locked in through the national climate change action plan and adaptation plan. The sustainability of this technical and institutional impact thus depends to large extent upon the government of Kenya's interest in implementing these climate action plans, and FP4 relies upon RP management to identify opportunities to influence policy.

Sustainability is also dependent upon the robustness of the impact pathways chosen, and here the importance of the inter-relation among FP and RP is again evident. Using an example from Africa, the EA RP leadership in Kenya chose to liaise with the AGN as one way to get CCAFS outputs on policy and institutions into national climate arenas and into the UNFCCC process. However, Ethiopia, Uganda and Tanzania – the other priority countries in EA – are members of the LDC group within the UNFCCC process. This group has a longer trajectory of better organization and more effective presence in the climate negotiation process. At COP21 in Paris, for example, the LDC group's main demands, for recognition of the 1.5°C target for global warming and the need for loss and damage to have a separate clause in the text were agreed to, while AGN demands for special recognition for Africa and the need for an adaptation goal were unsuccessful. The Evaluation team did not systematically assess the lessons and outcomes from the EA RP collaboration with the AGN. However, given the COP21 experience, a better decision for CCAFS would have been to work with a negotiators group that reflected the broader range of the Program's priority countries – such as the LDC Group where majority of the countries are in Africa - and therefore be able to have wider influence.

Notwithstanding the better than expected outcome of COP21, the script for policy incidence in the climate arena is being written and no panacea for sustainability exists. A common prognosis for achieving sustainability of FP4 impacts, proposed by many stakeholders, was to align CCAFS with large-scale climate-related interventions by multi-lateral agencies and development donors. This hypothesis, along with others perhaps more grounded in national climate response processes, requires thorough testing in any subsequent phase of the Program.

Conclusions

The four FPs are all relevant for CCAFS to implement it program towards the IDOs and CGIAR goals.

There is inter-dependency among the FPs where FP1 brings together and tests outputs from FP1, FP2 and FP3 and all these FPs feed into FP4 to upscale CSA practices, making it integral to the overall CCAFS design. Integration in projects has been improved by the adoption of ToC and impact pathways at FP

level, with greater understanding of synergies between adaptation and mitigation. This convergence is making its way through to RPs.

Relevance of FP1 could be strengthened by recognizing at the household level some of the non-agricultural strategies that can support livelihoods, such as off-farm work, micro-enterprises and temporary, or even permanent, migration. Trade-offs among options in the household also need to be taken more into account. It would be useful to broaden the concept of CSVs to encompass watersheds and landscapes. A stronger case needs to be made for how the CSV concept contributes to national agricultural development.

Since initiating work on CIS and weather-indexed insurance, FP2 has made progress regarding outputs, delivery and business models for dissemination. Private sector participation in India has greatly improved the scale of information. Evidence has been generated on success of the interventions and this needs to continue for promotion at the policy level. The time to generate CIS has been reduced compared to previous programs.

In FP3 working through country and partner priorities is a valuable strategy because it mainstreams the Program's work and builds the capacity of important stakeholders. FP3 has been effective in making progress towards its stated objectives. The FP research has influenced the development of national mitigation policies in some target countries. The use of GHG intensity to quantify mitigation is useful and efficient, and the recommendation of the CCAFS-commissioned evaluation of FP3 – to develop indicators to prove future effectiveness – should be implemented. For enhancing the CCAFS and CGIAR-wide effectiveness of research related to mitigation, the Evaluation team considers that the collaboration and exchange across the CRPs on mitigation in the AFOLU sector needs strengthening.

FP4 is relevant, both as a result of working with demand-side stakeholders to take advantage of opportunities that present themselves and by virtue of bringing research outputs from FP1, FP2 and FP3 to the attention of policy-makers. Challenges in defining some of the terms in the impact pathway make it difficult to assess progress towards the impact targets. With one exception, the Evaluation team found no evidence of influence on national investments in food security. The Evaluation team considers it important to aggregate local knowledge and local experience in ways that are meaningful for decision-makers at larger scales. For this, the Evaluation team considers that the science-policy platforms and the CCSL have potential. Regarding CCAFS' alignment with negotiator groups of countries to be influential, the Program should consider working with the LDC group in addition to the AGN.

3.5 Regional Programs: relevance, effectiveness and sustainability of impact

The Evaluation team found that CCAFS, through its organization, is very deliberately addressing integration within and across projects and regions and with its boundary partners. In the regions, especially SA, LAM and EA, integration has improved as relationships between the regional leaders and the relevant CGIAR researchers (as opposed to CGIAR centre management) have broadened and deepened. CCAFS' impact pathways have been developed in some of the regions using stakeholder consultation and dialogue with CGIAR centre and partner researchers. RP leaders have better access to relevant component research in other CRPs and CGIAR centres, and CGIAR centre contacts are operating more effectively and communicating better within their centres. Outside CCAFS and the

centres, activities such as the science-policy platforms and multi-stakeholder dialogues in WA and LAM are helping to achieve integration. RP leaders now have a better knowledge of which researchers are effective and genuinely committed to CCAFS' greater outcome focus. RP leaders also now have a number of mechanisms, including bonuses and additional funding and sanctions against poorly performing CGIAR centres, which not only foster integration but also promote higher-quality science.

West Africa

The WA region is characterized by a strong latitudinal rainfall gradient that determines cropping systems and even small fluctuations can have a major impact on small farmers' livelihood. Added to extensive poverty and widespread land degradation, climate change and variability will exacerbate overall vulnerability of rural communities. CCAFS program in WA focuses on FPs 1, 2 and 4, including work on seasonal forecasts, climate analogues, farms of the future, weather-indexed insurance, and CSA practices. CCAFS works currently in Burkina Faso, Ghana, Mali, Niger, Senegal and Cote d'Ivoire.

Relevance

Research activities in WA focus on climate change adaptation and its link to food production and access. The research is relevant to two of the objectives of CSA, namely sustainably increasing agricultural productivity and building resilience to climate change..

The Evaluation team found that CCAFS, and before that the Climate Change Challenge Program, has aligned its research with national priorities in several countries. Policy-makers and representatives of farmer associations in Senegal said in interviews that CCAFS research was relevant to national priorities and local needs. There is evidence of similar consultations also, for example, in Mali and Burkina Faso[79].

Evidence from interviews in Senegal, and review of publications with relevance to WA suggest to the team that CCAFS research in WA is in line with the research gaps listed in the latest IPCC Assessment Report, including the need to further develop regional climate models and sub-regional models and improve the understanding of climate variability and its consequences at the local and farm level; especially on climate impacts on livestock, plant pests and diseases as well as on water availability and governance.

Planning for the CCAFS extension 2015-2016 in WA took place using a participative approach to align regional and FP priorities. This enabled the work in WA to be relevant both to CCAFS objectives and to the priorities of research and policy partners.

However, the Evaluation team found that challenges for long-term adaptation (i.e. 20-40 years) are not yet well considered in the WA portfolio. According to CCAFS, while transformation scenario planning is included during the diagnosis phase of the participatory action research so as to include medium to long-term perspectives, stakeholders often focus on the shorter term options. The main focus of CCAFS research conducted in this region is on how to adjust to current climate variability. Although providing accurate information for short term decision making is extremely important for

[79] Somda et al. 2014. Participatory vulnerability assessment and planning of adaptation to climate change in the Yatenga, Burkina Faso. CCAFS Working Paper No. 64.

facing climate vulnerability in the region, this focus ignores the understanding of challenges and opportunities that need to be addressed today in order to secure (transformative) adaptation for more severe challenges in the future. Those challenges include, for example, uncertainty on the onset, direction and escalation of effects, the ways that climate effects will be transmitted from local to national and back to local economies and the effectiveness of collective action for adaptation. Furthermore, there is no pathway dealing with mitigation, even if the need for more research in mitigation, with special regard of (agro)forestry and bioenergy production, has been highlighted by national policy-makers (in Senegal) and by the IPCC report on vulnerability in the region.

Effectiveness and sustainability of impact

WA is progressing well towards the 2019 regional outcomes. Promising CSA practices are slowly emerging from participatory action research, which started in 2012. The RP has already influenced national policies in Mali, Senegal and Burkina Faso. During the country visit, the team observed progress in Senegal along the impact pathway planned for WA. For instance, interviews with policy-makers from various governmental organizations confirmed use of CCAFS science for developing adaptation programs (in line with FP1 and FP4), and field visits confirmed the importance of farmer tailored climate information for reducing climate vulnerability at the farmer level (FP2).

The Evaluation team's analysis of WA's outputs shows progress towards contribution to the IDOs on food security, adaptive capacity and policies and institutions. Some examples include: the outputs of the Project on Participatory Action Research have delivered insights for building resilient agro-silvo-pastoral systems in Burkina Faso, Ghana, Niger and Senegal; research activities in the project on African smallholders with Climate Advisories and Insurance Development is increasing understanding of climate risks at the local level and supports providing an insurance system that reduces vulnerability; and the science-policy platform created in Mali has facilitated the understanding of policy challenges for securing adaptation at a cross-sectoral level.[80] The Evaluation team also assessed the extent that 34 specific scientific outputs contributed towards IDOs[81]. A third of the outputs contribute to the IDO on adaptive capacity and about a quarter of them contribute to the IDOs on food security and adaptive capacity. A smaller number of outputs contribute to the IDOs on policies and institutions or in a combined manner to adaptation capacity and policy and institutions. A few outputs contribute to all three IDOs. In conclusion, majority of the outputs from WA clearly contributes to achieving three of the IDOs.

Many interviewees in the region emphasized the importance of the science-policy platforms that have enabled a constructive process of mainstreaming climate change issues (mainly adaptation) into a joint learning process across multiple stakeholders, and these offer further evidence of long-term impacts. In Senegal the Ministry of Agriculture has mainstreamed the national platform as one of the

[80] Sogoba et al, 2014. How can effective dialogue be established between researchers and policy makers on climate change in Mali; Sogoba et al., 2014. How to establish dialogue between researchers and policy-makers for climate change adaptation in Mali: Analysis of challenges, constraints and opportunities. CCAFS Working Paper No. 84.

[81] The appraisal included all journal papers, case studies, book chapters and briefs allocated to WA for the period 2014-15.

items to be funded under its budget. The Team's observations in Senegal on the farmer to farmer and extensionist to farmer learning processes suggest initial scaling-out.

Strategic collaboration with national policy-makers and alliances with regional bodies (e.g., ECOWAS), along with the progress achieved in science-policy platforms in Senegal, Ghana and Mali bodes well for future effectiveness in the region. Implementation of policies as well as scaling out and scaling-up the use of (more) resilient agricultural practices or the access to climate information is a big challenge and needs resources far beyond CCAFS' scope. Initial mainstreaming of strategic elements of adaptation and food security into national policies and programs is a good starting point, but there is a need to understand the potential synergies in out- and upscaling with other actors, including the private sector.

East Africa

CCAFS works currently in Kenya, Ethiopia, Tanzania and Uganda, and at a regional level supports the AGN on climate negotiations (see section 3.4.4 on FP4). EA was one of the two regions where RP implementation started. Predominantly the agriculture in EA priority countries is rain-fed and hence vulnerable to climatic risks related to increasing rainfall variability and temperature rise – the current food insecurity emergency situations in Ethiopia and Southern Africa bear witness to this.

The RP impact pathway centres on the incorporation of CCAFS outputs in projects that implement CSA best-bet technologies. CCAFS outputs are also to be used in the design and improvement of CIS provision to rural communities enabled by increased investment. CCAFS science will inform low-emissions strategies adopted by farmers. Food system policies informed by CCAFS outputs will be enacted and will support CSA technology use.

Relevance

In this region, RP management consulted stakeholders (some policy-makers and other researchers) in each country to determine national research priorities and needs, and how to address them. In line with requests from policy-makers in the region, EA identified 11 studies to further investigate the priority issues in climate change, agriculture and food security. Responding to national level demands for scientific policy support in agriculture, these studies formed the basis of FP4 work priorities that seek to contribute to the achievement of the IDOs on policies supporting climate-resilient agriculture directly and others indirectly.

Six CSVs in different agro-ecological zones have been selected to represent both the bio-physical and socio-economic diversity and the dominant farming systems in this region to initiate research on FP1 and FP2 activities that through the impact pathway actions set out above will contribute towards the achievement of the IDOs of increasing adaptive capacity and increased food security. CSA practices, including multipurpose agroforestry and maize intercropped with beans, are being implemented and researched at the CSVs (FP1). A project on CIS has been initiated in Kenya in collaboration with the national meteorological organization and a local university supported by a UK university. (FP2). CCAFS has placed less emphasis on lowering GHG emissions from the agricultural sector (FP3) due to the political differences across the region. For instance, while Ethiopia has a long standing commitment to climate resilience and green economy, the Ministry of Agriculture has support in developing

strategies for mitigation from other stakeholders, Kenya is relying on private sector actors to deliver mitigation through agriculture, and Uganda and Tanzania have clear adaptation policy priorities.

The public sector is unlikely to invest in low-emissions agriculture until policy-makers are convinced that this will not result in reduced food production and higher costs. They do not feel responsible for the anthropogenic factors leading to rapid climate change and threats to food security (justified by the recent global consensus on common but differentiated responsibilities and respective capabilities). Having said that, the importance of the agricultural sector in the INDCs of the EA countries show that policy-makers are aware of the role green agricultural development could play, but the INDCs are far from implementation and the adaptation/ productivity/ food security trade-offs are not registered in these highly politicized documents. These issues speak loudly to the future relevance of research, such as that which CCAFS could do, to the policy level decision making on agricultural development.

Effectiveness and sustainability of impact

The RP has established its value to next-users with proactive support to country and regional policy and planning processes. In its first five years, the RP emphasis on policy has helped the countries to frame their agricultural adaptation policies and action plans (the project case study on influencing and linking policies from national to local levels in Tanzania and Uganda provides clear evidence). The issue of the RP, and CCAFS in general supporting AGN is assessed in 3.4.4.

The FP2 work in EA on climate advisories for farmers also shows promise in the future to reach out to a large number of end-users through enhanced meteorological services and CIS products as indicated in the impact pathway. The Evaluation team was not able to assess insurance mechanisms or work on early warning systems as they are not yet sufficiently well-advanced in this region. The sustainability of weather-indexed crop insurance will require either a business model like the one used by ILRI's Index Based Livestock Insurance, or a reliable subsidy, as in India.

The Evaluation team's visit to the CSVs in Kenya revealed issues about the current effectiveness and the longer term sustainability of CSA technology transfer and adoption. Researchers interviewed during the RP visit pointed to low adoption rates of improved varieties as a persistent problem, and this was confirmed in the CCAFS baseline surveys[82]. However, farmers are actively changing cropping patterns and farming systems in response to factors such as market forces, input prices and labour availability.

A study in Kenya[83] shows that traditional methods of raising awareness through extension services, farmers groups and agri-service providers do not correlate to improved knowledge or adoption of promoted practices. Therefore the assumption that supporting an improved policy and implementation framework will promote widespread CSA adoption may not hold. This does not necessarily mean that the institutional channels are poor means of communication, but it may point towards a deeper problem of not adequately assessing farmers' demands and priorities. This requires engagement with farmers and use of consultative tools that many agricultural scientists are not

[82] Mwangangi and Mango 2012. Summary of Baseline Household Survey Results: Makueni, Kenya. CCAFS report.
[83] Bernier et al., 2015. Gender and Institutional Aspects of Climate-Smart Agricultural Practices: Evidence from Kenya. CCAFS Working Paper No. 79.

trained in. Diagnostic exercises like the vulnerability assessment carried out in Burkina Faso[84] could be instrumental in determining the key concerns of the farmers and become a basis for an appropriate intervention. Similarly other research conducted by CGIAR researchers and NGO partners has shown that the participatory technology development methodology can enable better agricultural technology uptake[85].

The EA RP ToC assumes that adoption of CSA practices will start to reduce GHG emissions due to input use efficiency and improved productivity. Although this seems logical technically, measurement of changes in GHG production due to CSA practice adoption will be needed to establish this. Given the generally low level of fertilizer use across Africa and the preponderance of extensive and semi-subsistence agricultural practices in the more climate vulnerable parts of EA, the measurement of GHG emissions changes are technically challenging and illogical outside of the larger-scale intensive production systems.

As mentioned in section 3.4.2 on FP2, sustainability of CIS depends crucially on the capacity of service providers. In EA, interviews revealed that Kenya Meteorological Services is short on resources, staff and capacity, yet it is a regional centre of excellence. Fortunately other programs, for example those funded by DFID (through the UK Meteorological Office) and International Development Research Centre, continue to support national metrological organizations. CCAFS could contribute more to building capacities of NGOs, community-based organizations and extension staff for last mile functions in CIS delivery and thereby contribute to sustainability of impact.

For CSA practices, sustainability will depend on transfer of CSVs to national agricultural research centres and agricultural universities after the lifetime of CCAFS. Across CSVs, NARS should be key partners, working at the national and local level with Ministry of Agriculture departments. Since the CSA technologies are still being developed and tested, CCAFS should develop strategy for this transfer in Phase II. Having included CSA in national and regional policy dialogue it is imperative that CCAFs now produces credible examples of CSA practices that would reduce food insecurity in face of climate change. For example, improved livestock breeds may bring better economic returns when fodder is abundant but would become a liability in drought prone lean years that climate change is predicted to cause.

South Asia

CCAFS works currently in India, Bangladesh and Nepal, with some links to Sri Lanka. The RP targets a wide range of key agro-ecologies and socio-economic systems. The Indo-Gangetic Plain is one of the globally significant food baskets. However, SA continues to be a poverty hotspot.

Relevance

The RP project portfolio contains activities by all four FPs in SA, with FP1 and FP4 the most and FP3 the least prominent. Regionally led activities seek to synergise and complement projects in each FP.

[84] Somda et al. 2014. Participatory vulnerability assessment and planning of adaptation to climate change in the Yatenga, Burkina Faso. CCAFS Working Paper No. 64.
[85] Waters-Bayer et al. 2015. Exploring the impact of farmer-led research supported by civil society organisations. Agriculture & Food Security, 4:4

The objectives and the general design of the SA RP are strongly aligned with the CSA framework and the CCAFS Program generally. During its field visits the Evaluation team observed that they are also generally well aligned with national priorities and policies.

In India, there are high level relationships between the RP leader and lead researchers from IFPRI and CIMMYT and key policy boundary partners in state and central governments, and with the Indian crop and weather insurance sector. Projects in FP4 are particularly well aligned with major Indian government initiatives such as the National Initiative on Climate Resilient Agriculture and the National Mission for Sustainable Agriculture. Several key boundary partners in India, such as the Indian Council of Agricultural Research, the Punjab and Gujarat state governments and the Agriculture Insurance Company, explicitly highlighted the systems approach of CCAFS, which makes it a partner of choice over national research entities that still tend to work in disciplinary silos and so cannot undertake systems research. More importantly, boundary partners consistently said that the Program's outcome focus and CSA framing were key determinants in making CCAFS more relevant than other research institutions.

Alignment and relationships are less developed in Bangladesh, while in Nepal relevance is being achieved more through linkages with the NGO sector, which is strong there. Sites in Nepal have been chosen primarily to test CSA practices. To help link FP1 field work to government policy, CCAFS is working to implement Nepal's Agricultural Development Strategy by setting up, through its partner NGOs, CSVs across a range of environments to provide evidence for scaling-out and -up. Partners, like LI-BIRD, support the Nepal Agricultural Research Council in promoting conservation and sustainable agriculture.

Through field visit observations, discussions with CCAFS researchers and partners and scrutiny of progress, the Evaluation team found that CCAFS' comparative advantage in the SA region is shifting. In India, it has worked primarily in Indo-Gangetic Plains and with focus on component CSA technologies that are now mature. National institutions are strong to take leadership on such research. Prioritization at country and regional level is needed to determine where CCAFS is most relevant with clear comparative advantage to target its activities on most climate vulnerable people and support the weaker national systems.

Effectiveness and sustainability of impact

While the impact pathways and outcome targets for SA are consistent with the CCAFS ToC, based on the project documentation in the P&R platform, the SA specific targets as stated are overly ambitious. However, the coherence of the program of work in SA and the long-standing relationships between lead CCAFS researchers and key boundary partners, in India in particular, along with the relative CCAFS funding levels allocated by the program to this region, provide some assurance of achievability. CCAFS SA can point to significant early successes in outcomes in terms of CSA technology development and adoption, primarily through the work in India. Overall, effectiveness has been greater in India than in Nepal and Bangladesh.

The portfolio of projects and activities in SA is coherently organized, with general input-output channels recognized between projects.[86] However, definition of what actual project outputs constitute an input to another project could be further tightened, although this is hampered by the absence of detailed project plans in the P&R platform (see 2.1.3). Appropriate sequencing is also difficult, because in some cases linked projects would need to be carried out in sequence, while in reality all projects have had to start at the same time.

As with effectiveness, and for the same reasons, prospects for sustainability are high in India. Communications, mainly through the CCAFS website in the form of blogs and briefing notes that target a range of audiences in SA (as well as globally) also contribute to sustainability of impact.

Research outputs from FP2 are effectively influencing the largest Indian player in the crop insurance business, the Agriculture Insurance Company. As noted for FP2, CCAFS research is underpinning the determination of better payment modalities and claim triggers. These improvements are not only leading to benefits for the Agriculture Insurance Company, but are also benefiting farmers through more timely claim payments and a reduction in unsupportable claims. This dual benefit enhances the sustainability of climate-indexed crop insurance.

The SA RP has had an enduring impact on how private sector and NGO providers frame agro-advisories in relation to agricultural practices. In the case of one key provider in India this is resulting in a likely sustained exposure of about 1.2 million subscribers (out of the 3.2 million) to the principles of CSA. There is potential for this ICT approach to be emulated in Nepal and Bangladesh, and eventually SEA.

Research in FP4 is informing central and state governments on how to access and target funds towards CSA more effectively. If governments are successful, this too will help to ensure sustainability of impact.

South East Asia

CCAFS currently works in Laos, Vietnam and Cambodia, with selected activities in Indonesia, the Philippines and Myanmar. The region is very diverse in terms of food systems, spanning high-input, high-intensity rice production systems and low-input, semi-subsistence, rainfed mixed cropping and agroforestry systems in forested highlands and mountains. Vulnerability to climate change ranges from areas impacted by sea level rise and sea water intrusion in the deltas, to increased frequency of extreme events (typhoons, droughts, temperatures) in most of the areas of SEA. Vulnerability is compounded by low levels of institutional and community capacity to adapt, particularly in the core countries of Laos, Cambodia and Myanmar.[87]

[86] An example are the output-input links between projects P25-FP1 (CSA practices), P53-FP1-SA (CSA business and extension models), P119-FP2-SA (decision support tools) and P60-FP4-SA (upscaling of CSA), with the latter essentially the main upscaling mechanism for the CSA practices and insurance work in FP1 and FP2.

[87] Resurreccion et al. 2008. Climate adaptation in Asia: knowledge gaps and research issues in South East Asia. ISET International and ISET-Nepal. Kathmandu, 76 p

Relevance

The SEA RP, formally initiated in 2014, is the most recently established of CCAFS RPs. Given the high degree of vulnerability of the region and the importance of food systems to food security and rural livelihoods in the Mekong region, it is appropriate for CCAFS to have a SEA RP.

In 2014, the SEA regional team conducted a series of consultation and planning workshops with key regional stakeholders and a wide range of CGIAR centre researchers already active in the region. The SEA vision and the outcome statements are grounded in this consultation process, and as a result the SEA portfolio of work has achieved a good degree of regional relevance, while at the same time also conforming to the general CCAFS outcome statements and underpinning targets.

The core countries are all in the process of formulating or implementing Green Growth agendas[88] in response to climate change, creating strong demand for CCAFS work. This seems to be strongest in Vietnam, where there is a strong policy push for agricultural mitigation. As a result, FP3 is particularly relevant (in contrast to the SA region, where mitigation is not a political priority). The challenge is to use this favourable policy environment as an engagement opportunity, even if initially there might be a misalignment between policy priorities and the CCAFS research agenda. The SEA RP is also positioning itself to engage and influence regionally through Association of Southeast Asian Nations.

Effectiveness and sustainability of impact

Because this RP is at an early stage only formative assessments are possible. Despite the downward cascade logic of the CCAFS ToC through FP and RP impact pathways, as in SA, the SEA specific target contributions seem overly optimistic and unsupported by credible project level outcome targets. Project documentation in the P&R platform is too brief to be able to judge how likely the aggregated outcomes of projects are to achieve regional targets. Details of planned approaches are missing, and in some cases the identity of the targeted boundary partners is absent. Assumptions on how project outcomes will effectively influence boundary partners are poorly articulated. As with WA, the CSA practices in SEA are yet to emerge, although there is evidence that in The Philippines and Vietnam earlier work by IRRI on AWD for rice—under CCAFS and GRISP—is being disseminated by key boundary partners. Mechanisms to scale results from the CSVs are still unclear.

Many concepts are new in the region (e.g. CSA, CSV, impact pathways) but are being internalized by CCAFS researchers and in-country partners. As noted in section on FP1, translation of terms such as ‘smart’ and ‘climate’ is not always straightforward, for example in Vietnam. In mountainous areas, because of the way farmers use the terrain, “village” may be less appropriate than “landscape” or “watershed”. As a result, the RP is broadening the CSV concept, a pragmatic and positive adaptation to the RP’s special context. The main challenge, however, resides in identifying what is scalable, who implements the scaling-out, and who should be the targeted beneficiaries? These are pertinent researchable issues in their own right.

[88] Based on interviews in Laos and Cambodia; for Vietnam refer to : http://lowemissionsasia.org/sites/default/files/pdf_file/LEDS%20and%20Green%20Growth%20-%20Vietnam%20.pdf

Coherence between projects in FP1 and FP2 is being attempted in the CSVs, while linkages to FP3 are still evolving as project activities are planned. The three core FP1 projects are being supplemented by 11 smaller regional activities, some of which seem poorly connected or their rationale unconvincing (e.g. ICRISAT work on introducing legumes to Laos), or are geographically disconnected from the CSVs (e.g. PhilRice scaling-out of Infomediary in the Philippines). The Evaluation team found the strategic purpose for CCAFS presence in the Philippines and Indonesia unclear. Some activities (such as FP3 work in Indonesia on low emissions from oil palm production and FP4 policy work in Philippines) are more disconnected from the core RP and are on the geographic and thematic fringes. Supporters characterize these as opportunistic ("low hanging fruit") additions to maximize outcomes. This strategy brings into question the degree to which achieving targets, rather than inter-FP coherence, is driving the choice of interventions. These points detract from a more coherent program design, which in turn reduces effectiveness. Greater cross-CRP convergence in regional sites needs to be pursued, perhaps through site integration plans in Phase II.

Latin America

CCAFS has activities in Colombia, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and, to a lesser extent, Brazil. According to the latest IPCC report, the extent of climate challenges to agricultural productivity with consequences for food security are expected to be very variable across the region and over time. As a result, there are no generic adaptation measures among agro-eco-zones, even within a country.[89]

Relevance

CCAFS used a consultative and iterative process to design its regional strategy for LAM. In 2013 CCAFS commissioned a stocktaking analysis of the state of the art in research and policy on climate change and food security, and then used this analysis as a basis for discussions with representatives from different countries and sectors, and researchers in the region.[90] CCAFS activities in LAM take regional and national priorities into consideration. All FPs have activities in the region, with different emphases in different countries. Most policy work is directed to single pillars of the CSA conceptual framework, e.g. assisting in the preparation of INDCs and NAMAs related to mitigation and the development of agricultural and food security policy.

The strength of CCAFS' national partnerships evidenced by the interviews with researchers and partners, the rapid growth of its regional portfolio, the alignment with key national and international research gaps indicate the relevance of the RP. However, CCAFS researchers and management appear to have well-founded concerns that progress on climate adaptation and mitigation, both at the sectoral and national level, needs to be better complemented with work that emphasizes the relevance of the Program to strategies for climate resilient food security among the poorest and most vulnerable groups.

[89] Magrin et al. 2014. Central and South America. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Barros et al. (eds.)]. pp. 1499-1566.

[90] See CCAFS, 2013. Informe de sistematización: Taller internacional, construcción de la estrategia CCAFS para América Latina.

The development of the CSV work in Colombia is following a very different pathway to that in other regions. The location chosen for the CSV is delimited by administrative rather than ecological boundaries, and was decided in consultation with local NGOs and community-based organizations. This should enable better alignment with the local development planning system. The implementation of the baseline survey and other initial steps were also negotiated with local people and out-sourced to local stakeholders. The Evaluation team considers that this approach enhances the relevance of work, because the objectives and outputs are shared and a local exchange and discussion forum for CSA activities is created. This offers lessons for future CSV development elsewhere.

Previous experience of the Evaluation team in the region confirms a long history of climate change research and development cooperation in some countries of this region, both with and without CGIAR involvement. As a result, highly experienced national and regional organizations and increasing competencies are available especially in Peru, Costa Rica and Colombia. Differences from country to country need to be acknowledged by CCAFS. Peru, for example, currently has the highest investments in climate change research for development regionally, while in El Salvador investments and competences are much lower. Thus, the comparative advantage of CCAFS varies from country to country. For example CCAFS has a real comparative advantage in El Salvador but less so in Peru. In Colombia even though there are relevant and high level competences available, CCAFS continues to have a comparative advantage due to the fact that CIAT, its lead centre, is located in country and has well established partnerships with several key actors.

Effectiveness and sustainability of impact

The RP started relatively recently and is evolving fast, in opportunistic ways as concrete opportunities appear. CCAFS has invested in strategic alliances with decision makers in order to achieve progress along the impact pathways at least at the national level. Collaboration with the private sector, such as producer associations for rice (Fedearroz) and livestock (Fedegan) in Colombia, is a promising step towards a wider, effective use of research results. Furthermore, the Evaluation team found evidence of contributions of CCAFS to the (long-term) NAMAs, national adaptation plans and INDCs in Colombia, Honduras, Guatemala and Costa Rica. However, the impact of these policies depends heavily upon implementation and the availability of financing mechanisms. The momentum toward implementation and review of mitigation measures gained at COP21 increases likelihood of impact.

Achieving some of the implementation targets presented in the regional pathways seems challenging, especially those related to scaling activities within countries; for example, implementing silvo-pastoral systems in Colombia to reduce GHG emissions. This is due to the implementation lag, i.e. the time required for influencing production patterns at the local level.

The Evaluation team did not find evidence that the co-benefits and trade-offs between climate change mitigation, adaptation and food security at the national, sub-national and local levels in LAM are being considered.

The Evaluation team identified several success factors in the ways that CCAFS operates in LAM including: the consultative approach and constructive attitude of the regional team for deciding the research portfolio; strong partnerships with diverse stakeholders including agricultural producer organizations; the scientific competence of the CCAFS team and RP leader's understanding of

government and public sector procedures. In addition, the climate dialogue platforms created at the sub-national levels in several countries help next-users to access and utilize CCAFS outputs. However, greater complementarity of research on climate adaptation and mitigation with that on climate-resilient food security is needed.

Transferability of CCAFS successes

This section draws on the assessment of interview responses obtained as part of the transferability aspect of KEQ3 (the convergence aspect of KEQ3 has been addressed in other sections, mainly in 3.3).

A key element in achieving impact at scale is to ensure that results and approaches from one place can be adapted and implemented in other places. Transferability here refers to the degree to which research results or outputs from a specific context (location/country/region) can be generalized or transferred to other contexts. Transferability is an indication of broad applicability that is an attribute of IPGs (see section 3.2).

Based on an inquiry to FP and RP leaders the Evaluation team selected a number of approaches, outputs and methods developed by CCAFS that have been or should be transferred across regions. Testimonial information and document analysis was used for assessing if the transfer has already happened, how it has happened and what were the major challenges that CCAFS researchers experienced for transferring results. Supported by corroborating evidence from stakeholder interviews, the team concluded that CCAFS has achieved transfer to some degree.

There are examples of global transferability. The data and methods from the project on improving N_2O estimates in Mexico and India will be widely applicable, as is the climate analogues approach that has been taken across several regions (see section 3.2 on IPGs). At a smaller scale, evidence from interviews indicated that the socio-economics scenarios approach used in the Future Scenarios project has been transferred across Central America. The Evaluation case study on Low-emission Development Strategies showed that methods have been transferred to research partners and other stakeholders in Colombia and other countries in LAM through links with the wider Program on Mitigation Action Plans & Scenarios. Similarly, methods for GHG measurement developed in LivestockPlus will be transferred from Colombia to Peru while approaches to agro-climatic advisories and climate science-policy platforms developed in Senegal have been applied in Colombia. The Evaluation team regards these latter transfers among Senegal, Colombia, and also Honduras, as far reaching. Exchange visits between Senegal and Colombia by policy-makers, farmer representatives and researchers have resulted in changes in attitude (revealed in interviews). A bilateral collaboration agreement between the two countries further indicates a change towards sharing and cooperation.

CCAFS needs to consider additional opportunities for transfer. The Evaluation team believes that the technologies to improve mitigation in rice cultivation could be partially transferred from SEA to WA, while research on GHG emissions and fertilizers in Zambia and China could also be more widely transferred.

Conclusions

CCAFS has been pursuing integration with regions and projects and with its boundary partners through its organization, which the Evaluation team considers commendable. Despite the risks of greater complexity and additional transaction costs, this approach could enable CCAFS to pursue more

ambitious outcome targets. The Evaluation team, however, concludes that many of these targets are overly optimistic.

The Evaluation team acknowledges that CCAFS is attentive to centre scientists needing to improve project design and improving the articulation of how project outcomes will help achieve regional outcome targets. As stated elsewhere, the team considers that the potential of the P&R platform can be increased without adding unnecessarily to transaction costs – a well-functioning platform may help reduce them.

In some regional work, the comparative advantage of CCAFS is becoming less evident; for example, in mature, component level research in SA (such as individual CSA practices – project P25-FP1-SA). Also in LAM, national capacity is strong in some countries such as Brazil and Peru and the comparative advantage of CCAFS is changing, for example in how the Program engages in mitigation. This evolution creates a case for shifting priorities to areas of research or geographic areas of climate vulnerability where CCAFS has clear comparative advantage, or to other countries. In prioritizing its activities, CCAFS should continue partnerships with governments and research groups that have research competence and policy interests to support common agenda with CCAFS at national and regional levels.

All regions contain CSA research and have introduced CSV to a varying degree (depending also on how recently CCAFS has started its activities in the region). The village focus in CSV is, however, not appropriate for all contexts. While it works well for example in SA, it needs to expand the area of interest to watersheds and landscapes in other regions, particularly LAM and SEA.

The Evaluation team noted several areas of progress in the RPs. In WA the success factors include well-functioning partnerships where next-users and policy-makers appreciated transparent communication and sharing of knowledge with all partners at all levels; spaces for dialogue, such as the science-policy platforms; flexibility to attend to stakeholders' needs with accurate science-based responses to their concerns; and clear and acknowledged leadership.

Major challenges in WA relate to including longer-term climate vulnerability in the research strategy, finding ways of bringing FP3 into the RP and securing longer term impact through scaling out and scaling up, which are beyond CCAFS' immediate scope of boundary partners.

The EA RP is well established both in terms of staff and activities to take CCAFS forward. It has achieved national level public sector influence in the regional and national policy arena where its role has been well received. The RP's interventions at the national level show good partnerships and the transfer of skills and technology into the public sector. Support to national and regional policies on agriculture (FP4) and the successful initiation of CIS (FP2) at pilot level have shown that strategic partnership at the local level can resolve last-mile issues in achieving the developmental goals of CCAFS.

The SA RP is, overall, a well-established and highly relevant RP. Key boundary partners consider CCAFS to have comparative advantage over other research entities in SA, not least because the systems approach framed around CSA is widely and strongly supported. However, project level outcome statements and targets need better substantiation. The potential for impact is predicated on existing effective partnerships with key boundary partners, particularly in India. However, there is a degree of

vulnerability as these strategic relationships are reliant on a few key personalities in CCAFS SA. The portfolio is unbalanced geographically, with the level of funding of activities and the degree of maturity of partnerships greater in India than the other two countries. Within India the portfolio is still strongly biased towards the more favourable environments in the north-west Indo-Gangetic Plains where there are larger farms with irrigation. A greater emphasis on participatory adaptation processes is required, particularly in India.

In SEA where CCAFS has established activities only recently, the RP has consulted widely, assuring relevance, and has made a reasonable start. At this stage, project targets seem unrealistic, with poor definition of approaches and boundary partners. The opportunistic inclusion of "low-hanging fruit" activities diminishes coherence. Geographic scope should be tightened and restricted to the three core countries, at the same time strengthening linkages between outputs of FP1, FP2 and FP3 with inputs to FP4.

In LAM, CCAFS has very strong national partnerships, particularly with countries that have highly experienced national and good level of competences. Activities in LAM build on the long history of climate change research in some countries. Greater collaboration should be established at the sub-national level (for example, Corporaciones Autonomas Regionales in Colombia). In Colombia, CCAFS has engaged NGOs and community-based organizations in decision about CVS locations and other initial steps, which the Evaluation team found commendable. This more consultative approach to CSV development and implementation should be consolidated and take further, whereby CCAFS research feeds into national development planning system from the local level upward. RP targets pose challenges and should be adjusted to a more realistic level. In LAM, there are countries that have sufficient competence to lead research and the nature of partnership with CCAFS can evolve. CCAFS should identify and focus activities in those countries where the Program has a comparative advantage in respect of the national competences for climate and agricultural research, for example El Salvador and Honduras.

Although CCAFS has no specific mechanism to secure transfer across regions, the analysis of several cases showed three attributes that enable transfer within the Program: (i) the management structure of CCAFS—having leaders at FP and RP level—enhances dialogue for linking regional and thematic topics; (ii) the visits by FP leaders in the regions facilitate the identification of what can be transferred from one region to other and collaboration between the FP and RP leaders; and (iii) the Program communications strategy facilitates access to and sharing of information among regions. In order to improve transfer, CCAFS could consider further criteria for transfer, purpose, target groups/regions, and mechanisms of transfer. Success in transfer also requires that scientists are incentivized to operate beyond the limits of their specific projects.

4 Cross-cutting issues

4.1 Gender and social inclusion

Introduction

The CGIAR Consortium Level Gender Strategy seeks to integrate gender analysis into the agricultural topics that are the main focus of CRP research. It defines gender analysis as the identification of differences between men and women with respect to their vulnerabilities, assets, capacities, constraints and opportunities using quantitative or qualitative methods. **Gender research** refers to studies in which gender and gender relations are the main research topic. Mainstreaming gender in research refers to the use of **gender analysis** to inform the entire research cycle: targeting, priority setting, research design, implementation, research adoption and use, monitoring, evaluation and impact assessment. The current SRF objectives on gender equality focus on women's access to assets and their voice in decision making.

Evolution of Gender and Social Inclusion component within CCAFS

During the development of the Climate Change Challenge Program in 2009, researchers recognized that beneficiary target groups were highly differentiated among and across households. It was agreed to mainstream Gender and Social Inclusion (G+SI) across all work streams as the CRP was planned. Addressing G+SI became compulsory for all new projects of the Program.

At the same time, donors pressured the CGIAR System to better address gender equality and so programs and centres were instructed to do more on gender issues. Internally, CCAFS questions whether gender was the most important dimension of differentiation for climate and food security and aligned gender equality with social inclusion. However, the balance between gender and social inclusion as they were integrated into Program activities largely favoured gender equality.

In 2011 Social Learning and G+SI were coordinated from the Program's Research Theme 4, and largely generated products for guidance and capacity development toward gender mainstreaming. Under the Extension G+SI is a standalone research area with a newly appointed Gender and Social Inclusion Coordinator and inclusion of G+SI is a prerequisite for funding. Nevertheless, the Evaluation team notes that social inclusion in CCAFS is notable more for its absence.

CCAFS focused on gender in part due to CGIAR guidance and in part as a response to donor organization priorities. CCAFS management fully recognizes that gender is only one dimension of social inequity. Meanwhile social inclusion, in terms of how to include the most climate vulnerable (often those socially excluded and marginalized) as the main beneficiaries of climate resilience interventions, is not well addressed in research generally. Some INGOs claim to be able to address inclusion by identification of and engagement with the marginalized using vulnerability assessments, and CCAFS is now partnering with such INGOs in SEA. A more effective channel for CCFAS to address social inclusion would be through its work on climate informed safety nets – both those that address consumption (food insecurity) and income poverty.

CCAFS gender strategy

CCAFS' gender strategy was developed in 2012[91]. Since then there have been changes in CCAFS' gender research personnel including appointment of the coordinator. CCAFS is currently reviewing its work on G+SI. In addition, regional gender impact pathways have been developed.

The Gender strategy proposes that the improved knowledge and capacity outputs and results of the Program will lead to "changes in decision-making for the design and implementation of adaptation, risk management and mitigation strategies". These strategies, if implemented, are expected to contribute to improved gender equity in the distribution of costs and benefits from climate change and better food security for women and men.

The regional gender impact pathways all use the same template of gaps, new activities, outcome targets, and expected impacts. Many of the gaps identified are common. Activities to address gaps include: capacity enhancement and awareness raising, gender research and promotion of results, and new partnerships. The organizations targeted to achieve outcomes are both public and private sector at sub-national, national and region levels. Impacts sought vary. In SA women's voice in decision making is prioritized. In SEA the Program seeks impact through cultural change that better values women. In WA the main impact sought is land tenure for women. In LAM the Gender and Development approach[92] is proposed to generate more technologies that are appropriate for women.

Both the Gender strategy and the regional gender impact pathways are rather generic and fail to focus on key aspects of gender inequity of climate change effects on agriculture and food security. Such aspects include: intra-household differentiation of climate effects on asset ownership; consumption and decision making; gendered differentiation in agricultural technology adoption and the costs and benefits distribution from adoption; the agency allowed to women is determining and testing adaptation strategies both at the household and social collective action levels.

Program level assessment

In the view of the Evaluation team, for maximum impact, it is essential that gender analyses are performed at the project planning stage. When gender concerns are identified early in the planning process the research design can help reach a high level of adoption by targeting acute demands of the most vulnerable. More in-depth gender impact studies can always be done during evaluations.

The need for awareness and training on G+SI issues is accepted but not fully adopted across all FPs, discussed in 4.1.2. However, all CCAFS groups interviewed wanted more guidance on how to achieve G+SI targets and recognized the need for capacity and support on G+SI.

One concrete achievement is the gender and inclusion toolbox, which was developed in the work that led to FP4. This is a collection of participatory action research methods framed for gender equality and climate change application that was co-produced with FAO and CARE. This output has achieved significant uptake among NGOs working on climate and agriculture themes, although less so among other CCAFS FPs. Further integration is a key next step and can be used to evaluate the potential for

[91] https://cgspace.cgiar.org/bitstream/handle/10568/27830/ccafs_gender_strategy2012-final.pdf?sequence=1
[92] See: https://en.wikipedia.org/wiki/Gender_and_development#Gender_and_development_.28GAD.29

participatory and social differentiation research. However, this has not yet been implemented, and CCAFS has focused on the social learning outcomes from the development of the toolbox.

Some stakeholders have recognized the role of CCAFS in promoting the gender equality aspects of climate change. For instance, CCAFS helped the Colombian Ministry of Environment and Rural Development to revise its guide for working with local communities on environmental change, which subsequently included aspects of gender equality.

However, CCAFS researchers and research partners told the Evaluation team that the integration of gender issues has been complex and at times problematic. Progress toward the IDO on gender equality has been slow as a result of a discontinuity in leadership and changes in the direction G+SI should take, compounded by institutional inertia in CGIAR centres and some partner organizations.

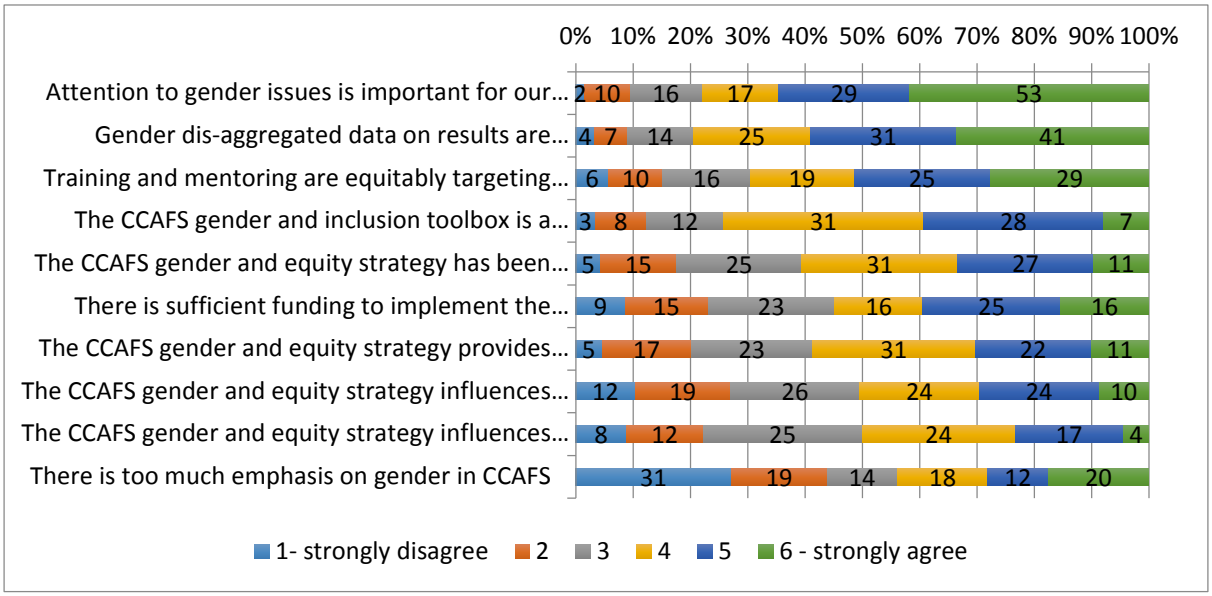
Successes of the gender work have been largely related to the early diagnostic stages of the R+D cycle, for example the tools for gender differentiation assessments. CCAFS has not been as successful in developing methods and processes for later stages of the R+D cycle such as action, implementation and evaluation and reflection.

The researcher survey revealed a diversity of views on attention to gender and equity in CCAFS (Figure 4-1). Almost two-thirds (64%) of respondents agree or strongly agree that gender is an important consideration for research outcomes and impact, while only about 30% agree or agree strongly that the CCAFS Gender Strategy has been communicated well to them. About half of the respondents think that the Strategy has not influenced their research nor provides a useful guide for research (scores 1-3). The gender and inclusion toolbox, however, is found useful by majority of the respondents (74%, scores 4-6). More than half (55%) of respondents agreed at least to some extent that funding is adequate for gender-related activities. One respondent commented that while funding is adequate, better ideas are needed for gender research. Over a quarter of researchers consider that there is an over emphasis on gender issues in CCAFS.

Commentary provided by individual researchers helps to illustrate some of the problems that have been involved in mainstreaming G+SI across the Program. In some comments, inadequate support or contact with gender team was raised, and some respondents perceived that the gender strategy and tools had not been well communicated. Further feedback stated that the CCAFS gender and social inclusion strategy does help but a lot of the research work is context specific and takes time and other resources. One researcher captured the 'problematique' of addressing gender and social inclusion in CCAFS very well and in a way that articulates what was said in a number of interviews with other CCAFS researchers:

*"*Gender *and social inclusion is key. We have not yet integrated these well into the research, let alone the outcome focus. But we need a stronger emphasis on gender research skills in the teams and on skills that allow us to think about gender outcomes. In terms of outcomes the challenge is to think about gender outcomes that a program like CCAFS can reasonably achieve without taking on changing gender norms per se. While we have tools at community level, what is lacking is a toolbox that supports gender research (and outcomes) on policies, institutions, enabling environments."*

Figure 9-1: CCAFS researchers' responses to survey questions on gender



Source: CCAFS researcher survey.

Gender in Flagship Projects and Regional Programs

FP1: Gender mainstreaming is poorly understood in the FP1 Evaluation case study projects. There is no clarity on how gender and equity dimensions will be tackled and questions of who benefits from the CSA practices and how they might affect women specifically are not being pursued systematically. FP1 project team members recognize this shortcoming and are generally willing to incorporate design elements and integrate methods to help address this gap. Progress on getting women's voices into CSA decision making has been poor as a result of structural constraints that are outside CCAFS sphere of operation and influence. These constraints reflect the different values of those setting the expected outcomes in CCAFS and those in power in the beneficiary populations. As a result, CCAFS faces a trade-off between achieving overall technology adoption targets for CSA and reaching differentiated targets.

FP2: The gender inequality aspects of weather advisories was realized as soon as the trials started. More detailed studies showed that although there was no negative impact on women, the advisories were not always of much use to them and some women did not have access to the transmission mechanisms. Despite these findings, FP2 has no systematic approach to use gender equality as a design parameter. However, some *ex post* gender analyses have been carried out recently and could serve in the development of tools to safeguard gender equality.

Advisories on any component of a farming system will affect different groups differently and be of different value to them. An important consideration going forward is to gather information on who does what and what kinds of CIS different groups (not just women and men) might need. Feedback systems built into India's voice mail agro-advisories offer a real-time mechanism to tailor services to the users' demands and to address aspects of gender, and could possibly be emulated elsewhere.

FP3: Initial steps towards mainstreaming gender equality issues have been taken; the FP3 mitigation strategy paper provides general guidance for including gender equality in pro-poor mitigation research. Further, FP3 researchers interviewed by the Evaluation team recognized the importance of addressing gender equality. Gender equality is also being considered in the basic information surveys

used in the LivestockPlus project case study. This may be an exception; analysis of the FP3 portfolio shows that fewer than 25% of the proposals examined included aspects of gender equality or social inclusion. This corroborates evidence from several interviews with FP3 researchers, who highlighted that they understand the "what" and "why" but not the "how" of mainstreaming gender equality into their work.

FP4: While FP4 and its predecessors developed the gender and inclusion toolbox, first as a stand-alone activity and then integrated across other projects, interviews with CGIAR researchers and partners showed a dichotomy of views on the role of gender research. Research partners expressed frustration with the development of the CCAFS gender research component. This may reflect a need for capacity development for partners and CCAFS staff. In addition, gender specialists involved in the Program point to large information gaps on the gender differentiation of climate effects and note that gender alone is a crude measure of differentiation, particularly in polygamous farming households. Nevertheless, there are opportunities for CCAFS to introduce G+SI into climate adaptation planning policies and implementation.

Gender research partners in FP4 have provided support to investigate and analyze data collected at CCAFS research sites to strategically identify measures to ensure that key research issues are appropriately framed to incorporate gender. This approach is too passive; the support should instead help CCAFS to design data collection so that it can easily identify key factors related to G+SI, which then form a basis for framing the research design. This approach would result in G+SI issues being better mainstreamed in the research process and targeted directly in planning rather than discovered later as ignored priorities. This may be symptomatic of top-down design for a very contextually specific bottom-up issue. Having local or regional gender experts would be much more effective if the necessary resources and flexibility were provided at that level. High level gender analysis can be performed externally.

WA: Work for the extension phase has included an impact pathway on gender equality aimed at "securing equal access to land tenure for men and women". The pathway also considers research on the design and implementation of gender equality policies in the region, although to a lesser extent. In Senegal, efforts to enable women to participate in multi-stakeholder dialogues, as well as work on empowering women as key actors in the value chain, are notable and go further than the expectations of the impact pathway. There is evidence that local women participate in pilot activities for more resilient agriculture as members of local farmer-groups, and as leaders supporting new products such as baobab fruit products in Kaffrinne. Similarly a research project on gender norms in Burkina Faso is looking at opportunities for strengthening women's access to trees outside the forest as sources of food and income.

EA: Gender research was introduced somewhat late but the RP now has a full-time staff member responsible for gender equality. Nevertheless, stakeholders say that there is inadequate G+SI research. Targeting CIS, insurance and CSA interventions could make for easy gains in reaching CCAFS gender-related targets. For example, a study in Nyando found that over half the Luo households surveyed "were headed by a widowed woman." This community has very different gender-based information needs compared to a neighbouring tribe where men make most of the decisions related to agriculture.

SA: Despite the production of a manual and training on gender mainstreaming, integration of gender equality in the region is still weak and requires a more systematic approach. Gender work is stronger in Nepal, reflecting the high rate of seasonal migration among men in Nepal, which means that agriculture is managed more and more by women. Partners in Nepal have a history of working with women and possess the capacity to program activities with a female focus. These partners could add capacity and knowledge to CCAFS. Most of the researchers interviewed by the team were open to the idea of incorporating G+SI in their work, but there is a strong need for external support and capacity building. The household typologies being developed as part of project P25-FP1-SA in CSA practices is a good start; if these could be extended to include G+SI dimensions, it could greatly improve targeting and amplify the progress already made. One additional thing to note is that CCAFS leaders and CGIAR centres differ in their priorities for G+SI. For example, SA seeks only to gather differentiated beneficiary numbers, while IFPRI and World Fish have invested in rigorous research to explore issues of G+SI through RCTs and choice experiments. There may be an opportunity for SA to learn from this approach.

SEA: Integration of G+SI dimensions is mixed, and as in SA requires a more systematic approach. Some projects have an explicit focus on gender (e.g. P48-FP2-SEA), and can perhaps provide insights and guidance to other projects. Generally, however, there is still a need to support CCAFS researchers in SEA to help them determine appropriate levels and methods of incorporating gender and equity dimensions into their work.

LAM: The gender pathway for LAM aims to increasing the understanding and use of the 'Gender and Development' approach. Currently, there is too little integration of gender issues in research projects and there is no impact pathway for social inclusion. In the LAM context of high social inequity, such an impact pathway would be important.

Conclusions

Overall, while there has been progress in, for example, developing tools for gender analysis (gender and inclusion toolbox), the integration of gender issues and, even more so, social inclusion is weak in FPs and across regions. The gender strategy and RP impact pathways are too generic. Interviews, case studies and the research survey all indicated that mainstreaming of gender is not well understood and at the FPs is at very initial stages. In CSA, there is lack of clarity on how gender and equity dimensions will be addressed and the technology adoption targets may be at odds with the equity targets.

In general, the strategic importance of G+SI is accepted across CCAFS, which is a good basis for further awareness-raising. There is need for more training and support particularly at project and regional level where work on research and issues on gender are context specific. The Evaluation team considers that strengthening gender expertise and analysis at local and regional level is more effective than a more top-down approach – as seen in the case of the East Africa RP. Local and regional gender experts, possibly out-sourced, could enable a more active approach to gender mainstreaming in research design. Capacity development of partners is also needed.

4.2 Partnerships

Managing partnerships

CCAFS main strategy relating to partnerships is the CCAFS Engagement and Communications Strategy (2013), which presents CCAFS as providing a science platform and facilitating among key partners. It outlines the different types of partners (e.g. core partners, policy-makers, donors, etc.) and also gives examples of engagement and communications tools. The Strategy appears very broad and does not provide clear guidelines on choice of partners and which partners would be most effective in the different stages of the impact pathways. This very broad view on partnerships is reflected in the CCAFS webpage, which lists around 950 partners by regions and FPs. While the strategy is useful in indicating what kinds of partners CCAFS works with, it is not clear about the key strategic partners.

In the researcher survey, national governments, even more than national research institutions, were seen as most important for CCAFS, which is unique compared to other CRP surveys. In the qualitative responses, there was overall agreement that partners are essential for scaling up of research outputs and that the right partners can give leverage to achieve out- or upscaling. The nature of partnerships depends on the local and regional context and therefore the experiences with partners vary among respondents. They generally considered that the value of partnerships outweighs the time and effort of managing them. However, concerns of managing partnerships and engaging partners were also raised.

CCAFS works on a cross-cutting theme that affects all the other CRPs and therefore it is involved in a wide range of cross CRP activities. Their internal rating of how well CCAFS has been doing in each CRP[93] shows inter-CRP collaboration the CRP on Livestock and Fish and the CRP on Forests, Trees and Agroforestry as most successful. This is not surprising since both these CRPs have very strong climate change dimensions. Other CRP collaborations are yet to mature and the Evaluation team observed that CCAFS is systematically taking CRP connections into account.

Future Earth partnership

Officially CCAFS is a strategic partnership of CGIAR and Future Earth.[94] The initial proposal for what has become CCAFS was written by a team from CGIAR and the global change community represented by the "Earth System Science Partnership" (ESSP).

Since the initiation of CCFAS the ESSP was disbanded to be replaced by Future Earth. Only in late 2014 was a secretariat in place for Future Earth. There is a proposed Memorandum of Understanding between CCAFS and Future Earth but to date this remains unsigned. Future Earth does consider CCAFS as a strategic partner that will help define how its food-water-energy knowledge action group will operate. A Future Earth sits on the CCAFS ISP.

[93] Received from CCAFS management in March 2015.

[94] Future Earth is an international research platform that provides knowledge and support to accelerate transformations to a sustainable world. It includes DIVERSITAS, The International Geosphere-Biosphere Program, The International Human Dimensions Program and The World Climate Research Program. http://www.futureearth.org/who-we-are

However, due the Future Earth establishment delays, active partnership is only likely to happen in 2016. Consequently, during the Evaluation, activity level collaboration with Future Earth was not apparent from the project case studies, RP visits, nor the key informant interviews. CCAFS management confirms that the Program stands ready to partner with Future Earth once it is possible.

Evolution of partnerships in CCAFS

At the level of projects and clusters of projects it is hard to form systematic judgements on how well collaboration occurred beyond CGIAR in Phase I. Currently, in the extension phase, CCAFS is making a conscious effort to broaden partnerships with non-CGIAR research organizations. The number of universities from OECD countries and other non-traditional partners such as NGOs has increased. CCAFS is also funding collaboration with non-CGIAR partners to a greater extent than before. Nonetheless, project level collaboration with external partners is variable and probably linked mostly to idiosyncratic factors related to the lead researchers. For example, linkages beyond CCAFS tend to be stronger where there is a longer history of project work by CGIAR centres, such as the former Rice-Wheat-Consortium in the Indo-Gangetic Plain. In newer geographical areas (see section 3.5.4 on SEA) social capital and networks still need to be built, both internally and externally. RP and FP leaders play a critical role in facilitating these external linkages, but some stated that the bandwidth available is too limited to pursue all opportunities.

Evidence from interviews suggests that existing incentives to foster greater external collaboration are insufficient. Compensation for the higher transaction costs needed to achieve integration and alignment with impact pathways are too weak across all three integration domains (projects, project clusters and regions). A budget evaluation of the case study projects in FP1 also indicated that coordination and engagement roles are under-resourced. More detailed project plans, project level ToC and impact pathways that include proper consideration of integration and linkages would help resolve this.

Partnership in Flagship Projects and Regional Programs

In addition to the higher level observations above, partnership can be assessed both within the individual FPs and across the RPs. In some cases, there are commonalities within a region, in others the FP offers a clearer view.

FP1: The range of CCAFS partners at the project level is closely related to the genealogy of earlier research. Older research brings with it historical relationships with more partners, while projects newly conceived in the transition phase (as is more often the case in WA and SEA) have less to draw on. The nature of these partnerships in turn is strongly determined by the project modality. In the more traditional, top-down, linear, technology transfer projects (e.g. from FP1 projects P25-FP1-SA on CSA practices and P54-FP1-SEA), there still is a tendency for the project team to be comprised of researchers primarily from CGIAR centres and public sector extension services or boundary partners who are associated with the project but often not explicit project partners and not funded. Conversely, projects working within a paradigm of participatory engagement and social learning are broader in composition and more inclusive of non-research partners such as NGOs (e.g. from FP1 P112-FP1-LAM and P55-FP1-SEA, or project on Citizen Science on ground-truthing of technologies), and are closer to what is generally understood to be participatory action research. NGO participation in some regions

is limited, although this may be a reflection of the institutional landscape of the agricultural research community.

CGIAR centres are research focused and have little experience in community development processes. They have few social scientists that are adept in these skills. Finding such skills through partner NGOs will help the design and uptake of the CSA technologies.

FP2: CIS absolutely require partnerships because the service involves a chain of actors. CCAFS has been able to identify appropriate partners in public, private, academic and non-government sectors to develop and provide these services. Demand for these services incentivizes a wide array of partner providers, and has been generally successful in India, Senegal and Kenya. The two emerging sub-national agro-climate roundtables in Colombia are gaining momentum and demonstrate the value of this approach to enhance awareness of climate variability and the need to develop adaptive management strategies with agricultural producer groups and support agencies. One issue we foresee in the future is winding down CCAFS engagement when work is more mature, such as in the provision of agro-climate advisories. In the 2nd phase the Program may want to consider exit strategies for some areas of work.

FP3: A diverse network of partners at national and regional levels as well as in the international scientific community has been established. There is less evidence of collaboration with potentially relevant partners at sub-national levels, especially in countries in LAM. The low-emissions agriculture team collaborates with the CRPs on Forests, Trees and Agroforestry, Water, Land and Ecosystems and Global Rice Science Partnership. The Evaluation team found that perceptions of collaboration with CCAFS are uneven across partners. Interviews with representatives of partner organizations showed that government agencies, NARS and NGOs perceived collaboration with FP3 as constructive and complementary. However, some interviewees from CGIAR centres and other advanced research institutes indicated that they perceive collaboration as extractive or opportunistic.

FP4: The Evaluation team found evidence of good receptivity and working relationships with the governments in Kenya, Uganda and Tanzania at policy, research and service levels. Policy actors tend to rely on CCAFS management for policy advice and strategic support, as reflected by CCAFS' inclusion in key processes and invitations to attend policy-making. Similarly, at the operational level, research and extension agencies expressed support for CCAFS' work in the field. The study of CCAFS' climate services (see 3.4.2) concludes that CCAFS is making progress: while work on CIS initially had a rather opportunistic approach, it evolved to a more systematic way of working with partners.

WA: There is a wide and active partnership network. Almost a third are NGOs and development organizations, more than 20% are government agencies and more than 15% are NARS. CCAFS in WA works with seven regional organizations, including ECOWAS, and collaborates with four CGIAR centres and several CRPs, including Forests, Trees and Agroforestry and Livestock and Fish.

SA: Partnerships in India are strong. In Nepal, all partners are from the NGO sector. This may be a reflection of the weak government presence and capacity; NGOs have stepped in to fill the institutional space. In Bangladesh linkages with relevant boundary partners are less evident and not as well established, mainly due to weaker relationships between the regional leader, project leaders

and key policy-makers in Bangladesh. This has led to activities that are focused more on research and less on outcome.

SEA: Co-development with NARS partners appears patchy and dependent on whether projects build on a history in countries with stronger research capacity, or are new projects with partners that are resource constrained with limited ability to engage. Integration among CGIAR centres, CCAFS and other CRPs is partial and largely driven through the convergence in the six CSVs. An emerging partnership model is being implemented with stronger involvement of two NGOs, International Institute of Rural Reconstruction and CARE, to embed some of the participatory, community and equity-based approaches. There is also strong engagement with the media to help messaging and awareness-raising on CSA for a range of audiences.

LAM: The diversity of partners creates a good balance of stakeholders. CCAFS works using national networks in South and Central America and also regional networks in Central America. Almost a quarter of the partners are governmental organizations, a quarter are academic institutions, and a fifth are NARS. The program also collaborates with NGOs and end-user organizations.

Conclusions

CCAFS has an Engagement and Communication Strategy that, however, is very broad when it comes to defining key strategic partners and strategies for engagement. CCASF works a lot with centres and other CRPs. In FPs, the level of engagement varies, partly depending on the FP orientation and project modality. Technology transfer oriented projects engage traditional research partners, but for better grounding of projects in local needs for local outcome would require more engagement with non-research partners. FP2 depends on a chain of actors and partnerships are therefore crucial.

Evidence from interviews and the research survey indicate that CCAFS should pay more attention to the way strategic partnerships and engagement with partners are managed, and this may require more resources, but certainly incentives for partners to enhance effectiveness. Partnerships are dynamic, and in some cases, the Program should evaluate the value of partnerships and consider exit strategies.

The partnership with Future Earth has not so far materialized and CCAFS may wish to review this association.

4.3 Capacity enhancement

Managing capacity enhancement

CCAFS has placed a lot of emphasis on capacity enhancement both in the original proposal and Extension Proposal. The Proposal 2010 says: “CRP7 will make a lasting difference through a strategic, fully embedded focus on capacity enhancement.” The two main areas in which CCAFS aims to increase capacity and the core principles were confirmed in the 2011 Capacity Enhancement Strategy. The two-pronged strategy targets:

- Researchers to generate knowledge on managing food systems, adaptive capacity and rural livelihoods under climate change, and

- Decision makers to demand, critique and use this knowledge effectively to work out policy options, and to evaluate and adjust these policy options and related actions

Awareness raising and capacity enhancement are included in all CCAFS impact pathways. In operational terms, the strategy foresees that each CCAFS theme (now Flagship) would budget around 10% for capacity enhancement outputs. In CCAFS budgets and financial reports there is no evidence whether this has materialized, as capacity enhancement has no separate budget line item (in contrast with gender). However, responses to the researcher survey implied that the recent budget cuts have affected capacity enhancement activities in particular. Furthermore, some 40% of respondents perceived the staff training they have received in ToC and impact pathway development as limited or missing.

The CCAFS-commissioned review of capacity enhancement activities[95] confirmed this and noted that CCAFS lacks specific targets for spending and performance on capacity enhancement. It observed the very large variety of capacity enhancement activities CCAFS engages in (for the review eight overall categories were applied) of which workshops were the most common. It recommended that CCAFS should establish a more formal system for better measuring the performance of its capacity enhancement activities. In response, CCAFS now includes explicit report on capacity enhancement activities in the P&R platform.

Activities

The extent of capacity enhancement varies across programs and regions. CCAFS in its annual reporting, reports on a wide range of strategic activities in FPs and RPs. In FP1, for example, capacity enhancement comprises a mix of learning on the job for partners and targeted thematic workshops for CCAFS researchers and NARS research partners. Training of village-based government extension advisors in India and NGO partners in Nepal is helping to disseminate CSA practices. Training in ToC and impact pathways thinking has been well received by FP1 researchers the Evaluation team interviewed, but there is also a view that these concepts need several iterations of workshops to consolidate, as for many this thinking is still new.

In FP2, as noted in 3.4.2, capacity enhancement is needed to convert data received into actionable advice. This CCAFS is doing, using different approaches in different contexts and with an awareness that it requires a long-term perspective. Capacity enhancement may need to focus on commercial suppliers of information, on extension agents, on staff in meteorological centres and on farmers, to familiarize them with how to use mobile phones to get useful information.

Capacity development is a strong component in FP3, which supports workshops, webinars, exchange networks[96] and other modes. Research partners and next-users consistently confirmed to the Evaluation team that they were highly satisfied with the content and teaching, especially in the workshops. In Senegal, interviews with representatives from public and private sector, civil society and villagers demonstrated that these stakeholders all consider capacity enhancement by CCAFS to

[95] Review of CCAFS Capacity Enhancement activities: Climate Futures evaluation (October 2014)
[96] For example CLIFF Student network

be an important factor that contributes to more resilient agriculture. All interviewees highlighted the constructive and open approach of CCAFS researchers.

FP4 likewise has a strong element of capacity enhancement that covers all the regions to enable partners to make more effective contributions to policy development.

Conclusion

While CCAFS in different documents has emphasized the importance of capacity enhancement, it is unclear to the Evaluation team to what extent important capacity enhancement activities are prioritized and the strategically most important targets supported and resourced. Feedback from partners was generally positive and appreciative but under budget shortcomings not all needs can be met. The Evaluation team considers that there remains an unmet need for capacity enhancement within CCAFS staff. For example, ToC and impact pathway development, gender-informed project planning and the use of participatory methods are critical skills, where internal CCAFS capacity will need strengthening.

5 Conclusions and recommendations

This chapter provides the main conclusions derived from the Evaluation team's findings and the key recommendations. In the conclusions, the Evaluation team highlights the areas where CCAFS is showing success in fulfilling triple loop learning steps and considers ways to amplify this success (see section 1.5.4). It presents conclusions regarding the four key evaluation questions as defined in the Inception Report. The chapter ends with key conclusions on the evaluation criteria and cross-cutting issues and recommendations following from these.

5.1 Areas of CCAFS success

One of the main objectives of the Evaluation was to identify key successes of CCAFS in terms of contributions to the IDOs and CGIAR's climate research related goals. Success in these cases exemplifies research where CCAFS is doing things well and doing the right things, and where there is good evidence, both in the Program and globally, supporting these findings. The results were judged by the team as likely to have positive influence and impact, given the shifting context of climate change challenges. Given the limitations of the TLL approach used in the Evaluation (see section 1.7), the examples discussed below are not an exhaustive list; indeed many other areas where CCAFS has done well have already been discussed in the previous chapters. Rather, here we provide what constitute some of the CCAFS highlights.

Climate information services to farmers. CCAFS' strategy is based on high scientific confidence that current increasing climate variability is a precursor of climate change. Agro-climate advisories and other forms of CIS are crucial for seasonal decisions in farming systems. The precision of forecasts and the timeliness of CIS delivery are important elements for success. Identifying stakeholders along the CIS value chain that can contribute to these elements is important. CCAFS is playing a major role in this crucial area and in partnership with ICT providers, CCAFS has packaged agro-climate advice for a wide range of end-users. Success in the longer term at farmer level may require changes in enterprise or in production system, and so CIS development will need to take this into account. While the number of the users has been monitored, this information has not been linked to evidence on farming practice change. For learning and improvement of the advice, CCAFS needs to understand better the behaviour changes that agro-climate and insurance packages provoke in end-users.

Climate modelling to develop triggers for weather-indexed insurance pay-outs. This CCAFS research is highly relevant to the goal of improving the climate resilience of food production systems. Weather-indexed insurance is important for relieving farmers from some of the climate risks. Research into how to extend pay-outs effectively to a broad range of farmers in ways that support adaptive decision-making, and do not lead to indebtedness and maladaptive behaviour are a major contribution.

Technology packages around CSA. In several locations, for example in Haryana and Punjab, CCAFS is bundling CSA technologies into packages designed on the basis of evidence on changes in environmental conditions, for example regarding water availability (lowering water tables and reduced water availability) and farmers' needs. In further development of the packages and advice to producers, CCAFS and partners need to widen the net of farmers targeted to include more of the resource poor, and to consider changes required in cropping systems to pre-empt climate tipping point problems such as water resource scarcity and excess temperatures for certain crops. In order to amplify the adoption and effectiveness of these packages and for learning, CCAFS needs to monitor

the benefits of CSA adoption in livelihoods and demonstrate the extent to which CSA addresses climate effects.

Influencing national policies on mitigation to climate change. CCAFS has successfully contributed to defining INDCs and to designing NAMAs in all regions and in most partner countries. These two instruments –INDCs and NAMAs – will be key to achieve the objectives as in the Paris Agreement. The CCAFS team saw the importance of these instruments –agreed after 2010 –and used the opportunities well to co-generate scientific knowledge with its partners for influencing policy design.

Quantifying mitigation effects in the agricultural sector. CCAFS has successfully contributed to the development of an innovative system for quantification of mitigation effects based on the concept of carbon intensity. Although there is still a long way before the concept is widely accepted, the scientific basis of this approach confirms its accuracy and usefulness. CCAFS' research has been opportune and useful in this process.

Accounting mitigation effects from agriculture. CCAFS has been very successful in developing standardized and homogenized data through projects including SHAMBA and SAMPLES and improving N_2O estimates globally. These projects contribute to significantly reducing the burden of quantifying emissions from agriculture, which is particularly valuable in developing countries.

Mitigation of GHG emissions in rice-based systems. Research under CCAFS has enhanced the understanding of processes related to GHG emission mitigation in rice-based systems. For example, the AWD technology in SEA has proven benefits regarding water management and GHG mitigation. Scaling AWD as an agricultural mitigation strategy is being promoted in the context of Green Growth agenda and national level mitigation planning in Vietnam, and could serve as an example for other countries. However, given that adoption of AWD has been variable, more analysis is needed on the socio-economic constraints and incentives that influence adoption at the household level.

Science-policy discussion spaces. In WA and in LAM, CCAFS has helped to establish, facilitate and mainstream spaces for regular dialogue between scientists, policy-makers and other stakeholders on climate and agriculture. The value of this dialogue to next-users can be inferred from the impact on national policies in partner countries as well as from the subsequent transfer of this process to other regions.

5.2 Conclusions on key evaluation questions

As the KEQs cut across several evaluation criteria, the conclusions here provide an additional lens against which the assessment already made against evaluation criteria in Chapters 2, 3 and 4 can be further triangulated and validated.

KEQ1: How well is strategic collaboration and integration both within and outside CGIAR being achieved – termed "looking left and right in the traffic"?

The Program emphasis on outcomes articulated through ToCs and impact pathways, training of CCAFS researchers in these new concepts, and the integration frameworks of CSA and CSVs, have all clearly been instrumental in driving and achieving a stronger impetus for integration. The willingness to 'look left and right in the traffic' is more pronounced within the CCAFS core team, and drops off from project leader level to activity leaders or project scientists. While CCAFS is starting to drive behavioural change

and openness toward integration, the actual ability to transcend disciplinary and institutional boundaries and 'read the traffic' at the project level is still patchy, in turn leading to suboptimal inclusion of other work and new partners.

CCAFS' comparatively large proportion of W1/W2 funding also reinforces the ability to drive stronger integration. This is supplemented by a number of additional incentives that theme and regional leaders have at their disposal to encourage integration. However, while these are helping at the regional and cluster level, at the project and activity 'coalface' the Evaluation team considers that the incentive signals to engage - in what most researchers see as additional transaction costs detracting from research - are too weak. Explicit resourcing and recognition of coordination and engagement roles within projects and earlier more detailed project planning would provide more effective incentives for integration.

In general terms, science integration at the cluster level and integration of research outputs into policy and decision making is a strength of CCAFS, particularly through FP4 and the RPs. This is where CCAFS FP and RP leaders tend to be able to exert a greater influence and where integration efforts by CCAFS have been the most effective. Conversely, integration in the activity or project domain needs work.

KEQ2: To what extent is CCAFS generating unique international public goods for agriculture, food security and climate change?

The Program has contributed to the body of global knowledge on climate effects on agriculture, how to address them, and how to reduce agriculture's contribution to climate change mitigation. And CCAFS has pioneered processes for getting climate and baseline data into the public domain. The contributions to the global body of knowledge on climate and food security is less.

CCAFS generates high quality and high utility products particularly related to CSA, CIS and low-emissions agriculture. International reach is high as outputs are relevant across many countries and output use is not subject to monopoly by any set of next-users. However, higher external input CSA technologies will only be suitable for certain sets of farmers.

Technical know-how requirement to take advantage of some of CCAFS products and services is considerable and investments in training of next-users is necessary to ensure IPG delivery. The Analogues and the Scenarios work are good examples of how this can be made to work.

Collaboration with other actors, such as private sector insurance and ICT sector is enabling CIS IPG delivery. CCAFS recognizes the need to invest in dissemination, extension, technical assistance, policy advice, and training so that outputs generated reach the network of next-users from the global and international to the national and local levels and thereby achieve IPG status.

KEQ3: How well do the Flagships Projects link together and combine at output and outcome levels in the regions; and, to what extent are successes toward outcomes transferable from region to region?

The extent to which CCAFS is achieving convergence among FPs in addressing productivity, adaptation and mitigation differs from region to region, and even within regions. These differences relate to the specific national and regional contexts as well as the ability and willingness of CGIAR centres and

scientists to enhance convergence. Examples of convergence include the science-policy platforms in WA and LAM and, at a more local level, the way CSV is implemented in Senegal. CCAFS has provided science-based guidance for decision making in agricultural management at different levels to help capture synergies between mitigation and adaptation on one hand and mitigation and productivity for food security on the other hand. This is still early progress and not wide spread achievement.

Although there is no specific mechanism within CCAFS aimed at securing transfer across regions, the Evaluation identified four enabling conditions for transferability. The Program level ToC creates a conceptual framework for understanding similarities in challenges and opportunities across regions. The management structure of CCAFS secures dialogue between regional and thematic leaders. FP leaders make visits to the regions and these foster collaboration between regional and thematic leaders. The communications strategy allows access to activities going on in other regions.

There is interesting south-south transfer, for example of agro-climatic information from Senegal to Colombia, climate insurance index from India to WA and climate dialogues from Colombia to Honduras.

Conceptualizing clear criteria, purpose and target groups/regions to transfer outputs could incentivize transfer and increase overall program efficiency. A transfer mechanism could also be developed to aggregate local knowledge and local experiences of climate effects on agriculture and food security in ways that are meaningful for decision-makers at bigger scales.

KEQ4: How robust are the monitoring, evaluation and learning processes of the Program?

CCAFS is moving toward a robust and innovative MEL system and most progress has been achieved under FP4 and in LAM. The Program has initiated investments into the P&R platform for monitoring and adaptive management purposes at project, region and FP levels. Impact pathways development at regional and FP levels and the 'FAIR' information management system are evidence of these investments.

These developments have enabled the start-up of a RBM system established for projects under FPs. Additional staff has been brought in (particularly in LAM) to operationalise the MEL system leading a greater "CCAFS culture". These provide ways to improve effectiveness and relevance for CCAFS and wider across other CRPs.

CCAFS management recognizes that the capacity to develop and communicate ToCs, impact pathways and monitoring and evaluation needs to be mainstreamed throughout the Program including collaborating CGIAR centres and partners. This will require substantial resources, but such investment will have high rates of return in terms of effectiveness and impact of technologies developed and evidence for policy inclusion.

Gaps are evident in the most thorny issues of MEL. So far the levels of social differentiation in the MEL are not sufficient. Ways to resource efficient and effective impact assessment, incentives for learning from failures, and monetising benefits of interventions to provide greater investor confidence are all needed.

5.3 Main conclusions and recommendations

Taking into account the conclusions against evaluation criteria presented at the end of sections in chapters 2, 3 and 4, as well as the key successes outlined in section 5.1 and responses to the KEQs in 5.2, the Evaluation team has formulated key conclusions. In this section, the Evaluation team also presents its recommendations that follow from some of the conclusions. The section is divided to two parts: CGIAR level where the team makes two recommendations, and CCAFS level where the team makes further 12 recommendations targeted at CCAFS management and the ISP.

CGIAR level conclusions and recommendations

CCAFS has been an important component of CGIAR portfolio in Phase I and has addressed significant gaps in CGIAR research. It has helped integrate research of centres across CGIAR thus increasing the relevance of that research for the Program's objectives. CCAFS is thus responding to climate challenges affecting agriculture and livelihoods that CGIAR, its partners and others involved in agriculture need to address. CCAFS has been successful in generating scientific knowledge in different aspects of climate and agriculture and in taking science-based knowledge, services and guidance to national and regional users. The examples of success presented by the Evaluation team reflect this performance.

Recommendation 1 CCFAS has the potential to act as an integrating element drawing together research relevant to addressing climate effects on agriculture and food security in the future. On the basis of the Program's relevance, previous performance and potential, the Evaluation team recommends CCAFS to continue to Phase II.

The Evaluation found evidence from stakeholders, from documented information and from participant observation that the unreliability of W1/W2 funding from CGIAR is undermining the Program Management's capacity to deliver a relevant, scientifically high quality and effective program. The cuts in funding were not helpful to the implementation of a broad ranging program. The late notice of funding reductions was deleterious to relations with partners and in some cases what might have become highly relevant parts of the Program were lost. 2015 was a case in point where news of cuts in funding arrived very late in the financial cycle undermining the confidence stakeholders have in the Program to deliver. It has also meant that some Management decisions may have seemed arbitrary to some stakeholders.

Recommendation 2. The management of the CCAFS for efficiency and effectiveness, its credibility with research partners, and the ways that CGIAR centre researchers engage with the Program are all negatively affected by the unreliability of W1/W2 funding from CGIAR. As a minimum, more timely budgetary decisions should be taken and funding levels should be set clearly by the Consortium Office at the beginning of the annual cycle and maintained for the full financial year.

CCAFS level conclusions and recommendations

Quality of science

CCAFS has developed a highly skilled set of research leaders with a good proportion brought into the Program from outside CGIAR. This has ensured the quality of the science performed. As in all multi-disciplinary research programs there are some research areas stronger than others, and the

partnerships that CCAFS has developed help both to strengthen areas where the CGIAR System is weak or absent, and to identify where the leadership of bodies of research can be delegated to regional partners.

While QoS as judged by published outputs is generally high, the Evaluation team is concerned that a high proportion of the Program's publications review of existing knowledge rather than presenting new research contributions. In addition, project leaders find that the pressure to publish can detract from other activities important to QoS, such as mentoring and research design.

Relevance

CCAFS is relevant to the internationally set and acknowledged objectives of reducing the carbon footprint of agricultural sector and climate-proofing food security. The way this thematic relevance is translated into operational relevance depends upon the framing that the CGIAR System provides for this CRP and the way CCAFS interprets and implements activities to achieve CGIAR SLOs.

CCAFS' relevance to the CGIAR SLOs would be better served by a more explicit and shared understanding of the Program's capability to effect change. CCAFS faces the conundrum of the rationalising and trading-off the 'success at all levels' directive from CGIAR, the need to get high level policy decision makers to shift resources quickly into agricultural development for emissions reductions and food security objectives, and the need for solid research that tests out how agriculture can become climate smart and at the same time deliver on food security improvements, particularly for those people who are climate vulnerable. The current FP impact pathways have been driven largely by IDOs set in parallel to the SRF processes but responding to perceived CGIAR level demands for increases in adaptive capacity, climate resilience of agriculture and reduced GHG emissions from agriculture.

This rationalisation for relevance is seen through the Program's ToCs and the underlying impact pathways. The Evaluation team observed disconnect of FP level impact pathways and some of the IDOs, particularly those related to gender and food security. Some of the IDO level targets are not defined well enough (FP1 and FP4), making it difficult to track and demonstrate progress towards impact. In addition, the targets often seem unrealistic against how much CCAFS can reasonably expect to achieve. This applies to aspects of gender equality and social inclusion, and to the value of CSA and CSVs as ways of promoting the adoption of climate-resilience in agricultural based livelihood systems. CCAFS has had little demonstrable impact on food security.

Recommendation 3. For improving the utility and realism of the Program's impact pathways and accountability framework, CCAFS should adjust the sub-IDOs that the Program targets to make them operational for Program planning and management while responding to the CGIAR level outcome expectations. Furthermore, CCAFS should develop revised targets and indicators that are commensurate with the global ambition, more specific in the context of each priority country, and more realistic for research on food security, gender equality and social inclusion, climate adaptation and mitigation, and policies and institutions.

During its first phase, CCAFS focused much of its regional work on locations where the participating centres have had previous activities and engaged partners who have had the historic readiness and capacity to share CCAFS' agenda and take it forward. The Evaluation team found that CCAFS' successes

are mainly related to promoting CSA and CIS for those farmers with sufficient resources to be able to invest in 'climate proofing' the productivity of their farming systems, and with influencing policy-makers interested in national food security, and competitive agriculture sectors that can meet low-emissions development targets. The Evaluation team therefore concludes that as much of this work has matured it can be devolved to national partners.

This is the case particularly in India where the prospects for influence and impact are high, particularly in the irrigated areas such as the north-west Indo-Gangetic Plains, but there is national capacity to take over leadership of the activities. There are other areas in India, Orissa and South-India, where CCAFS would seem to have better comparative advantage. Also in LAM countries such as Peru and Brazil, and also Costa Rica, have high level of national technical capacity. In these cases, the existing partnerships could evolve to serve regional strategic purposes. The main focus in these regions could shift to countries where CCAFS has clear and demonstrable comparative advantage compared to national capacity, and there is high demand for its institutional, policy and technological interventions. Such countries are Bangladesh and Nepal in SA, and for example Honduras, Guatemala and El Salvador in LAM. In Colombia CCAFS can conduct innovative research on mitigation issues. In SEA capacity of partners is very constrained in Laos and Cambodia and this may seriously hinder prospects of CCAFS' progress and results. The Evaluation team observed much better prospects in Vietnam.

This Evaluation team sees devolution and focus as necessary evolution of the Program that started from a broad and rather dispersed portfolio compiling contributions from all CGIAR centres. Prioritization, which CCAFS is well organized to pursue, is essential both for adjusting the Program to a more stringent funding environment and for enhancing its relevance to locations, audiences and target end-users that are most dependent on the Program's interventions and support. Furthermore, CCAFS work on CSA, CIS, low-emissions agriculture, policies and institutions can be better focused in fewer strategic locations.

Recommendation 4. Taking into account its successes, its response to next-users' and partners' demands, and the potential for progress against system level objectives, and in face of a reduced funding envelope projected for Phase II, CCAFS should conduct a geographic prioritization of its activities refocusing on countries with lower CSA research capability. In rebalancing and focusing its regional portfolio, CCAFS should consider its comparative advantage relative to the strength of national partners, the prospects for influence and impact and the national demand for CCAFS' institutional, policy and technological interventions. It should also consider how to build on and broaden the current strong national partnerships even if its leadership and activities in those countries were to diminish.

In terms of climate change effects on food security, the Program is oriented toward addressing largely supply-side issues related to national level food security and agricultural sector competitiveness. It is recognized that these are of greater concern to some national governments, but CCAFS also has chosen to address the IDO of "Food security - increased and stable access to food commodities by rural poor". To do this better and more efficiently, with regard to a likely constrained future program budget, CCAFS should consider linking for two-way collaborative work with organizations and initiatives that focus on demand-side aspects of food security and nutrition of the poor – such as Leveraging Agriculture for Nutrition in South Asia.

Recommendation 5. Other than the largely supply-side and productivity driven approach in CSA, CCAFS has not addressed well issues of climate change effects on food insecurity, particularly on climate vulnerable people. To address this gap under a resourced constrained next phase CCAFS should partner with human nutrition and food security programs in Africa and South Asia that have greater capacity to explore food security issues from complementary perspectives to the CGIAR focus on supply side and food productivity.

Effectiveness

CCAFS has made progress in operationalizing integration for enhancing effectiveness. It has brought together component science outputs from other CRPs and elsewhere and sought to integrate outputs to decision making. Considerable alignment and integration was achieved in consolidating the Program in the Extension phase, which addressed the disperse agenda of CCAFS commissioned and centre driven projects. Combining scientific knowledge and local experiential learning in transdisciplinary approaches would enhance likelihood of outcomes on the ground.

The evaluation team considers that measured against the integration potential inherent within the CCAFS research portfolios, and benchmarking its practice against other international organizations, more integration and linking is required. The team notes with concern that budget uncertainties regarding level, reliability and flexibility of funding have negatively affected the necessary sequencing of projects and consequently the overall effectiveness and delivery.

Recommendation 6. In order to enhance its effectiveness, CCAFS would benefit from greater integration within the Program—among projects, FPs and RPs—and with other CRPs. To support better integration, CCAFS should improve coordination and researcher engagement by:

i. improving reward structures to incentivize researchers toward integration so researchers act as champions for transfer beyond their project requirements.
ii. developing means for monitoring and assessing the extent and effectiveness of integration among projects.

Recommendation 7. In CCAFS main impact pathways for FPs and projects have input-output relationships that are insufficiently explicit. In order to maximize the synergistic potential and coherence of its portfolio and to enhance the efficiency of overall results delivery, CCAFS should

i. optimize the sequencing of the activities in its FPs, and projects within FPs, by careful input-output mapping before projects in activity clusters commence. As part of this, the coherence between FP4 and the rest of the Program should be improved.
ii. tailor the (generic) CSA and CSV frameworks in order to match local conditions in regions, and broaden partnerships to bring in additional skills currently not in the mix such as research organizations more engaged with the socio-economic aspects of food security and human nutrition.
iii. build on the policy engagement processes initiated with a view to focussing the regional programs to achieve greater coherence between FP4 and the rest of the Program. This could include clearer articulation of how projects in FP1, FP2 and FP3 are delivering key inputs into policy processes and upscaling, and reviewing relevance of some of the FP1 regional activities.

iv. better define what "equitable institutional investments in climate smart food systems" are and how to assess moves towards them.

Rapid rural change as a result largely of other drivers than climate, and the much more diverse livelihood realities than implied in the current CSA/ CSV framing, will require a broadening of the CSA and CSV concepts. There is a need for better targeted CSA practices in the context of competing, non-agricultural household livelihoods and climate adaptation strategies. Stepping out of agriculture could be the most climate smart adaptation (intra- or inter-generational) for a significant proportion of smallholder farmers.

This requires that better tools and methods are developed to support the analysis of trade-offs between different livelihood activities and contexts, and to credibly integrate gender equality and social inclusion dimensions into the analysis of the implications of sustainable intensification.

In addition, an increased understanding based on empirical evidence (in addition to simulation approaches) of the synergies and trade-offs between mitigation, adaptation and food security achieved through CSA is needed.

Recommendation 8. CCAFS should broaden its framework for CSA from the current focus on agricultural technologies and implementation through CSVs, and build on the buy-in by the boundary partners taking into account**:**

i. the rapidly changing socio-economic context of rural communities and subsequent house-hold level trade-offs that may involve moving out of agriculture as an adaptation strategy.
ii. the need to focus on more holistic livelihoods approach seeking greater social inclusion and addressing equity issues.
iii. the extent to which other scales than village (for example watershed or landscape) are better for implementation in certain contexts.
iv. research required to facilitate CSA out- and upscaling approaches using household typologies and placing greater emphasis on gender and social inequity.

Recommendation 9. In order to enhance both the effectiveness and the relevance of CSA work CCAFS should generate evidence on climate smart solutions at the local level engaging in the following:

i. conduct primary research on adaptive behavior by smallholder farmers in CSA adoption, locally grounded action-research to test the relevance of CSA technologies to different smallholder farmer types, and then promote proven technologies among target communities.
ii. continue work on identifying better criteria to define what is climate smart and developing frameworks to underpin trade-off analysis.
iii. publish in peer-reviewed journal critical reviews and lessons regarding CSVs in regard of their effectiveness to support climate smart solutions.
iv. generate and publish evidence on effectiveness of CSA options, on impact of mitigation options on climate vulnerability, and on mitigation co-benefits from farming practices that aim at increasing climate resilience.

CCAFS has successfully engaged in research, including action research on index-based insurance and improving triggering mechanisms based on agricultural and climate science. This research can also add value to developing early warning systems and social safety nets that are less dependent on subsidies still required for the market-based insurance models. In this area of research, CCAFS has progressed furthest in engaging broad range of partnerships (from government to academia to NGOs) in contextualizing global knowledge for local needs and wide-scale impact. This provides a useful model for other FPs. CCAFS needs to present evidence from successful cases of implementing insurance for demonstrating the benefits among international community.

Recommendation 10. CCAFS has had a strong focus on climate risk management through its work on insurance and the development of agroclimate advisories. This should continue. To enhance the effectiveness of this work, CCAFS should strengthen FP2 activities by:

i. conducting research on the determining factors that affect adaptive behaviour and the extent to which weather-indexed insurance provision leads to maladaptive behaviour and increased risk taking;
ii. improving targeting and design of CIS and insurance for reducing negative effects of climate change on the vulnerable, while increasing their food security;
iii. combining climate and agricultural sciences in the design and provision of shock responsive and climate adaptive social safety nets;
iv. conducting economic valuation of CIS provision to generate convincing evidence for national governments of the need to and returns from enhancing CIS.

With regard to policy inputs to the UNFCCC process, the Program's decision to work with the AGN and to push for special recognition of the agricultural sector in the process up to and including COP21, were not successful. The AGN has a majority of powerful members that are not priority countries for CCAFS (indeed, most of CCAFS priority countries are not in Africa) that do not share the same perspective on climate negotiations as the LDC group which conversely has members in CCAFS regions bar LAM and this Group from some time ago has been more effective in bringing its priorities into the UNFCCC process (e.g. recognition in the Paris Agreement of the need for the 1.5^{o}C average global temperature rise target, and the continued role of the LDC Fund). Again at COP21 parties did not privilege one sector over another, preferring to establish a new legally binding framework for global public good creation through mitigation and adaptation that can be interpreted through sectors once completed and ratified.

Recommendation 11. CCAFS can increase its policy informing role – and thereby be more effective in achieving movement along the higher level theory of change by**:**

i. engaging with target countries in the preparation of INDC reviews and NDC preparations focusing in on ways to reduce GHG emissions from the agricultural sector in ways that return co-benefits to adaptive capacity and food security;
ii. engaging with the most effective negotiating groups and their members in the UNFCCC that represent the interest of CCAFS priority countries.

Mitigation issues in the AFOLU sector are relevant not only for CCAFS, but also for other CRPs, such as Forests, Trees and Agroforestry CRP and GRiSP. From the scientific perspective AFOLU mitigation

options require a wide range of questions, some of them addressed from the commodity perspective (as in GRiSP) and others needing a more systemic approach that CCAFS can offer. For enhancing the CCAFS and CGIAR-wide effectiveness of research related to mitigation, the Evaluation team considers that the collaboration and exchange across the CRPs on mitigation in the AFOLU sector needs strengthening.

Recommendation 12. CCAFS activities in FP3 on low-emissions agriculture are rather isolated from other FPs and research elsewhere. CCAFS should improve integration of FP3 with the other Flagships and with research done by partners by:

i. using results from FP3 in FP1 and vice-versa for improving knowledge about reciprocal impacts of practices aiming at mitigation and increasing climate resilience;
ii. improving partnerships at the sub-national level, particularly in terms of out- and upscaling of results from FP3;
iii. increasing collaboration with other CRPs dealing with AFOLU, especially Forests, Trees and Agroforestry;
iv. integrating to other research analysis of impacts of deploying bio-energy production systems on CSA, including analysis of the knock-on effects that this will have especially on food security.

Gender equality

CCAFS has developed tools for gender analysis and has worked toward the integration of gender issues in its research. The ways that social inclusion is addressed across the Program are weak in both the FPs and across the regions. The CCAFS Gender and Social Inclusion strategy and the gender impact pathways at RP level are too generic. They need to focus more directly on research into the gender inequity of climate change effects on agriculture and food security.

The high levels of institutional inertia to take gender equality and social inclusion issues in agriculture research both inside and outside CGIAR make this a difficult area to achieve success. More capacity enhancement of CCAFS researchers and partners is needed. Outsourcing gender analysis and gender mainstreaming in research design may be required.

While the difficulties inherent in achieving gender equality in CSA technology adoption and benefit sharing are recognized, CCAFS has yet to make a collective decision on how to best balance technology adoption success with gender equality and social inclusivity in beneficiary groups. Ambition and realism of where gender equality and social inclusion objectives can be achieved need to be balanced in future plans.

Discontinuous leadership and related changes in emphasis and priorities of this work theme, added to the institutional reticence (and lack of competence) of some CGIAR researchers and research partners to invest in, develop and implement gender equality and social inclusion aspects represent significant challenges to the new lead of the G+SI theme.

Recommendation 13. In order to make progress towards Program objectives in general and the gender-related IDO in particular, CCAFS needs to strengthen both the systematic incorporation of gender inequity issues into its research design and the analysis of the effects of research results on

gender relations and social inclusion in next-user and beneficiary populations. CCAFS should address the following:

i. gender equality and social inclusion concerns at the project design stage;
ii.
iii. improving the integration of gender relations and social inclusion expertise in regional teams for enhancing gender relevance of regional activities;
iv. identifying opportunities for generating benefits to women through low-emissions agriculture;
v. identifying areas (components of FPs and projects under RPs) where good GIS research can be conducted and focus the GIS resources on these areas to learn lessons that can then be applied across the Program and by others.
vi. gender relations and social inclusion aspects of CSA adoption through inter- and intra-household level research, including generation of gender differentiated data through baselines and monitoring;

Monitoring and impact assessment

CCAFS has introduced several elements for developing a comprehensive MEL system. These include the P&R platform, lessons from the RBM pilot adapted to broader application, collection of baselines information, and use of commissioned external studies as a management tool. Attention to using the ToCs as dynamic concepts subject to testing and adjustment would enhance the MEL in supporting the results orientation of the Program. In CCAFS, outcome and impact assessment are lacking. A number of success stories of outcomes cases have been published, but they lack robust evidence of CCAFS derived outcomes and tend to serve more of an advocacy purpose than impartial assessment of effects. Investment in more rigorous impact studies is needed, addressing to the extent possible issues of attribution of outcomes to CCAFS activities. Adequate impact assessment, particularly of CSV sites is needed, particularly that CCAFS monitors and documents the effects of its CSA interventions on food security under climate change, differentiating climate effects from other effects. Approaches for testing ToC hypotheses and research effectiveness could include Randomized Controlled Trials (on questions that would not raise ethical issues); comparisons with counterfactuals when possible; normalization of yields to take into account climate data; and observation of outcomes to gather evidence supporting or refuting hypotheses. CCAFS needs to continue its work on economic valuation of benefits arising from CSA.

Recommendation 14. CCAFS should improve its processes for outcome tracking and impact assessment, in order to learn how outcomes and impact happen, to enable better adaptive management, and to provide greater accountability. The Program should:

i. strengthen the ToC related to impact pathways at regional and FP levels by better definition of assumptions and risks and transforming these into hypotheses for testing during Program implementation – this is good theory of change practice outside of CGIAR;
ii. test these hypotheses with the most robust experimental approaches applicable in different contexts, seeking additional resources for this when necessary

iii. use participatory impact pathway analysis method to generate 'stretch objectives' at project and RP levels and to provide incentives for learning from failures and successes at project, RP and FP levels;
iv. develop long-term monitoring practices for effectiveness of low-emissions agriculture innovations;
v. continue and expand on the efforts on economic valuation of benefits deriving from CSA and CIS;
vi. examine how well national and subnational food system policies take into consideration climate smart practices and strategies, and assess if and to what extent (sub-) national jurisdictions increase their institutional investments in food systems in ways that address climate change effects;
vii. expand training of CGIAR researchers and CCAFS' partners in ToC and impact pathways.
viii. and, as part of the FAIR information management system roll-out CCAFS should provide the software and capacity enhancement on its use to all CGIAR centres and facilitate adoption in other CRPs.