The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

Annual Reporting for 2017

CGIAR

RESEARCH PROGRAM ON
Climate Change, Agriculture and Food Security

CCAFS

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CGIAR Fund	ACIAR - Australian Centre for International Agricultural Research	Irish Aid
Ministry of Foreign Affairs of the Netherlands	Swiss Agency for Development and Cooperation SDC	United Kingdom Aid
Thailand		

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WUR - Wageningen University and Research	Utrecht University	UVM - University of Vermont
IRI - Columbia University	CARE	University of Leeds
IIRR - International Institute of Rural Reconstruction	University of Copenhagen	Women in Global Science and Technology

Contents

Acronyms

A4NH	CGIAR Research Program on Agriculture for Nutrition and Health
ACIS	Agro-Climatic Information Systems
ACLYP	Climate for Development in Africa Youth Platform
ACTS	African Centre for Technology Studies
AFS	CGIAR Research Program on Agri-Food Systems
AGN	African Group of Negotiators
AGRHYMET	Regional Centre for Training and Application of Agrometeorology and Operational Hydrology
AICI	Agricultural Insurance Company of India
AMIA	Adaptation and Mitigation Initiative in Agriculture
APEC	Asia-Pacific Economic Cooperation
ASAC	Sustainable Agriculture Adapted to the Climate (see: CSA)
ASAP	Adaptation in Smallholder Agriculture Programme
ASEAN	Association of Southeast Asian Nations
AWD	Alternate Wetting and Drying
BFS	Bureau on Food Security
BNI	Biological Nitrification Inhibitors
BOAD	West African Development Bank
BRAC	Building Resources Across Communities
C	Carbon
CABI	Centre for Agriculture and Biosciences International
CAC	Central American Agricultural Council
CAM	CCAFS Agriculture Monitor
CARE	Cooperative for Assistance and Relief Everywhere
CATIE	Tropical Agricultural Research and Higher Education Center
CBO	Community Based Organization
CC	Crosscutting
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CIAT	International Center for Tropical Agriculture
CIFOR	Center for International Forestry Research
CIMMYT	International Maize and Wheat Improvement Center
CIP	International Potato Center
CIRAD	French Agricultural Research Centre for International Development
CLIFF	Climate Food and Farming
CoA	Clusters of Activity
COP	Conference of the Parties
CRAFT	CCAFS Regional Agricultural Forecasting Toolbox
CRP	CGIAR Research Program
CSA	Climate-Smart Agriculture
CSAP	Climate-Smart Agricultural Practices
CSAYN	Climate-Smart Agriculture Youth Network
CS-MAP	Climate-Smart MAP
CSV	Climate-Smart Village
CTCN	Climate Technology Centre & Network

DRC	Democratic Republic of the Congo
EA	East Africa
EF	Emission Factor
EiB	European Investment Bank
EMBRAPA	Brazilian Agricultural Research Corporation
ENACTS	Enhancing National Climate Services
ENSO	El Niño–Southern Oscillation
EO	Earth observations
Ep-IA	Ex-post Impact Assessment
FAN	Focal Area Network
FAO	Food and Agriculture Organization of the United Nations
FAP	Farming with Alternative Pollinators
FEDEARROZ	National Federation of Rice Growers
FLW	Food Loss and Waste
FMARD	Federal Ministry of Agriculture and Rural Development (Nigeria)
FP	Flagship Project
FSP	Farmer Service Provider
FTA	CGIAR Research Program on Forests, Trees and Agroforestry
GACSA	Global Alliance For Climate-Smart Agriculture
GCAN	Gender, Climate Change, and Nutrition Integration Initiative
GCF	Green Climate Fund
GCM	Global Circulation Models
GFCS	Global Framework for Climate Services
GHG	Greenhouse Gas
GIS	Geographic Information System
GIZ	German Corporation for International Cooperation GmbH
GRA	Global Research Alliance on Agricultural Greenhouse Gases
GSI	Gender and Social Inclusion
HHM	Household Methodologies
IBFI	Index-based Flood Insurance
ICARDA	International Center for Agricultural Research in the Dry Areas
ICCO	Interchurch Organisation for Development Cooperation
ICM	Integrated Crop Management
ICPAC	Intergovernmental Authority on Drought and Development Climate Prediction and Applications Centre
ICRAF	World Agroforestry Centre
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICT	Information and Communication Technology
IDEAM	Colombian Meteorological Agency
IDO	Intermediate Development Outcome
IDRC	International Development Research Center
IEA	Independent Evaluation Arrangement
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IIRR	International Institute of Rural Reconstruction
IITA	International Institute of Tropical Agriculture

ILRI	International Livestock Research Institute
IMPACT	International Model for Policy Analysis of Agricultural Commodities and Trade
INDC	Intended Nationally Determined Contribution
INR	Indian Rupee
IoT	Internet of Things
IP	Intellectual Property
IRD	Institute of Research for Development
IRI	International Research Institute for Climate and Society
IRRI	International Rice Research Institute
ISC	Independent Steering Committee
ISI	International Scientific Indexing
ISSD	Integrated Seed Sector Development
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IWMI	International Water Management Institute
JAMSi	Joint Agro-Meteorological Business Services Incubator
KU	University of Copenhagen
LAI	Leaf Area Index
LAM	Latin America
LED	Low Emission Development
LP	Learning Platform
LTAC	Local Technical Agro-Climatic Committee
M&E	Monitoring and Evaluation
MARD	Ministry of Agriculture and Rural Development (Vietnam)
MARLO	Managing Agricultural Research for Learning and Outcomes
MEL	Monitoring, Evaluation and Learning
MELIA	Monitoring, Evaluation, Impact Assessment and Learning
MNRE	Ministry of New and Renewable Energy
MoA	Ministry of Agriculture
MOT	Mitigation Option Tool
MRV	Monitoring, Reporting and Verification
N	Nitrogen
NAMA	Nationally Appropriate Mitigation Action
NAP	National Adaptation Plan
NARS	National Agricultural Research System
NASFAM	National Smallholder Farmers' Association of Malawi
NDA	National Designated Authority
NDC	Nationally Determined Contribution
NEPAD	New Partnership for Africa's Development
NFCS	National Framework for Climate Services
NGO	Non-Governmental Organizations
PC	Proof of Concept
PICSA	Participatory Integrated Climate Services for Agriculture
PIM	CGIAR Research Program on Policies, Institutions and Markets
PMU	Program Management Unit
PNAS	Proceedings of the National Academy of Sciences of the United States of America
POWB	Plan of Work and Budget

PSP	Participatory Scenario Planning
PVP	Plant Variety Protection
RHoMIS	Rural Household Multi-Indicator Survey
RTB	CGIAR Research Program on Roots, Tubers and Bananas
SA	South Asia
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SDG	Sustainable Development Goal
SEA	Southeast Asia
SESAN	National Secretariat of Food and Nutritional Security
SIP	Stepwise Investment Pathway
SLO	System Level Outcome
SMO	System Management Office
T&P	Technology and Practice
TERI	The Energy and Resources Institute
UCI	University of California, Irvine
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIQUE	Unique Forestry and Land Use
USAID	United States Agency for International Development
USD	United States Dollar
UTFI	Underground Taming of Floods for Irrigation
UVM	University of Vermont
W1	Portfolio Window Funding
W2	Program Window Funding
W3	Project Window Funding
WA	West Africa
WB	World Bank
WFP	World Food Program
WISAT	Women in Global Science and Technology
WLE	CGIAR Research Program on Water, Land and Ecosystems
WMO	World Meteorological Organization
WUR	Wageningen University and Research
ZEF	Center for Development Research

1. Key Results

1.1 CRP Progress Towards Intermediate Outcomes and SLOs

Progress towards SLOs

CCAFS made considerable progress on the CCAFS SLO target of *11 million more households with improved practices*, with some 6.5 million farmers being better serviced by climate-informed advisories (Philippines, Rwanda, Colombia, Senegal – IRRI, IRI, CIAT), receiving climate-smart seed (Ethiopia – Bioversity), or being part of a program that will deliver solar-based irrigation (India – IWMI/WLE), where CCAFS research has informed a USD 21.5 billion investment. Initial monitoring and evaluation (M&E) results from Rwanda show that over 85% of participating farmers (both women and men) change their farm or livelihood management in response to advisories, and share the information with more than 10 peers. These efforts are receiving due recognition, with the Rwanda work receiving a Climate Smart Agriculture (CSA) Project of the Year Award. CCAFS' work also pays close attention to gender and social inclusion. For example, in Ethiopia, slightly over half of the 1.3 million farmers reached are estimated to be women. A gender-sensitive framework for prioritization of CSA interventions was developed and used to identify location-specific gender-responsive CSA interventions that are being implemented through women farmers' leadership in Climate-Smart Villages (CSVs). Investments that promote climate smart practices were informed by CCAFS science in CSVs, including USD 170 million for Happy Seeder technology (targeting 2 million farmers) in India and USD 66 million in Cauca, Colombia, to scale up CSA. Further CCAFS science-informed investments by the World Bank, African Development Bank and the cocoa industry are also in the pipeline.

Through working closely with major development agencies and national development programs, CCAFS can also report progress on the SLO target of *9 million people out of poverty*. CCAFS science, engagement and priority setting in four countries (India, Niger, Colombia and Myanmar) and in Central America has helped inform a USD 21.5 billion investment in solar irrigation and about USD 250 million of other CSA investments, in addition to at least 12 relevant national policy decisions, with several including significant gender aspects. Significant advances in effectiveness and use of climate services for agricultural planning and risk management were made in 12 countries (including reaching women more effectively). Work on agricultural insurance advanced in five countries. These investments and policy decisions are designed to help people exit poverty through improved, climate resilient food systems. CCAFS-ICRAF science informed World Food Programme (WFP) targeting methods for an estimated population of 2.6 million people (Niger, Afghanistan and DRC). The tool specifically targets women and children.

The nutrition focus of CCAFS through the CCAFS SLO target of *5.5 million people with improved diets* began in 2017. An ex-post impact assessment (ep-IA) is underway on the science that informed India's National Food Security Act. The original Bioversity research that informed this policy demonstrated the viability of processing small millets into products with high market potential and high nutritional value, empowering women and reducing drudgery, while also supporting food security and climate adaptation. The promotion of these millets under the Act is likely to impact the 31 million farmers who grow these crops. The Gender, Climate Change, and Nutrition Integration Initiative (GCAN) identified research priorities at the nexus of climate change, gender and nutrition for several countries and regions.

The CCAFS SLO target of *reducing emissions by 0.16 Gt CO_2-e yr^{-1}* compared to business-as-usual will be largely driven by Nationally Appropriate Mitigation Actions (NAMAs) and technical guidance in Colombia (livestock), Kenya (dairy), Thailand (rice) and Vietnam (rice), with CCAFS contributing significantly to the evidence base and design. CCAFS research has informed the technology and upscaling of low emissions practices, including optimal fertilizer use and carbon sequestration in India, Kenya, Tanzania, Ethiopia and Mexico (CIMMYT); paddy rice management in Bangladesh and Vietnam (IRRI); pasture restoration in

Brazil and Colombia (CIAT); and livestock management through improved feed and manure management in Kenya, Ethiopia and Indonesia (ILRI/ICRAF/WUR/UNIQUE). Possible 2019 ep-IAs (with adaptation and/or food security co-benefits) include: a) major expansion of solar irrigation (India, more than 2.75 million solar pumps – IWMI/WLE), with potential of 4.55 Mt CO_2-e yr^{-1} reduction; and b) USD 170 million investment to reduce crop residue burning (India – CIMMYT) with potential of 20 Mt CO_2-e yr^{-1} reduction. Reports from health departments in India indicate that women and children are more vulnerable to and suffer most from air pollution from crop residue burning; with the crop residue program potentially benefitting the health of 20 million people. The total mitigation impact across up to 12 countries is estimated to be about 57 Mt CO_2-e yr^{-1} or 36% of the SLO target, with 3-30% reductions in relevant production systems.

The CCAFS SLO target of *forest saved from deforestation* has unfortunately been significantly reduced due to cuts in the Phase II budget, which resulted in cutting specific CCAFS projects.

Progress towards IDOs

CCAFS recorded 10 outcome case studies as being of good or excellent standard, as judged by a review committee comprised of management and external experts (externals weighted 66% in final scores) (Table A2). These have contributed to the CCAFS IDOs as follows (in general they contribute to more than one IDO, but for simplicity are listed under a single one):

IDO: Increased resilience of the poor to climate change and other shocks

The research for this IDO has focused on stimulating investments that are climate-smart, introducing or enhancing climate-informed advisories, getting climate risk management tools mainstreamed into key agencies, and getting climate-resilient technologies adopted by farmers. Increasing coverage of index insurance also contributes significantly to this IDO but is reported under "IDO: Enhanced smallholder market access".

Rwanda's national agricultural extension service facilitates 75,000 Rwandan farmers to access, understand and use climate services through participatory processes

Through IRI and the Earth Institute (Columbia University) and University of Reading, CCAFS supported the Rwanda agricultural extension service to scale up the Participatory Integrated Climate Services for Agriculture (PICSA) process in 20 of Rwanda's 30 districts. A thousand trained government staff and volunteer Farmer Promoters in turn trained and facilitated 75,000 Rwandan farmers to understand climate information and incorporate it into their decision making. The work is based on previous research to understand the best means of disseminating probabilistic climate-informed advisories and on research that led to the PICSA process. CCAFS has worked with the Rwanda Meteorological Agency to fill major gaps in their meteorological historical records, and to develop online "Maproom" tools that make high-resolution historical analyses and seasonal forecast information available in graphical formats.

World Food Programme uses mobile-based monitoring tools to guide programming in three countries, affecting up to 2.6 million people

ICRAF with WFP used voice-calls over mobile phones to collect nutrition information from women and mothers. The immediate user of this innovation is the WFP's Vulnerability, Assessment and Mapping Unit, which provides technical support across WFP and helps monitor and trigger responses. Remote data collection with mobile phones aims to allow WFP (and other development partners) to collect more data, from more people, more frequently, and for less money including in areas difficult to reach because of security or other logistical concerns. Timely and relatively cheap information increases the value-for-money for monitoring progress and improving programming. Based on the research and engagement,

WFP is piloting the use of this innovation in three countries (Niger, Afghanistan and DRC), where they serve 2.6 million beneficiaries, primarily women and children.

Use of tricot crowd-sourced citizen science approach for variety trials increases access/availability of adapted seeds for 1.3 million Ethiopian farmers

The tricot crowd-sourced approach developed by Bioversity for variety trials is a cost-effective way to test, at large scale, new climate-stress tolerant and nutritious crop varieties directly on farm, generating information about local adaptation/acceptability and disseminating the seeds in one go. Integrated Seed Sector Development (ISSD)-Ethiopia adopted this approach in its large-scale seed sector development program and used the approach with c. 6000 farmers (53% women) at 60 farmer training centers. These farmers subsequently shared seeds with others and created seed demand. ISSD-Ethiopia has performed on-farm experimentation with varieties of sorghum, haricot bean, wheat, barley, chickpea, potato, finger millet, fava bean, teff and field pea. Through its partnerships with 149 seed producer cooperatives and 20 private seed producers, ISSD-Ethiopia makes seeds of the identified varieties available to an estimated 1.3 million farmers.

IDO: Enhanced smallholder market access

Work towards this IDO focuses on agricultural insurance and the provision of novel financial services. CCAFS has shown that index-based insurance can increase access to credit and inputs, and has advanced work on insurance in five countries. This includes adoption of index-based flood insurance for current and pipeline initiatives in India and Sri Lanka; incorporation of evidence and expertise into new commercial insurance for cotton farmers in Senegal; and early stage of adoption of gender-sensitive tools and approaches by Pula Advisors, providing bundled agricultural insurance services in Malawi and Nigeria. Efforts with impact investors (with c. USD 330 million invested) are ongoing in the coffee and cocoa sectors, to help them better manage risk.

IDO: Increased incomes and employment

The work for this IDO is largely focusing on the sub-IDO “more efficient use of inputs”, as a means to reduce emissions intensities – please see discussion under “Sub-IDO: Reduced net GHG emissions” for further details. Other outcomes do, however, contribute to increased incomes. For example, initial M&E on the Rwanda climate-informed advisories indicates that most farmers perceive improvements in their household food security and income, women and men equally. The solar irrigation work reported below also targets improved income.

IDO: Improved diets for poor and vulnerable people

Achieving improved diets for poor and vulnerable people is being addressed by new projects and priority-setting activities that have a significant focus on food and nutrition security. These activities were initiated in 2017 and include new collaborations with A4NH, Utrecht and WUR, among others. Scenario-guided policy and investment planning with a food and nutrition security perspective is underway in South Asia (SA), Southeast Asia (SEA) and East Africa (EA), supported by case study syntheses of the mechanisms that can effectively include gender and youth issues. Some of the outcome case studies mentioned above include nutrition components. For example, the tricot method in Ethiopia reported above did not look at climate adaptation in isolation, but farmers also paid attention to color, aroma, taste and nutrition; process- and cook-ability; and kernel weight. The WFP tool is focused on nutrition information.

IDO: Adaptation and mitigation achieved

All above-mentioned outcome case studies contribute to this IDO, but in addition there are several investment and policy outcomes that often tackle both adaptation and mitigation. This includes ongoing

efforts to inform the World Bank's agricultural project pipeline and the African Development Bank's CSA portfolio. CCAFS also led the technical component in the formulation process of the CSA regional strategy for the Central American Agricultural Council (CAC), which has subsequently attracted USD 2 million in terms of initiatives/projects for implementing CSA.

Informing UNFCCC decision on agriculture at COP23

CCAFS' research and engagement were instrumental in supporting the UNFCCC COP23 decision on the Koronivia Joint Work on Agriculture. CCAFS provided scientific evidence on the importance of agriculture to the Paris Agreement goals, analysis of mitigation and adaptation in the Nationally Determined Contributions (NDCs), and concrete technical and policy options for addressing agriculture in UNFCCC negotiations, and convened workshops that negotiators cited as critical to enabling them to formulate their positions. Capacity development efforts focused on strengthening the capacities of negotiators from Africa, Asia and Latin America (LAM). Notably, the African Group of Negotiators (AGN) submissions significantly contributed to the decision. Since 2012, CCAFS has continuously supported agriculture and climate change negotiators and experts from Africa to prepare submissions for UNFCCC negotiations. Efforts also took cognizance of gender and social inclusion issues, and in 2017 agriculture and gender workshops were run in parallel, providing an opportunity for agriculture and gender negotiators to work closely.

Implementing the ITPGRFA in Bhutan, Burkina Faso, Costa Rica, Côte d'Ivoire, Guatemala, Nepal, Rwanda and Uganda

With technical support from Bioversity, government organizations in eight countries developed policies/laws; introduced these into national policy processes to create policy/legal space for the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) implementation; identified genetic resources within their country to be included in the multilateral system; and designated national competent authorities capable to consider requests for access to plant genetic resources for food and agriculture and sharing of those resources with users worldwide. The eight countries are implementing the Treaty and Nagoya Protocol in a mutually supportive way, and it is envisaged that sharing of genetic material will become a crucial aspect of climate change adaptation efforts.

Cauca leads climate smartness for agriculture in Colombia

Municipal and state authorities in Cauca, Colombia are promoting and investing in CSA practices aiming to reach approximately 150,000 farmers, as a result of the implementation of the CSV approach, using evidence generation and local empowerment. Capacity development and inclusion of women and youth are significant objectives of the program. In addition, the state government of Cauca approved USD 66 million from the Royalties National Fund to give to the Cauca Environmental Authority (CRC) to scale CSA in at least eight municipalities of the state.

Sub-IDO: Reduced net GHG emissions

There are several outcome case studies that contribute specifically to this sub-IDO, though they also address other sub-IDOs. Progress towards this sub-IDO occurred through climate finance commitments and technical assistance. In Thailand, the NAMA Facility made its first investment in mitigation in paddy rice based on IRRI science for four different low-emissions development (LED) rice technologies. In Bangladesh, IRRI developed technical guidance for the Northwest Focal Area Network (FAN), a multi-sectoral rice network, which mobilized farmer groups and built capacity for alternate wetting and drying (AWD) among 5000 thousand rice farmers in eight districts and 17 locations. Regarding emissions in other cropping systems, and increasing input efficiency, the private sector is using guidance on optimal use of N-fertilizer based on CIMMYT's research on N-sensor technologies in Mexico and WUR's research on yield gaps in EA. In Mexico, drone companies adopted algorithms developed by CIMMYT for detecting N needs

in cereal crops across large areas. In EA, Yara is using nutrient gap maps to determine minimum N-fertilizer applications. CIMMYT and WUR also helped develop guidance on conservation agriculture, which is being tested in six regional states of Ethiopia. Outcomes were also achieved for improved measurement, reporting and verification (MRV) of livestock, with CIAT verifying the RUMINANT model for Colombia, the results of which were subsequently used to inform Colombia's NDC.

Scaling out Solar Pump Irrigators' Cooperate Enterprise (SPICE) model in India linked to 2.75 million solar pumps

The SPICE model was tested and evaluated by IWMI (CCAFS/WLE collaboration) in Gujarat and Bihar, and is now being scaled out by the Government of India through a USD 21.5 billion scheme to advance solar-powered irrigation. The Indian government will provide 2.75 million solar pumps to individual farmers and farmer cooperatives across India. The scheme aims to ensure installation of grid-connected solar power plants of up to 2 MW capacity and installation of standalone off-grid solar water pumps to fulfill irrigation needs of farmers not connected to the grid. Farmers will be able to sell surplus solar power generated to the local power distribution companies. This scheme aims to improve farm income, empower rural communities and reduce emissions through the promotion of green energy. In addition, it also helps to minimize drought effects on crops during dry season.

CCAFS evidence on scalable CSA business models drove USD 170 million national policy investment in India to curb crop residue burning

Evidence generated by CCAFS-CIMMYT and partners in the CSVs helped the Indian Government to prioritize crop residue management solutions and establish a large scale investment of USD 170 million. The scheme targets increased incomes for over 2 million farmers, and improved soil health, reduced water use and reduced carbon footprint for 4 million ha. Areas close to where residue burning is practiced suffer intense health impacts and productivity losses. Currently, less than 15% of the total rice residue in northwest India is being utilized through on-farm recycling, electricity generation, etc. CIMMYT research on solutions for crop residues (Happy Seeder technology) has been one of the core areas of CCAFS research in CSVs. Over the past five years, the evidence generated on the multiple benefits of Happy Seeder technology have been disseminated through policy forums, policy papers and media.

IDO: Equity and inclusion achieved

Many of the case studies mentioned above have equity and inclusion outcomes. CCAFS tools and strategies have influenced the efforts of four organizations—CARE (Cambodia, Laos, Vietnam), Rwanda's agricultural extension service, Pula Advisors (Malawi, Nigeria) and USAID—to ensure their services and investments meet the needs of women. Contributions to equity and inclusion were also made through syntheses of current research at the nexus of agricultural development, nutrition, climate change, and gender, youth and other marginalized groups. Addressing the substantial equity gaps in exposure and vulnerability requires highly targeted investment and considerable capacity building to mainstream these issues in rural development policy initiatives and investments.

IDO: National partners and beneficiaries enabled

All the outcome case studies mentioned above include a capacity development component. Progress towards this IDO included Rwanda launching the development of a national climate services policy framework under the UN Global Framework for Climate Services, and training of trainees to get 75,000 farmers trained. Institutional capacity was enhanced in many instances, e.g. Colombia established an inter-institutional process to support advisories through Local Technical Advisory Committees (LTACs); Honduras Ministry of Agriculture policy re-established a national Agricultural Insurance Committee; and Nigeria's Federal Ministry of Agriculture and Rural Development launched a national agricultural insurance development strategy. Training programs for radio broadcasters in the Philippines led to

millions reached by a radio campaign on climate change adaptation and mitigation. Training broadcasters in Rwanda resulted in regular daily weather forecasts and a new climate service education program on Radio Huguka, reaching two-thirds of Rwanda's population.

Scaling up climate information services in Latin America, engaging over 200 institutions in 4 countries, realizing benefits for at least 100,000 farmers

Regional South-South exchanges and continuous engagement for scaling-out the CCAFS-LTAC approach with institutions in Honduras, Colombia, Guatemala, and Nicaragua have led to the creation of 13 new LTACs and strengthening of five existing LTACs across the four countries. The initiative has enabled the empowerment of more than 190 institutions, including farmer-organizations, private-sector, international NGOs, and governmental organizations, through new capacities related to the participatory generation, provision, interpretation and use of forecast-based recommendations for adaptation to climate variability. In addition, 10 farmer organizations in six counties in LAM now have fully dedicated agro-climatic prediction and climate-site-specific agronomy analysis teams, sustainably producing climate-site-specific agronomic recommendations and seasonal agro-climatic forecasts. In Colombia, for example, about 100,000 farmers benefit from climate-site-specific agronomy analysis generated by CIAT and partners.

1.2 Progress by CRP Flagships

Flagship 1: Priorities and Policies for CSA

Flagship 1 (FP1) achieved good progress towards its outcomes in 2017. There was significant progress towards the outcome of policy decisions based on CCAFS engagement and information support, with significant integration of gender and social inclusion concerns. Many activities contributed to the development of training materials and workshops to strengthen partner capacity including a visioning workshop in Mali with local decision makers around what agriculture may look like in 2030 (ICRISAT); another workshop with national and local stakeholders in Ghana, Senegal and Burkina Faso on CSA approaches and tools and climate finance; and mainstreaming the CCAFS scenario recommendations into the newly developed national rural sector plan in Burkina Faso (CCAFS, ICRISAT). In EA, working sessions were convened for the AGN in partnership with IDRC and the African Centre for Technology Studies (ACTS) to prepare an agriculture submission to SBSTA46, with CCAFS knowledge outputs used to provide scientific evidence (CCAFS EA, CCAFS Gender and Social Inclusion, ILRI). The private sector is being engaged globally through the strategic partnership with the World Business Council for Sustainable Development (WBCSD), and nationally, for example within Kenya's dairy NAMA for gender-inclusive extension services and climate-smart stepwise investment pathways (SIPs) for coffee producers in Uganda (IITA). The CCAFS scenarios team began delivering long-term training for the Cambodian parliament in international climate change negotiations, and workshops were co-organized with the Ministry of Agriculture and Rural Development (MARD) in Vietnam around AWD suitability mapping and investment potentials in relation to Vietnam's National Adaptation Plan (NAP). CCAFS also contributed to a World Bank technical assistance project in assessing the impacts of the El Niño Southern Oscillation (ENSO) in five SEA countries, recommending areas of actions and investments (IFPRI, CCAFS, IRRI, World Bank).

Collaborations with Utrecht and WUR led to further scenarios development and quantification methodology, and a key element of this work is the inclusion of modules for a food systems approach and nutritional outcomes (with A4NH). Work also started through a USAID-funded initiative on the future of livestock systems in several countries and preparations were undertaken for evaluating the Ethiopian government's Livestock Master Plan at different scales (ILRI, University of Florida). In SA, a new framework of stakeholder prioritization of CSA interventions was developed and used to identify location-specific gender-responsive CSA interventions that are being implemented through women farmers'

leadership in the CSVs (CIMMYT, ICRISAT, WorldFish, IWMI). IFPRI's IMPACT model continued to be developed, and results from a study on the use of quantitative foresight modelling is informing USAID's Bureau on Food Security (BFS) investment strategy (IFPRI, several CGIAR and external partners). In SA, regional modelling was used to address issues of scaling up CSA through policies and institutions and linking it with national agendas for food security (IFPRI, CIMMYT). Household methods were also developed (based on RHoMIS, a quantitative survey tool) to evaluate synergies and trade-offs at the household level in relation to livelihood indicators and gender outcomes (CCAFS GSI, CIMMYT, ILRI).

Several key publications, including a special issue on ex ante priority setting, were released in 2017. Contributions were made to several studies on the policy enabling environment and a gender review of climate change legislative and policy frameworks and strategies in EA was undertaken and published (CCAFS GSI, ILRI, CIAT). The World Bank continues to scale up its CSA investments, to a target of 28% of its portfolio. FP1's secondee at the World Bank continued to use CCAFS and CGIAR research outputs to prepare quality reviews on climate change for World Bank agricultural projects. FP1 projects in LAM, West Africa (WA), EA, SA and SEA continued to operate via learning alliances and science-policy dialogue platforms, which have served as discussion forums where CCAFS science can be discussed and results used to inform national and subnational policies.

Flagship 2: Climate-Smart Technologies and Practices

Significant activity under Flagship 2 (FP2) is centered on the participatory evaluation of CSA practices and technologies in CSVs. A total of 35 CSVs were supported by CCAFS, distributed across 20 countries with a total of 40 different CSA options being evaluated by researchers and farmers alike. The research framework of CSVs was formally published in *Ecology and Society*, and the concept of CSVs themselves has been taken up by a number of governments and development agencies, including Indian state authorities who are establishing CSVs as a development approach in thousands of sites; the government of Nepal; the government of the Philippines, who are establishing climate resilient villages in 17 states across the country; and IDRC, who together with IIRR are establishing four CSVs in different agro-ecologies in Myanmar. Hence, the concept itself is scaling and contributing to adoption of CSA technologies and practices.

Whilst many studies examine the benefits of individual technologies or practices, a paper authored by CIMMYT scientists has evaluated different combinations of CSA innovations, and examined trade-offs and synergies of combinations, including gender and youth-related outcomes. Amongst options analyzed and found to be beneficial were CSA practices that avoid the need for burning in rice-wheat systems, enabling a quicker crop rotation between rice and wheat. CIMMYT's Happy Seeder technology was robustly tested in CSVs, demonstrating both adaptation and mitigation benefits, and positive effects on youth. The technology has now received incentives for significant scaling out across India, with some USD 170 million committed. SPICE tested and evaluated solar irrigation systems in Gujarat and Bihar in India, with Tata Trust. It is now being scaled out by the Government of India through a USD 21.5 billion scheme to implement 2.75 million solar pumps across India.

A new innovation developed by IWMI on underground taming of floods for irrigation was successfully piloted in Uttar Pradesh and prominently featured in the 2017 edition of the World Water Development Report. The approach consists of putting floodwaters into groundwater during the rainy season, then drawing on those resources during the dry season. Research by The Energy and Resources Institute (TERI) examined the gender-related impacts of the technology, showing how both men and women benefit, but how the community identified the operation and maintenance of the structures as a constraint, especially if women are responsible. The local district has included this technology in its development plan and now earmarked USD 1.2 million for scaling out the innovation by 50-100 times.

Six major rice growing provinces in the Mekong River Delta adopted Climate-Related Risk Maps and Adaptation Plans (CS-MAP) to effectively manage rice production. Further upscaling is supported by MARD, which issued Circular 184/TT-CLT instructing provinces developing action plans to follow the adaptive measures identified based on CS-MAP protocol.

Use of big data approaches to strengthen agricultural extension and seed systems has been applied in EA, LAM and SA. The ClimMob platform, developed by Bioversity, uses a citizen science approach to facilitate participatory evaluation of varieties, and has been adopted as an approach by 25 extension systems, directly reaching 18,000 farmers with adapted germplasm. CIAT have developed big data based models to understand climate drivers of yield variation, and used these approaches with national extension systems and private sector information providers in Colombia, Nicaragua, Mexico and Peru to reach c. 100,000 farmers. Partners report yield increases of 15-24% as a result of these innovations. Climate risk maps have been linked to extension in Ghana where specific CSA practices have been incorporated in a national training manual of obligatory use for all public and private extension, targeting the 800,000 cocoa farmers in the country. Additional CSA-specific training and extension materials were developed with World Cocoa Foundation.

Work on influencing investment for CSA continued, especially in Africa and Asia where a number of CSA country profiles were developed with the World Bank and FAO (Pakistan, Bangladesh, Bhutan, Nepal, Tanzania, Mozambique). The country profiles fed into national investment planning processes linked to regional investment plans. CCAFS provided support in the development of the Tanzania CSA Framework Program, Kenya CSA Framework Program, and three Kenya county government investment plans for CSA funding. The CSA X-Ray concept was developed for Tanzania, mining a vast CSA compendium database (with data on over 70 technologies and more than 40 indicators of outcomes). The X-Ray provides a comprehensive synthesis of the evidence base for technologies, and reports potential benefits including gender-related impacts. Finally, FP2 provided strategic support to APEC in the establishment of a Multi-Year Action Plan for Climate Change and Food Security for 2018-2021, which was endorsed in the November APEC Summit. CCAFS experts facilitated the dialogue and agreement on joint areas of priority with 17 countries.

Flagship 3: Low Emissions Development

In 2017, CCAFS produced GHG emission factors and modeling of emissions factors to continue to build a robust evidence base for estimating the GHG emissions of smallholder farmers. Sixty-seven new emission factors (EFs) were produced from eight studies covering rice, nutrient management, and pasture management; all are hosted on the updated SAMPLES website. An open-access database on N_2O emissions was used to improve the modeling of N_2O emissions. To improve accounting for emissions, guidance for national monitoring, reporting and verification (MRV) of emissions was developed with partners from 22 countries for livestock emissions, agriculture's largest contributor of emissions. The guidance analyzed what countries are doing and provided examples and suggestions of what could be improved to better capture mitigation impacts. Capacity for estimating emissions grew through expansion of our PhD field research program to include the Global Research Alliance on Agricultural Greenhouse Gases (GRA) in a new program called CLIFF-GRADS that will fund 10-15 students annually through 2020 to work in a wide range of host Centers.

Country-level information (hotspots, priorities, feasibility, investment, suitability maps) was provided to national NDC developers and USAID project designers, including comprehensive comparative analysis of feasibility of LED practices and supporting interventions in the rice supply chain in Bangladesh and Vietnam and the livestock supply chain in Ethiopia and Kenya. Suitability maps for AWD were further refined in Bangladesh and Vietnam and a methodology for AWD suitability mapping published. In India, the GHG footprints were calculated and compared for major food commodities and low emission pathways for rice-wheat crops identified in three journal articles. Important outcomes were achieved,

including Colombia's use of the RUMINANT model to identify priority mitigation options and report in their UNFCCC national communications. In Tanzania, Kenya and Ethiopia, nutrient gap mapping informed fertilizer companies and the public sector of recommendations and priorities for minimal nitrogen use. Important scientific articles included a global review and analysis of N-calculated tropics-specific emission factors and observed the need for study length to be included in N_2O analyses. Flagship 3 (FP3) collaborated with The Nature Conservancy and others in a PNAS article on "natural solutions" for meeting the 2°C target, which recommended high impact interventions.

Outcomes leading to LED plans in 2017 included IRRI's contribution to a rice NAMA in Thailand funded by the NAMA Facility Vietnam also invited IRRI to develop a finance proposal for a paddy rice NAMA for the Green Climate Fund (GCF).

The roles of women, men and women's organizations related to AWD, livestock and fertilizer use were analyzed to identify opportunities for improving women's participation in LED decisions. In Kenya, the Kenya Dairy Board incorporated gender into their organizational strategy and UNIQUE Forestry worked with the private sector to develop more gender-inclusive extension strategies for biogas and dairy. ILRI conducted a training with USAID and other development groups on constraints to women's participation in more intensive, market-oriented dairy production.

LED readiness indicators were developed in partnership with Climate Focus, published and presented at a WUR workshop on readiness to policy makers and other stakeholders. The on-line resource guide on LED is still in progress – units on technical options and MRV will be completed in 2018.

Flagship 4: Climate Services and Safety Nets

Flagship 4 (FP4) engagement and innovative products contributed to more effective climate information and advisory services for agriculture in eight countries. Through its collaboration with IRI's Enhancing National Climate Services (ENACTS) initiative, online "Maproom" tools to analyze agriculturally relevant climate risks and enhance the utility of downscaled seasonal forecasts were adopted by four national meteorological services (Rwanda, Senegal, Ethiopia, Mali) and two regional climate centers (ICPAC, AGRHYMET) in Africa. A journal paper presents the methods that the broader ENACTS initiative has used to help African national meteorological services overcome data quality, availability and access challenges, and presents a vision for further scaling.

PICSA, developed by University of Reading, was adopted by USAID's Africa RISING project in WA, translated into Spanish and extended to LAM (Colombia, Peru, Central America). In Rwanda, where PICSA was scaled up to over 75,000 farmers through the country's agricultural extension service, initial monitoring results show high rates of use for management decisions, perceived household welfare benefits, gender equity, and farmer-to-farmer sharing.

Eighteen LTACs—developed earlier in Colombia as an institutional mechanism to convene relevant stakeholders to co-produce and deliver climate-informed agricultural advisories—were established or strengthened in Honduras, Colombia, Guatemala and Nicaragua. This initiative engaged and enhanced the capacity of more than 190 institutions, including government, farmer organizations, development NGOs and the private sector.

Knowledge gained from efforts to advance early warning systems for climate-sensitive agricultural and zoonotic diseases in SEA was captured in journal articles on climate influences on aflatoxin in maize, and dengue and bacillary dysentery in humans. Two tools to monitor and forecast seasonal climate impacts on crop production have been advanced with the engagement of users: the CCAFS Regional Agricultural Forecasting Tool Box (CRAFT) for food security early warning primarily in WA, and the CCAFS Agriculture Monitor (CAM) for insurance in SA.

A published review of climate screening approaches and tools has expanded the range of climate service users that FP4 aims to support to include major development organizations and funders.
Index Based Flood Insurance technology and schemes were successfully piloted in Bihar, India and published in a journal article; and have been incorporated into plans for scaling up by India's Ministry of Agriculture and Farmers' Welfare; a World Bank project in the flood-prone Indian state of Assam; and Sri Lanka's insurance industry.

FP4 guidance and engagement supported policy development to strengthen agricultural climate services and risk management. Nigeria's Federal Ministry of Agriculture and Rural Development launched a strategy it previously requested CCAFS to help it develop, to expand agricultural insurance coverage for the country's 15 million smallholder farmers. FP4 supported Rwanda's national meteorological agency to initiate development of a national climate services policy framework and governance arrangement, through the UN Global Framework for Climate Services.

1.3 Cross-Cutting Dimensions (at CRP level)

1.3.1 Gender

Several high profile products were developed in 2017 on gender and social inclusion. CCAFS collaborated with IFAD and CARE on a gender review of projects in the IFAD Adaptation in Smallholder Agriculture Programme (ASAP), which was published as an IFAD How to do Note: Design of gender transformative smallholder agriculture adaptation programs, as well as a CCAFS Info Note. Several journal articles were published, including Addressing gender in agricultural research for development in the face of a changing climate: where are we and where should we be going?; Incorporating gender into LED: A case study from Vietnam; Closing the gender gap in agriculture under climate change; Reframing women's empowerment in water security programs in Western Nepal; Inclusion of Gender in Africa's Climate Change Policies and Strategies; and Uptake of Climate-Smart Agriculture through a Gendered Intersectionality Lens. A cross-CRP writeshop on gender produced 10 papers which were submitted to a Climatic Change special issue on gender transformation in CSA (to be published in 2018), guest edited by the CCAFS Gender and Social Inclusion (GSI) Flagship Leader.

Syntheses of CCAFS gender research to date found significant gender differences in adaptive capacity of individuals and communities to respond to climate change. The gender gap is also substantial in exposure to climate change and its impacts, and in uptake of new practices that lower vulnerability. Differing needs, access to, and control over resources of women need to be considered at policy and project design stage by information and service providers. Research priorities for the next stage of gender research were also identified, in relation to CSA portfolios, climate and nutrition linkages, climate-related policy at global, national and regional levels, climate information, weather-index insurance, and climate-smart dairy production.

Monitoring of gender impacts and benefits are ongoing, with frameworks and approaches tested in all Flagships. All options being tested in CSVs are also being evaluated for their impacts on gender related criteria. A new monitoring system to assess the gender dimensions of CSA options is being piloted in CSVs and includes household and community level analysis, while a Gender Equity Index for CSA was piloted in India. Participatory approaches such as ClimMob, and mobile-based monitoring and advisory tools were piloted, targeting the participation of women. In LAM, rainwater harvesting and garden vegetable plots coupled with market access resulted in empowerment of women and increases in productive assets.

Research on intra-household dynamics and implications for CSA and LED were examined. In partnership with the National Smallholder Farmers' Association of Malawi (NASFAM) the impact of household methodologies (HHM) was assessed on a range of livelihood indicators including household decision making with over 160 households. Studies in western Uganda and Kenya assessed intra-household decisions in relation to household investments and resource allocation. A comparison of male- and

female-headed households found differences according to sex of household head in high-yield low-emissions pathways for cereal production in SA.

Policy research and support was undertaken at the regional and national levels. CCAFS provided research support to gender and climate policy in Africa and to the Kenya Dairy NAMA that as a result includes "Increasing on-farm dairy productivity through private sector investment in gender-inclusive extension services and fodder supply" as one of four components. Possibilities for more gender-inclusive business models and extension with the private sector were also identified. Support was provided to the Kenya Dairy Board to integrate gender into its organizational strategy and operations. ILRI documented the predominance of women in the informal dairy sector and the risks of increased marketing of milk for increasing gender inequities, which led to a successful proposal to the Netherlands Organisation for Scientific Research (NWO) for funding more in-depth inquiry. Technical and financial support was provided to the AGN and CCAFS research was used to inform the AGN submission on the UNFCCC Gender Action Plan at SBI 46 in May 2017. Work in Uganda on improving coffee production with local policy makers and farmers includes significant integration of gender.

CCAFS contributed a chapter on gender and CSA to the Climate-Smart Manual for Agricultural Education in CSA, a joint initiative of the Government of Zimbabwe, Climate Technology Centre and Network (CTCN) and UNDP, developed for use in agriculture colleges in Zimbabwe and extension programs. WISAT completed analysis of women's representation in key knowledge and technology fields including agriculture, as well as their economic and social status, for Nepal and Senegal.

Two gender postdocs were supported, including one on gender and livestock at ILRI (with FP3) to explore the social and gendered dynamics around engagement in low emissions dairy development. A postdoc on gender and climate information services was established with FP4 at IRI to undertake a synthesis of existing data and research findings on gender and climate information services, and develop gender guidelines.

A number of products, inputs and tools were developed to support the mainstreaming of gender and social inclusion into CSA, including gender in the CSA Country Profiles, a database of CCAFS publications that include sex-disaggregated data, and presentations at COP23. A Learning Platform on Gender, Agriculture and Climate Change was established on the CGIAR Gender Platform.

Gender integration in CCAFS is increasingly better-informed by research and data analysis. Frameworks for integrating and assessing gender integration and participation of women smallholder farmers are more robust and producing significant research results. More work needs to be done on assessing gender and social inclusion results of implementation of CSA and low emissions development practices, training and information activities, value chain development, and new tools for promoting farmer resilience. More work is also needed on producing high-quality publications and journal articles. Developing collaborative gender research with other CRPs is an area of focus for 2018.

1.3.2 Youth

Several youth-related products were published in 2017. A working paper and Info Note on Youth Decision Making in Agricultural Adaptation to Climate Change presented results of interviews with youth in four EA countries. Three online discussion forums on youth were organized with the Climate-Smart Agriculture Youth Network (CSAYN), the Climate for Development in Africa Youth Platform (ACLYP), the Interchurch Organisation for Development Cooperation (ICCO), AgriProfocus, and Livestock CRP, covering agribusiness, ICTs and the Sustainable Development Goals (SDGs). A publication on Uptake of Climate-Smart Agriculture through a Gendered Intersectionality Lens analyzed the influence of gender, age, ethnicity, education, age and marital status on adoption of CSA. Additional youth research is featured in: Farmer Demand for Climate Services; and a gender review of climate change legislative and policy

frameworks and strategies in EA, which stresses that women, young people and vulnerable groups should be identified as important targets for adaptation to climate change.

A CCAFS implementation strategy on youth and CSA is being developed, along with a database of ongoing youth activities. Youth has been identified as a sub-theme of the Learning Platform on Gender, Agriculture and Climate Change, and will be developed in collaboration with Centers and CRPs.

Frameworks developed for targeting and implementing CSA, nutrition and food security, business models, as well as portfolios of practices and scaling for sustainable intensification of smallholder and vulnerable farming systems, include youth through targeting, capacity building and data collection. In SEA, gender-sensitive comparative situation analyses and identification of youth activities tailored to LED priorities were undertaken using the Sustainable Rice Platform with 580 households across three provinces in Vietnam. Other methods to engage youth in agriculture were explored, such as use of ICTs, potential entrepreneurial opportunities, and gaming methods. Training of trainers on tools and methods for policy evaluation include training on youth issues in CSA. Approaches and tools for including youth in planning, scaling, and participatory action research in the livestock sector, agro-sylvo-pastoral systems, and climate information services were tested.

More work needs to be done on producing high-quality publications and journal articles presenting the results of CCAFS youth research.

1.3.3 Other Aspects of Equity / "Leaving No-one Behind"

CCAFS works on other aspects of equity, including the equity and social justice impacts of adaptation and mitigation, development of frameworks and guidelines for socially equitable index insurance, and research on priority issues for pastoralist (often marginalized) communities. Some of the CCAFS partners, e.g. CARE and the Universities of Reading and Leeds, have specific foci on equity issues. The CCAFS theory of change includes the assumption that private sector action is crucial for scaling given the immensity of the climate challenge. CCAFS and partners are examining how a private sector approach impacts the more vulnerable members of communities.

1.3.4 Capacity Development

CCAFS capacity development activities are mainstreamed within research and engagement activities, to raise both research capacity among partners (post-graduate students and early- or mid-career researchers) and the capacity of research users and co-creators (including farmers, policy-makers and technical staff in implementing agencies, companies and NGOs). In 2017, CCAFS supported 14,276 participants in capacity development programs, of which 41% were women. In terms of capacity development amongst research partners, the National Agricultural Research Systems (NARS) remained the main focus. In addition, efforts were undertaken to develop capacity of young developing country researchers: the Climate, Food and Farming (CLIFF) program continued to support PhD students in 2017, and was further strengthened in partnership with the GRA, and a joint initiative, the Climate, Food and Farming - Global Research Alliance Development Scholarships (CLIFF-GRADS) was launched, enabling three additional years of funding and a broader network of hosting Centers and participants.

In terms of capacity development with research users and co-creators, efforts were undertaken at multiple scales. At the global level, major achievements included in the context of UNFCCC negotiations, South-South cooperation among partners from different regions, CSA prioritization, index-based insurance, and MRV for livestock emissions. At the regional and national levels, capacity development efforts enhanced capacity for implementing the NDCs, CSA, ITPGRFA and Nagoya protocol. The capacity of national partners for MRV, scenarios development and climate information services were also enhanced.

An important learning point was the role of sub-national actors in effective implementation, and a number of new activities were initiated to develop capacity at the sub-national level, including in Colombia, Ethiopia, India and Vietnam. Capacity development efforts are driven by CCAFS science, particularly from the CSVs. For example, in WA, research from CSVs is being used to develop capacity amongst major development projects which collectively work with over 780,000 farmers (36% women). Similarly, in the Philippines, research from CSVs has formed the basis of the national Adaptation and Mitigation Initiative in Agriculture (AMIA) and capacity development efforts have focused on regional focal persons within the department of agriculture and local government counterparts.

1.3.5 Open Data

A validated 73% of CCAFS' 168 peer-reviewed 2017 publications were open access. The 27% not open was largely due to budgeting issues, i.e. payment to journals. One lesson is for researchers to budget for these costs at the start of projects. CCAFS reviewed its Data Management Support Pack and, in partnership with CIAT, launched a revised version that includes a Center perspective, which helps to align CCAFS' processes with the Centers'. This is important as the responsibility for open access relies with the legal entity (Centers). In addition, the MARLO system was updated using the same indicators as the ones used by the Big Data Platform (i.e. GARDIAN Harvester) to verify the FAIR Principles. Results showed that CCAFS information products were 82% Findable, 70% Accessible, 70% Interoperable and 67% Reusable.

1.3.6 Intellectual Assets

(a) Strategic management of IAs to maximize global accessibility and/or impact

While CCAFS does not have patents or PVPs, the program takes the following actions to maximize the accessibility and impact of its intellectual property: CCAFS 1) follows up on partners' compliance with agreements and contracts thus ensuring that all agreements and contracts, including confidentiality, comply with IA Principles; 2) maintains a regularly updated Intellectual Properties (IP) portfolio which, in CCAFS' case, is lists of publications and databases; 3) ensures that partners adhere to prior informed consent principles; and 4) ensures that information subject to confidentiality obligations from CCAFS is appropriately managed.

(b) Published patents and/or plant variety right applications (or equivalent)

N/A

(c) Critical issues or challenges

No challenges experienced.

2. CRP Effectiveness and Efficiency

2.1 Variance from Planned Program

a) Significant expansion of research areas

During 2017 it became clear that innovative finance and new business models are needed to achieve adoption at scale, hence FP2's theory of change now sees partnerships with financial institutions as critical to achieve Flagship targets. In late 2017 we secured the services of a finance specialist and in 2018 more emphasis will be placed on this area of research and engagement, with further scaling up of this research area in 2019, as budget is freed up from lower performing areas.

b) Significant cuts of research areas

As a result of budget cuts going into Phase II, CCAFS examined past projects for performance and strategic fit, and unfortunately a project on avoided deforestation and livestock production was removed. This has meant a reduction in the GHG emissions target and avoided deforestation targets.

c) New directions due to unexpected results

As a result of discussions with funding agencies, CCAFS is undertaking a review of funders' climate risk screening approaches and tools, to explore opportunities to engage with such agencies to strengthen their use of climate-related information and avoid poor practices that might contribute to maladaptation.

2.2 Use of W1-2 Funding

W1/W2 funds were planned to fund the core elements of the CCAFS strategy, as described in the POWB and Phase II proposal. We would argue that all CCAFS achievements are due to the W1/W2 as we only use W3/Bilateral funds to support the overall strategy of CCAFS. W3/Bilateral projects are only accepted if aligned with the strategy, and usually contribute to specific case studies in particular countries. W1/W2 funds were relatively equally allocated to the different CCAFS Regional Programs (LAM, EA, WA, SA and SEA) to build project portfolios across all Flagships. W1/W2 funds were allocated to Flagships as follows: 21% FP1, 32% FP2, 27% FP3 and 21% FP4.

2.3 Key External Partnerships

CCAFS is fundamentally a partnership program with partners in every activity as a means to help deliver outcomes, each project of CCAFS having a theory of change linked to the overall CCAFS theory of change. For example, GIZ and NEPAD partnered with CCAFS on work with NDCs, focusing on building capacity in government institutions to improve NDCs in WA and EA. A high-level partnership with APEC and their member countries resulted in an Asia-Pacific collaboration around climate and food security.

Significant partnerships were fostered on the ground, particularly in relation to participatory testing of technologies and practices. They included potential scaling out partners (local development agencies, NGOs) but also national agricultural research agencies and local universities. Such partnership development efforts at the local level were complemented by efforts at the sub-national, national, regional and global levels. Numerous regional government partnerships were established in support of scaling out processes. These have in many cases delivered sub-national plans and strategies, and investment commitments. National partnerships focused on the NARS, government agencies, private sector and NGOs. Regionally, partnerships with regional bodies were strengthened by the Regional Programs. Globally, in addition to strengthening existing partnerships, new partnerships were established, including with the GCF and with various organizations involved in the UNFCCC processes. Throughout partnership development efforts, bridging partners were found to be important for linking research and action, or science and policy. For example, UNIQUE Forestry and Land Use was a key partner for the work on livestock MRV. Their role in supporting the design and implementation of MRV for livestock NAMAs with CCAFS and in conducting a global review of MRV with the GRA and CCAFS enabled them to develop strong on-the-ground technical expertise and policy credibility. Such partnerships are only successful because they also involve key government agencies, in this case the Kenyan Department of Livestock and the Kenya Dairy Board. Successful development of climate services for agriculture in Rwanda was also enabled by bridging partnerships, including the World Meteorological Organization (WMO), national government partners such as the Rwanda Agricultural Board and the national meteorological agency (Meteo Rwanda), local government institutions through the extension service, local development NGOs, and the IRI and University of Reading.

Several projects engaged in productive partnerships with the private sector. These included partnerships with Olam International, working with tens of thousands of coffee farmers in Uganda (IITA); a range of companies in Costa Rica, on pathways to decrease GHG emissions in the agricultural sector (Utrecht, UCI);

and BNP Paribas, on anticipatory climate governance in WA, Central America, SA and SEA (Utrecht, Oxford, WUR). Efforts were also undertaken to engage with impact investors (Root Capital), certification bodies (Rainforest Alliance), insurance industry and ICT companies. These project-level efforts were complemented by the global strategic partnership with WBCSD, to engage across key industry players.

There are also various strategic research partners, complementing CGIAR Centers. For example, in Phase II there is more attention on the nutrition-climate change nexus (in FP1), so CCAFS fostered a partnership of WUR and Utrecht, with Utrecht bringing the scenario building skills and WUR the nutrition expertise. Activities will be getting underway in one focus country (Bangladesh) in 2018, working with various CGIAR Centers as well as A4NH. In FP3, CIRAD facilitated collaboration across Embrapa (the Brazilian Agricultural Research Corporation), local government, universities and farmer organizations to develop innovative pasture restoration technologies and extension. The continuing FP4 partnership with its host, IRI, provides an important bridge between the CGIAR and the climate science community, enabling CCAFS to overcome constraints to availability and usability of climate information. FP4 partners with the University of Reading on developing and implementing a participatory approach (PICSA) to help rural communities understand and integrate climate information into decision-making, and on social equity challenges with index-based agricultural insurance.

CCAFS partners with some of the key global agencies and alliances, to develop research results but also to provide powerful global voices around key topics. In FP3, the GRA collaborated with CCAFS on the global livestock MRV report and workshop. Their practical experience in inventory design and training, combined with their wide national networks, complements CCAFS' expertise and networks. As a result, the technical analysis was more in-depth, the sources for the global survey were more extensive, and the messages coming out were widely disseminated globally. Through its partnership with the Global Framework for Climate Services Secretariat at the WMO, FP4 helped Rwanda initiate the development of its National Framework for Climate Services (NFCS) framework, established a mechanism to support Asian countries in the development of National Frameworks, and supported the development of a Global Framework for Climate Services (GFCS) helpdesk to bring good practice into national climate services. CARE is a strategic partner of FP4 on the development of climate services for farmers in SEA. FP4 is also part of a consortium working with USAID to develop an evidence base and learning agenda in support of USAID's climate services investments.

In terms of learning, most partnerships are managed effectively within place-based projects. Involving potential next users as project partners seems to be an effective strategy for fostering uptake of Flagship research by governments and development organizations. Less strong partnerships were observed where resources, political will or timing were poorly aligned with CCAFS project aims. Budget reductions hurt a number of project partnerships. Some partners faced administrative delays in their organizations that limited the effectiveness of the partnership. CCAFS found it useful to have designated "strategic partners". For example, at global level we communicated and met with most strategic partners in 2017 and agreed on annual plans. However, we also noted that a few were not really engaged enough to justify continuing in the strategic partnership. Nonetheless, we will continue in the partnership but assess relationships again at the end of 2018 to allow two years of experience.

2.4 Cross-CGIAR Partnerships (other CRPs and Platforms)

CCAFS established six Learning Platforms to explicitly link CRPs/Centers, and also has a Contact Point in each Center to link Center-CCAFS activities.

As part of the Learning Platform on "ex-ante evaluation and decision support for climate-smart options", 2017 saw an Agricultural Systems special issue published, "Prioritizing climate-smart agricultural interventions at different scales", with nine papers on different tools with authors from eight CGIAR Centers and four of CCAFS' global strategic partners. A follow-up synthesis journal article was worked on

and submitted for publication, describing a framework for assessing CSA research and action investments, involving seven Centers. As part of the Learning Platform, work also started on the impacts of climate change on feed and forages in livestock systems. This included strategic contributions to ILRI publications as well as dissertation work. Collaboration with Flagship 5 in the Livestock CRP is continuing through joint activities in Ethiopia with USAID funding around the future of livestock systems in selected regions.

As part of the Learning Platform on "participatory evaluation of CSA technologies and practices in Climate-Smart Villages" (including integrated assessment of CSA options) thematic areas of collaboration included low emission rice cultivars (IRRI, Rice CRP), biological nitrification inhibitors (Maize CRP, Wheat CRP), synergies between adaptation and mitigation (six Centers and three CRPs), soil carbon (WLE, FTA), MRV in livestock (Livestock CRP, ILRI, CIAT, CIFOR, FTA), and weather-related insurance (PIM). The CSVs have emerged as a hub for jointly evaluating practices and technologies. In SA, CCAFS jointly evaluated practices including soil efficiency of fertility management options with PIM, Wheat CRP, Maize CRP and WLE. In SEA, a community Fish Refuge Pond model was established; CSV communities learned about technical, political and social dimensions of CSA practices demonstrated by Fish CRP in Battambang, Cambodia; and CCAFS, MARD, Bioversity, IWMI, IRRI, WorldFish, ICRAF, CIAT, ILRI, ICRISAT and the Centre for Agriculture and Bioscience International (CABI) made a joint assessment of El Niño response in drought prone regions of Vietnam and of potential CSA options for future agriculture production. In LAM CSVs, joint evaluations focused on soil efficiency of fertility management options (WLE), biofortified crops (A4NH), and forages (Livestock). In WA, biofortified plant varieties (A4NH) were evaluated in the CSVs. In EA, agroforestry options were integrated in the CSA portfolios (ICRAF, FTA); a community seed bank linked to the CGIAR Genebank Platform established in Uganda (Bioversity); trials on a new potato variety were undertaken in Tanzania (CIP, RTB); and climate risk profiling and climate vulnerability assessment were developed in Ethiopia (ICRISAT, CIAT, WLE).

The Learning Platform on "identifying priorities and options for low-emissions development" advanced in 2017 on its cross-CGIAR activities in the areas of soil carbon and LED livestock. In June 2017, WLE, FTA and CCAFS collaborated to organize a webinar to facilitate exchange among 30 CGIAR scientists from seven Centers on soil carbon research and priorities for future research. This was the first ever cross-CG effort on soil carbon and climate change. WLE, FTA and CCAFS then followed up with a workshop with 14 scientists and program leaders from seven Centers at COP23 in Bonn, hosted by the University of Bonn's Center for Development Research (ZEF). A CGIAR webinar was held on livestock and MRV with the GCF to share results from ILRI (also representing the Livestock CRP), CIAT, CIFOR (also representing FTA) and UNIQUE Forestry. FP3 also initiated a synthesis journal article on synergies between adaptation and mitigation, drawing on case studies from six Centers, WUR and the Institute of Research for Development (IRD).

The Learning Platform on "weather-related agricultural insurance" advanced through a major event at SBSTA46 in Bonn – "Scaling Up Agricultural Adaptation through Insurance." This was followed by a half-day partnership meeting to define next steps towards scaling up index-based agricultural insurance, with representation from CCAFS, PIM, WLE, and Livestock and Maize CRPs. CCAFS collaborates with PIM on the Learning Platform, and other CRPs cover specific sub-sectors (e.g. flood-based insurance through collaboration with WLE). Major activities included: 1) initiating a joint concept paper on where CGIAR-wide expertise can best add value to external index-based agricultural insurance initiatives; 2) outreach to the InsuResilience Global Partnership; and 3) initiating a planning process with IFPRI for joint activities with PIM to be rolled out in 2018. Major planned activities include: 1) finalizing a concept paper; 2) a Learning Platform side event on Leveraging Science in Scaling Agricultural Insurance: Insights from CGIAR Research, at the 14th International Microinsurance Conference in Zambia in November 2018; and 3) an Insurance Learning Platform knowledge exchange webinar series starting in August 2018.

The Gender, Agriculture and Climate Change Learning Platform is a cross-Center/CRP collaboration platform, with its website hosted by the Gender Platform website. A consultation meeting was held with

CRP gender researchers at the annual Gender Platform conference in December 2017, where the sub-topics (climate policy, youth, crop production, livestock and water) and recommendations for Platform focus and support were agreed on. CCAFS is also a member of Gender Platform working groups (e.g. Big Data). CCAFS work on gender, livestock and dairy production intersects with the Livestock CRP and the CIAT Livestock+ project. Three online discussion forums were organized with the Livestock CRP, covering such topics as youth, CSA, agribusiness, ICTs and the SDGs. A special issue of Climatic Change on Gender and Transformative CSA (in press) will include articles from six Centers and two research partners.

The Learning Platform on "partnerships and capacity for scaling CSA" worked across CRPs to provide common impact pathways for CGIAR climate change research. In 2017, the Learning Platform involved all CRPs and all 15 Centers on a range of outputs and activities. Targeted policy engagement campaigns were conducted focused on key processes (e.g. UNFCCC, GACSA, GCF), strategic partners (e.g. IFAD, World Bank), regional partners (e.g. ASEAN, NEPAD) and national governments/partners (e.g. Ethiopia, India, Netherlands), to scale up CSA. Technical guidelines were prepared for elaboration and implementation of agriculture and food security components of NAPs with inputs from eight CRPs and nine Centers. These guidelines were showcased at COP23 in a joint communications effort with the CGIAR System Management Office (SMO), all Centers and CRPs. The Agriculture Advantage event series was organized at COP23, which brought together efforts of six Centers, four CRPs and several strategic partners to make a case for climate action in agriculture. CGIAR contributions to the 4th Global Science Conference on CSA was also facilitated, with a focus on South-South cooperation. A special issue of Agriculture for Development on CSA was published with inputs from seven Centers.

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

Monitoring, evaluation and learning (MEL) efforts have been mainstreamed into all program activities through MARLO, and through regular agenda items in the management meetings of the Core Team. Through the annual planning and reporting recycles, lessons are generated at the project, region, flagship and program level, which inform program strategy. Each project is rated across multiple criteria and feedback is provided to project leaders to facilitate learning and improve performance. Regional Program Leaders and Flagship Leaders are also evaluated on several criteria: outcomes achieved by their portfolio of projects, degree to which gender is mainstreamed, high-impact publications produced etc., which allows ongoing evaluation and learning. All ep-IAs and a summary report on all outcomes reported are subject to discussion by the Core Team for lessons learnt. MEL also covers engagement and communications efforts, which are evaluated following major events, as well as on an annual basis, and reflected on to improve performance. All Flagship and Regional Programs produce and share annual reports on their respective engagement and communications efforts; learning on communications is also shared regularly through bi-monthly meetings of the Key Communications Team, comprising communicators from the Program Management Unit and all Flagships and Regions.

CCAFS led the creation of planning and reporting standards across eight CRPs and two CGIAR Platforms. Extensive negotiations took place to define and agree on common conceptual standards to be used for planning, reporting and programmatic management. This includes standardization and consolidation of key common data and information elements. These joint efforts have resulted in the adoption of the Managing Agricultural Research for Learning and Outcomes (MARLO) tool at the system level too (including CIAT, CCAFS, PIM, WLE, A4NH, Livestock CRP, FTA, Maize CRP, Wheat CRP, Big Data, EiB, and the SMO). Rice CRP will also adopt MARLO in 2018.

A number of evaluations, impact assessments and other learning exercises were conducted in 2017 (see Table I-1). CCAFS' experience with a "theory of change" approach to project planning and management, and lessons learnt to date, were published in an open-access article in the journal Agricultural Systems.

One ep-IA was initiated in 2017 and is due to be completed in 2018: “National Food Security Act Supports Climate-Smart Agriculture in India by Stimulating the Sourcing of Small Millets”. CCAFS management is committed to funding at least one ep-IA each year, and expects program participants to fund additional ep-IAs.

At the program level a review of CSVs was conducted. CSVs have been in operation in one guise or another for over five years. There are a total of 35 CSV sites in 20 countries, and we have been evaluating more than 40 CSA technologies and practices over the past couple of years. In the Phase II proposal, CSVs are an integral component of CCAFS’ theory of change, and form the basis for both a Cluster of Activities for FP2 and a CCAFS Learning Platform for integration with AFS-CRPs and other Integrating CRPs. In the IEA evaluation of CCAFS, the concept of CSVs was endorsed, with some recommendations for improvement which were brought into the thinking for Phase II (Table I-2). In the Phase II proposal, there was a commitment to do a "review" of lessons learnt in CSVs, with a view to making directional corrections. The lessons learnt document has been developed, with a number of observations and recommendations for driving the CSV concept forward. Some of the recommendations are already being implemented, whilst others will be taken into account in the preparation of concept notes for the 2019 portfolio. One of the actions taken to implement recommendations from the IEA evaluation was to put in place a comprehensive monitoring framework in CSVs, which uses ICT-based tools to better understand the synergies and trade-offs of CSA options at the plot, household, community and landscape levels. The approach was piloted in LAM and WA, and is being rolled out to SA, SEA and EA in 2018.

Each year program participants report on outcomes, and a number of these are supplemented by validation studies, often by independent consultants. In addition, participants are urged to undertake “lessons learnt” studies. In 2017 several such studies were conducted (Table I-1). Some highlights are as follows:

a) Assessing the influence of CCAFS’ climate data and tools. The study explored whether the use of some of CCAFS' climate data products led to development outcomes, and if so, what type of changes were observed and how the products have contributed to such changes. Some 30 cases were investigated that employed CCAFS’ climate products, most of which were cases of independent researchers or development partners directly accessing the products from the CCAFS website. The study demonstrated that CCAFS’ climate data and tools are widely used even without specific promotion, consistent with CCAFS’ mandate as a provider of international public goods.

b) Feasibility and validity of using mobile phone-based monitoring tools.

c) An assessment of benefits from pilot climate services work in My Loi, Vietnam, by ICRAF and CARE. This study is intended to help build on the lessons learnt from the pilot prior to upscaling.

d) Study by IFPRI to strengthen emergency response strategies to ENSO-related extreme weather events in Cambodia, Laos, Myanmar, Philippines, and Vietnam. This work is helping prioritize future action and research.

e) Role of different business models in scaling and adoption of Happy Seeder technology in Haryana and Punjab, India. This work was conducted as part of the work on curbing crop residue burning activities in India, to help identify the key agents to scale up the Happy Seeder technology, and their financial, technical and capacity needs.

2.6 Improving Efficiency

CCAFS moved from two face-to-face meetings per year of the Independent Steering Committee (ISC) to one face-to-face meeting and one virtual meeting per year. This saved 40% of the costs of such meetings, but does come with less engagement between ISC and CCAFS management. Engagement with the ISC is

highly valued, both for the formal meeting as well as the informal discussions on strategic issues. To try and maintain that engagement CCAFS will invite ISC members to other CCAFS events, in the hope that some of the informal strategic discussions will be maintained.

3. CRP Management

3.1 CRP Management and Governance

No major changes were made to management or governance arrangements and practices. The virtual meeting of the ISC in 2017 was not as productive as hoped, so we changed the format in 2018, covering fewer, less complex issues and leaving the more complex issues for the face-to-face meeting. The 2018 virtual meeting worked well. The face-to-face meeting of the ISC in 2017 was evaluated as successful, with the open private sector panel discussion being particularly effective. The virtual and physical meetings of the management team were highly effective. No top level management challenges were experienced.

3.2 Management of Risks to Your CRP

Programmatic risks

- Centers not allocating bilateral funds to CCAFS: This largely occurs because Centers find it administratively easier to allocate funds to the CRPs they control. The result is a low ratio of bilateral to W1/W2 funds. CCAFS is now incentivizing bilateral fundraising through having the bilateral to W1/W2 ratio as one of the variables in performance-based management, and 2017 saw the highest levels of this ratio.
- Funding stability from year to year: The increases and decreases of budget, often late in the year, make management very difficult. CCAFS has thus set aside a large contingency fund in 2017 to smooth implementation. However, it appears that there is more stability now than in the past, so the contingency fund may be too large relative to the current levels of instability.
- Loss and erosion of funding increases uncertainty and reduces partner trust and critical mass of research to have impact: CCAFS has seen a steady decline of funding, with projects and the partners associated with them being negatively impacted. There has also been a decrease in funds to Flagship Leaders and Regional Program Leaders, potentially resulting in a loss of critical synthesis and cross-cutting work. With lower funds, the CRP loses leverage to align Centers' research to the climate change agenda. Good communication is crucial, so that Centers and partners know about the funding challenges. Cut-backs have meant a greater focus on making extremely strategic choices about what is done. CCAFS management note that there have been no budget cuts from 2017 to 2018, so this specific challenge may no longer be an issue.

Contextual risks

Reduced interest in climate change: With the rise of “Trump-ism” there is some roll-back on the climate change focus in some constituencies. However, the frequent weather extremes and unpredictable weather patterns mean that even if central governments move away from climate change, other parts of society remain committed. CCAFS has attempted to maintain its global campaigns on the impact of climate change, drawing on the latest research.

Institutional risks

Weak commitment and/or capacity of CGIAR Centers to deliver a cohesive body of CGIAR climate change science given the incorporation of climate change issues in all CRPs in Phase II: CCAFS has positioned the CGIAR as a go-to place for climate change issues in developing country agriculture. The position of the

CGIAR could be weakened in the climate change world if it is seen as a collection of unconnected parts. CCAFS has implemented a set of Learning Platforms across CRPs to try and provide some coherence. These will be evaluated in early 2019.

3.3 Financial Summary

The largest execution of W1/W2 funds in year 2017 was by FP2 with 32% of the USD 15.956 million of program funds, followed by FP3 with 26% and finally FP1 and FP4 both having 21%. In addition, USD 2,252 million was allocated to central functions (CRP management costs, some global outreach events, communications, etc.). After the inclusion of W3/Bilateral expenses, the participation of Flagships was in the same order with the following percentages: FP2 42%, FP3 20%, FP1 19% and FP4 18%.

The composition of W1/W2 funds in 2017 had the highest contribution from W2 compared to all past years, with 70% coming from W2. In terms of expenses, 2017 was also the year with the highest ratio of W3/Bilateral over W1/W2 expenses, having two times more W3/Bilateral compared to W1/W2.

From 2017, almost USD 2 million of W1/W2 were left unallocated to be used between 2018 and 2019. Given previous years of late budget cuts we opted to be conservative. This guarantees that there will be sufficient funds to complete the planned activities, for the first three-year period of Phase II.

TABLES

Table A: Evidence on Progress towards SLOs

Table A-1: Evidence on progress towards the SLOs (sphere of interest)

CGIAR Target	Brief summary of new evidence of CGIAR contribution to *relevant* targets for this CRP (with citation)	Expected additional contribution before end of 2022 (if not already fully covered).
	None of the below have been counted against the original CRP outcomes, as they are still all in progress	These are the original CRP targets
100 million more farm households have adopted improved varieties, breeds or trees, and / or improved management practices	No new evidence yet, but possible 2019 ep-IAs include those on new climate-informed advisories (Philippines, Rwanda, Colombia, Senegal), climate-smart seed systems (Ethiopia), and solar irrigation (India), which together reach c. 6.5 million farmers. CCAFS is redoing baseline surveys in 2018 and 2019 to assess changes.	11
30 million people, of which 50% are women, assisted to exit poverty	No new evidence yet, but—in part based on CCAFS science, engagement and priority setting CCAFS has helped shape: a USD 21.5 billion investment in solar irrigation in India and about USD 250 million of other CSA investments in four countries (India, Niger, Colombia and Myanmar) and in Central America; at least eight policy decisions taken; significant advances in the effectiveness and use of climate services for agricultural planning and risk management in 12 countries; and advances and scaling of insurance in five countries. These investments, policy decisions and engagements are designed to help people exit poverty through improved and climate resilient food systems. Possible future ep-IAs include: a) WFP using CCAFS science to reach 2.6 million persons with new targeting methods, and b) World Bank using CCAFS science	9

	to inform several hundreds of millions dollars of CSA investments.	
150 million more people, of which 50% are women, without deficiencies in one or more of the following essential micronutrients: iron, zinc, iodine, vitamin A, folate and vitamin B12	No new evidence yet, but an ep-IA was initiated in 2017 for India's National Food Security Act which supports CSA by stimulating the sourcing of small millets (that are more nutritious and climate smart than large grains). The promotion of these millets under the Act is likely to impact the 31 million farmers who grow these crops.	5.5
Reduce agriculture-related greenhouse gas emissions by 0.2 Gt CO_2-e yr^{-1} (5%) compared with business-as-usual scenario in 2022	No new evidence yet, but CCAFS has actively contributed to projects that aim to reduce emissions by about 57 Mt CO_2-e yr^{-1} GHG, including from dairy and rice production, and soil fertilizer management (Costa Rica: 4 Mt CO_2-e yr^{-1}; Thailand: 1.664 Mt CO_2-e yr^{-1}; Bangladesh: 3.5 Mt CO_2-e yr^{-1}; Kenya: 8.8 Mt CO_2-e yr^{-1}; Vietnam: 6.48 Mt CO_2-e yr^{-1}; India: 1.8 Mt CO_2-e yr^{-1}; Mexico: 4 to 138 t CO_2-e yr^{-1}; Indonesia: 0.08 Mt CO_2-e yr^{-1}). In addition, the Colombia project aims to sequester 1.228 Mt CO_2-e in degraded rangeland soils. Possible ep-IAs in 2019, with further emissions reductions plus food security benefits, include a) USD 170 million national policy investment in India to curb crop residue burning (4.55 Mt CO_2-e yr^{-1}); and b) 2.75 million solar pumps being deployed to Indian farmers (20 Mt CO_2-e yr^{-1}).	30-100 Mt CO_2-e yr^{-1} (number revised as the avoided deforestation target was reduced – see below)
2.5 million ha of forest saved from deforestation	Because of budget cuts relative to the full proposal budget, this SLO target has been significantly reduced because projects targeting it were removed from the portfolio. However, in future years yield increases through CSA will be examined for the degree that they result in reduced cropland expansion and avoided deforestation.	0.2 (number revised because of budget cuts)

Table A-2: List of New Outcome Case Studies from This Reporting Year (Sphere of Influence)

Title of outcome case study	No. of Sub-IDO	Links to evidence*	Space for additional, very brief details, including on cross-cutting issues
Implementing the plant genetic resources treaty in Bhutan, Burkina Faso, Costa Rica, Côte d'Ivoire, Guatemala, Nepal, Rwanda and Uganda	Increased conservation and use of genetic resources Conducive agricultural policy environment	Outcome case study	Governments in eight countries developed policies/laws, and introduced these into national policy processes to create policy/legal space for effective implementation of ITPGRFA. Capacity development was a significant objective, and country teams from all eight countries were trained in policy analysis, strategy development, documentation, and implementation.
Informing UNFCCC decision on agriculture at COP23	Conducive agricultural policy environment Reduced net GHG emissions from agriculture, forests and other forms of land-use	Outcome case study 1 Outcome case study 2	After many years of negotiation a work program on agriculture was finally agreed. Through the provision of evidence and engagement in the UNFCCC process, and capacity development of regional negotiator groups in Africa, Asia and LAM, CCAFS played an important role in informing negotiators who reached a decision on agriculture at COP23. Engagement efforts highlighted the importance of gender and social inclusion, which is also reflected in the decision.
Use of citizen science approach for variety trials increases access/ availability of adapted seeds for 1.3 million Ethiopian farmers	Reduced smallholders production risk	Outcome case study	A crowd-sourced, citizen science approach ("tricot method") for variety trials is a cost-effective way to test, at scale, new climate-stress tolerant and nutritious crop varieties. Around 6,000 farmers and 60 farmer training centers were trained in trial formats and these farmers subsequently undertook field trials and shared seeds with others to create seed demand. ISSD-Ethiopia adopted the method and distributed seed to an estimated 1.3 million farmers. More than half of farmers directly reached by trials were women.
Cauca leads climate smartness for agriculture in Colombia	Enhanced institutional capacity of partner	Outcome case study	Municipal and state authorities in Cauca are promoting and investing in CSA practices aiming to reach approximately 150,000 farmers, as a result of the implementation of the CSV approach, using evidence generation and local empowerment. Inputs were

	research organizations Enabled environment for climate resilience		provided to the Rural Women's Policy of Cauca and two national policies (on education and environment) through the establishment of the Rural Node of Youth for the Environment. Capacity development effort focused on communities through Field Farmers Schools for Adaptation.
Scalable CSA business models drove a USD 170 million national policy investment in India to curb crop residue burning	Reduced smallholders' production risk Improved access to financial and other services	Outcome case study	Science-based evidence generated by CCAFS-CIMMYT partners in the CSVs helped the Indian Government to prioritize crop residues management solutions and establish a large scale routing investment of USD 170 million for in-situ management using the Happy Seeder technology. Capacity development was the principal objective. There was a focus on enhancing women's knowledge and motivating and attracting youth in agriculture. Activities also focused on engaging in agricultural education policy and training stakeholders.
Scaling out the Solar Pump Irrigators' Cooperate Enterprise (SPICE) model in India	Diversified enterprise opportunities Reduced smallholders production risk	Outcome case study	The SPICE model was tested and evaluated in the states of Gujarat and Bihar in India by IWMI in collaboration with Tata Trust. It is being scaled out by the Government of India through a USD 21.5 billion scheme to implement solarization of farm irrigation. As per the scheme, the Ministry of New and Renewable Energy (MNRE) plans to provide 2.75 million solar pumps to individual farmers and/or farmers' cooperatives across India.
Scaling up climate information services in LAM, engaging over 200 institutions in four countries, realising benefits for at least 100,000 farmers	Enhanced institutional capacity of partner research organizations Enhanced adaptive capacity to climate risks Closed yield gaps through improved	Outcome case study 1 Outcome case study 2 Outcome case study 3	The CCAFS LTACs were scaled out to additional countries; capacity of 10 farmer organizations for agro-climatic prediction and climate-site-specific agronomy analysis was strengthened; and productivity of more than 100,000 farmers was increased. Capacity development and gender were significant objectives. Capacity was developed within LTACs and farmer organizations in four countries, and training was provided to at least 100 technicians. Emphasis was placed on the inclusion of marginalized groups including women and youth.

	agronomic and animal husbandry practices		
African meteorological institutions provide new high-resolution seasonal climate analyses for agricultural decision-making across five countries and regionally	Enhanced adaptive capacity to climate risks	Outcome case study	Five NMS serving a rural population of 125 million (Mali, Rwanda, Senegal, Ethiopia, Malawi) and two regional climate centers in Africa routinely provide new high-resolution information and analyses of growing season characteristics for agricultural and food security decision-makers. The process has elevated the capacity and status of collaborating NMS. CCAFS developed the new tools, and contributed to their implementation and capacity development in partnership with the IRI's ENACTS initiative.
Rwanda's national agricultural extension service facilitates 75,000 Rwandan farmers to access, understand and use climate services through participatory processes	Enhanced adaptive capacity to climate risks	Outcome case study	The Rwanda Climate Services for Agriculture project supported the Twigire Muhinzi agricultural extension service to scale up the PICSA process in 20 of Rwanda's 30 districts. One thousand trained government staff and volunteer Farmer Promoters trained and facilitated 75,000 Rwandan farmers to understand climate information and incorporate it into their decision making. Initial M&E results show that over 85% of participating farmers change their farm or livelihood management in response, and share the information with peers. Gender was a principal objective: efforts focused on building capacity to understand climate service needs of women farmers, and deliver services that meet their needs effectively.
WFP uses mobile-based monitoring tools to guide programming in three countries, affecting up to 2.6 million persons	Increased household capacity to cope with shocks Gender-equitable control of productive assets and resource	Outcome case study	ICRAF, with WFP, used voice-calls over mobile phones to collect nutrition information from women and mothers. The immediate user of this innovation is the WFP's Vulnerability, Assessment and Mapping Unit, which provides technical support across WFP and helps monitor and trigger responses. Based on the research and engagement, WFP is piloting this innovation in three countries (Niger, Afghanistan and DRC), where they serve 2.6 million beneficiaries. Gender was a principal objective, and two indicators (Minimum Dietary Diversity for Women and Minimum Adequate Diet) both specifically targeted programming for women and children.

Table B: Status of Planned Milestones

FP	Mapped and contributing to Sub-IDO	2022 CRP outcomes (from proposal)	Milestone*	2017 milestones status (Complete, Extended or Cancelled)	Provide evidence for completed milestones or explanation for extended or cancelled
FP1	CC Increased capacity for innovation in partner development organizations and in poor and vulnerable communities	F1 Outcome: # of policy decisions taken (in part) based on engagement and information dissemination by CCAFS	2017 – Training materials developed and workshops held to strengthen partner capacity in applying decision support tools in targeting, priority setting, policy/investment decision making capacities and articulating national priorities in global fora; national planners are supported in utilizing CCAFS information in policy decisions and investment plans through science-policy platforms and processes	Complete	Several capacity building events were held in 2017 (by projects and the Core Team), and engagement with national planners resulted in CCAFS information being incorporated into SBSTA submissions, sub-national plans in EA, and ENSO activities in SEA. • Ghana's submission on the elements of the Gender Action Plan • Scenarios for consideration by national focal points to develop clearly articulated, mutually supportive, national level approaches to implementing the ITPGRFA and the Nagoya Protocol in several languages • Evaluation of institutions, actions, and the political economy of ENSO responses in SEA countries • Climate smart stepwise investment pathways for the Ugandan coffee sector • AGN submissions play significant role in achieving the Koronivia Joint Work on Agriculture • Training the Cambodian Parliament for international climate change negotiations
	Optimized consumption of diverse	FP1 Outcome: # of organizations and institutions	2017 – New generation of multi-level CCAFS scenarios methodology	Extended	Milestone is extended pending the establishment of a Utrecht-WUR pilot study in Bangladesh in 2018. The work was delayed in 2017 because of logistical issues.

	nutrient-rich foods	in selected countries/states adapting plans and directing investment to optimize consumption of diverse nutrient-rich foods, with all plans and investments examined for their gender implications	developed and tested, including combined climate and socio-economic scenarios with a focus on food and nutrition security and gender and social inclusion gaming approaches for youth are explored		
	Optimized consumption of diverse nutrient-rich foods		2017 – CCAFS regional scenarios are used for multi-level policy development and implementation in selected countries/states, focusing on climate and food and nutrition security policies aimed at dietary diversity	Extended	Milestone is extended to 2018 pending studies commencing in Bangladesh and Ethiopia. Both these studies were delayed in 2017 because of funding difficulties.
	CC Improved forecasting of impacts of climate change	FP1 Outcome: # of countries/states where CCAFS	2017 – Two modified versions of global and regional models to evaluate climate smart	Complete	IFPRI IMPACT model continues to be updated and used to evaluate CSA options; used in all CSA Country Profiles. RHoMIS dataset is used to create models and assess trade-offs/synergies of practices in several African countries. The CSA prioritization

	and targeted technology development	priority setting used to target and implement interventions to improve food and nutrition security under a changing climate	practices and technologies and the related trade-offs and synergies for CSA are developed and tested		model for SA is in use for India. • Informing decision-making on investments in agricultural research, resource management, and infrastructure • Exploring the potential of household methodologies to strengthen gender equality and improve smallholder livelihoods: research in Malawi in maize-based systems • Prioritizing climate-smart agricultural land use options at a regional scale
	CC Improved forecasting of impacts of climate change and targeted technology development		2017 – Cross-CRP modes of operation are defined, including joint ex ante analyses and data sharing and the CoA 1.1 Learning Platform established	Complete	Cross-CRP collaboration contributed to the publication of a special issue on foresight analysis in Agricultural Systems. • Prioritizing climate-smart agricultural interventions at different scales • Ex ante priority setting for CSA research
	CC Gender-equitable control of productive assets and resources	FP1 Outcome: # of national/state organizations and institutions adapting their plans and directing investment to increase women's access to, and control over, productive assets and	2017 – Comparative analysis completed of enabling policy environments (especially food and nutrition security policies) with respect to gender equity considerations and recommendations for strengthened gender and social inclusion in enhanced enabling policy environments	Complete	An analysis of gender considerations within climate policies in EA was published and a specific study in Uganda was also completed. Bioversity published a study on community seed banks that included gender analysis. • Uganda policy gaps • EA gender policy gaps • Community seed banks

		resources			
	CC Enabled environment for climate resilience	FP1 Outcome: $ USD new investments by state, national, regional and global agencies, informed by CCAFS science and engagement	2017 – Novel analytical frameworks, indicators and metrics for evaluating cross-level dynamics and the effectiveness of enabling policy environments to support adaptation options and the scaling of CSA are developed and tested, considering 'good enough' governance	Extended	This has been extended because of a request to contribute to the AGN and the African Union country scorecards on adaptation during 2018. • Use of CCAFS research outputs to prepare project reviews on climate change for World Bank investment projects
	CC Enabled environment for climate resilience		2017 – Science-policy exchange processes, stakeholder fora and learning alliances are maintained and create conditions for open policy dialogue draft guidelines for mainstreaming climate change adaptation and climate-smart practices in agriculture and other sectors and at different administrative levels are disseminated	Complete	The science-policy dialogues continued in several countries, and a two-part webinar series was held to share lessons across regions. • Uganda learning alliance looks beyond CSA • Climate-related risk maps and adaptive cropping calendar for Vietnam • Sharing experiences with learning alliances and science-policy platforms across regions: webinars • Activation of subnational platform to broker institutional changes in Ghana
FP2	CC Increased	FP2 Outcome: #	2017 – Diagnosis on sub-	Complete	There are multiple outputs on this for Vietnam, Myanmar, the

	capacity for innovation in partner development organizations and in poor and vulnerable communities	policy decisions taken (in part) based on engagement and information dissemination by CCAFS	national policy and institutional frameworks analysis focusing on different options that can support the adoption of preferred CSA practices		Philippines, India and Colombia: • The challenges in implementing Vietnam's NDC in the agriculture sector under the current supporting laws, regulations, and policies • Towards CSA in SEA: initial results in Ma Village, Vietnam • Adaptation from below: a feminist analysis of possibilities and pitfalls of technified climate change adaptation intervention in Phailom community, Lao PDR • Yen Bai province considered policy framework in mainstreaming CSA for its three ecological zones • Philippines' government funded a multi-million USD AMIA project to effectively scale CSA out to the whole country and develop sub-national and national CSA frameworks • Underground taming of floods for irrigation (UTFI) in the river basins of SA: institutionalizing approaches and policies for sustainable water management and livelihood enhancement • Government of India's new USD 21.5 billion scheme to implement solarization of farm irrigation • Peer-reviewed paper: How does institutional embeddedness shape innovation platforms? A diagnostic study of three districts in the Upper West Region of Ghana • Methodology to scale-up CSA practices in Cauca, Colombia: master's thesis • Summary of key inputs and considerations for updating the Public Policy for the Dignity of Women in the Cauca department (Colombia) • Rural chapter of Youth-for-Environment-Initiative implemented by the Cauca Environmental Education Secretariat and the Colombian Ministry of Environment
	CC Increased capacity for		2017 – CSA knowledge products made available	Extended	Major progress made on the compendium including a draft website, and one CSA X-Ray published. Milestone expected to be

	innovation in partner development organizations and in poor and vulnerable communities		for partners including Africa CSA and mitigation compendiums online (approximately 5,000 data points), Climate Wizard updated and five CSA X-rays		completed in 2018 with formal release of the compendium. • CSA X-Ray • Climate Wizard API and Integration WOCAT Climate Change Adaptation Module
	CC Gender-equitable control of productive assets and resources	FP2 Outcome: 15 development organizations, with the focus on investments for CSA activities, adapting their plans or directing investment to increase women's access to, and control over, productive assets and resources	2017 – Gender tailored CSA portfolios and business cases identified for testing with local partners in CSVs	Complete	Numerous gender-centric CSA options are now being tested in CSVs across the portfolio, including: ICM, biomass recycling, deep fertilizers placement, adjusted rice inter-row space, and maize transplanting technologies in SA. Women empowered for climate smart crop-dairy farming systems: post-harvest management, value chains and market in SA. Fruit trees were introduced for the benefit of women in Senegal; market gardening (during rainy and dry seasons) and off-season cropping were initiated by women on common land for improving their income in Senegal and Ghana. Biofortified potato trials involved 30 men and 30 women in Burkina Faso. A NWO-WOTRO project was initiated to support the upscaling of gender equitable CSA/SuPER (sustainable, profitable, equitable and resilient) approaches with small-scale women producers using appropriate combinations of business training and financial services that support community-based adaptation action plans.
	CC Gender-equitable control of productive assets and		2017 – Gender-disaggregated impact of CSA technologies and practices evaluated in CSVs framework,	Extended	A detailed monitoring system for CSVs was developed which collects gender-disaggregated data on CSA options, enabling/constraining factors to adoption, perceived effects on food security, livelihoods, adaptation and gender indicators (labor, control over resources, participation in decision making).

	resources		methods and approaches developed to co-design, test and monitor transformative gender focus options		Complementary methods are being tested to examine the intra-household gender dynamics of CSA options. The CSV monitoring was piloted in two CSVs (LAM, WA), and will be implemented in all other CCAFS regions in 2018. WFP uses mobile-based monitoring tools to collect nutrition information from women and mothers and guide programming in three countries. • Study on gender response to the UTFI pilot in Uttar Pradesh • Peer-reviewed publication: "Gender and inorganic nitrogen: what are the implications of moving towards a more balanced use of nitrogen fertilizer in the tropics?" • Index measured gender equitable knowledge for CSA portfolios adoption ensuring food and nutrition security under climatic risks in Bihar, India: journal paper and video. • Farm record keeping: a must-have tool for gender-enabled climate-smart agricultural practices (CSAP) scaling strategy for development • Fairness and efficiency in smallholder farming: the relation with intra-household decision-making • Socio-economic and gender disaggregated quantified information to understand farm decision-making adoption of CSAPs in diverse farming system typologies in Haryana and Bihar
	Improved access to financial and other services	FP2 Outcome: 15 sub-national public/private initiatives providing access to novel financial services and supporting	2017 – A shortlist of CSA technologies, practices and services with good potential for a business case (including business model for small ruminant value chain) in SA and EA; business plan developed and validated	Complete	A number of CSA options were trialed, and a shortlist of successful options was prioritized for out-scaling in SA (Turbo Happy Seeder, Nutrient Expert tool, Greenseeker, direct seeded rice, alternate wetting and drying, farm budgeting, etc.), with significant uptake and investment by local authorities and the private sector. Potential business cases have been prioritized, e.g. baby corn production and nutrient management. The value propositions of CSA technologies and practices for the private sector, government, and male and female farmers have been considered. UTFI was trialed in SA, and subsequently promoted

		innovative CSA business models	in three SA CSVs business model for water storage options, including alternative investments options tested in WA		by local authorities for scaling out. • SPICE scaled out by the Government of India through a new USD 21.5 billion scheme • Co-solving groundwater depletion and seasonal flooding through an innovative managed aquifer recharge approach: converting pilot to a regional solution in the Ram Ganga sub-basin • Building climate-resilient agriculture systems in SA: top ten success stories • Performance of portfolios of CSA practices in a rice-wheat system of western Indo-Gangetic plains • Managing climate risks through small ruminants in Kenyan CSVs • 10 best bet innovations for adaptation in agriculture: a supplement to the UNFCCC NAP Technical Guidelines
	Improved access to financial and other services		2017 – Two pilots of widespread use of CSA practices in voluntary certification schemes (cocoa or coffee value chains) and testing of innovative financial mechanisms in two CSVs in WA	Extended	Four pilots are currently underway in Ghana, making use of CSA-specific training and extension materials developed with World Cocoa Foundation and built on CCAFS products. The merger of Rainforest Alliance and UTZ, two of the largest voluntary certification agencies active in cocoa, opens the door for greater scale than previously anticipated. CIAT is working with UTZ on a global cocoa and climate change web portal to leverage this. Financial mechanisms for CSA remain challenging. We are now exploring web-based risk assessment tools with Root Capital, combining climate with deforestation for cocoa and coffee globally. • Report incorporating CCAFS science into the global cocoa sector strategy for climate resilience: Feed the Future for Climate-Smart Cocoa Program

	CC Improved forecasting of impacts of climate change and targeted technology development	FP2 Outcome: 50 site-specific targeted CSA options (technologies, practices and services) tested and examined for their gender implications	2017 – 10 promising climate-smart water, crop-livestock-agroforestry practices and five value chains prioritized, tested and adapted in CSVs in 12 countries supported by agricultural innovation platforms	Complete	Over 40 CSA options were tested in 20 countries. See special issue on CSA technologies in WA: • Optimizing yield of improved varieties of millet and sorghum under highly variable rainfall conditions using contour ridges in Cinzana, Mali • Tillage and fertilizer effect on maize and soybean yields in the Guinea savanna zone of Ghana • Combining soil fertilization, cropping systems and improved varieties to minimize climate risks in the northern region of Burkina Faso • Value chain analysis of integrated aquaculture systems: evidence and potential for scaling out in North Central area of Vietnam Climate smart practices have been identified in Peru and Ghana, and have been incorporated into a Rainforest Alliance training manual for cocoa farmers, with the potential to reach 150,000 in Ghana and more broadly 737,000 across WA.
	CC Improved forecasting of impacts of climate change and targeted technology development		2017 – Framework developed and validated to design, test and monitor transformative CSA crop-livestock-tree gender sensitive practices. Standardized data capture (climate, soil and management information) and cost-effectiveness assessed at site level. Common analytical protocols and	Complete	A sound CSV Monitoring Plan was designed to guide regional teams and researchers engaged at different levels in CSA evaluation activities across the global CSV network (LAM, WA, EA, SA and SEA regions). It includes specific indicators to be measured (under the three CSA pillars) to track changes occurring at plot, farm and household levels and test the hypothesis that farmers' experimentation with/implementation of CSA options leads to positive biophysical and socio-economic changes at these levels. Its implementation was piloted in Ghana where the WA regional and local teams were trained. Two online regional webinars (LAM, WA) were implemented. • Insights on farmers' own assessment of CSA in Vietnam

			case studies developed for evaluating socially disaggregated CSA options benefits on productivity, adaptation and mitigation (with FP3)		published • Gender-disaggregated data collected by the ClimMob for participatory testing of gender-based differences in technology preferences • Farm record keeping: a must-have tool for gender-enabled CSAP scaling strategy for development • Index measured gender equitable knowledge for CSAPs adoption ensuring food and nutrition security under climatic risks in Bihar, India • Prioritization and cost-benefit analysis of climate smart practices in cacao production in Peru to evaluate adaptation and scaling potential • Satellite imagery as an alternative to collect data through surveys • Platform implemented in Colombia to collect data from commercial productive experiences and analyze them with machine learning methods to generate information for farmers and agricultural sector institutions
	Reduced smallholders production risk	FP2 Outcome: 6 million farm households receiving incentives (training, financial, programmatic, policy-related) for adopting CSA related practices and technologies that potentially	2017 – Synthesis reports on local-level enabling environment, incentives and sub-national policies and plans supporting CSA investment and enhanced adoption	Extended	• Climate risk profiles developed in Kenya to guide CSA investments and priorities at sub-national level. • Significant progress made in SA: o Guidelines for initiation, facilitation and M&E of an innovation platform as a mechanism to develop and scale climate smart agribusiness developed o Government of Uttar Pradesh developed district development plans using CCAFS' research on UTFI o Evidence base produced on policy level engagement for out scaling CSAPs by the sub-national governments • SPICE being scaled out by the Government of India through a new multi-billion-dollar scheme to implement solarisation of farm irrigation

		reduce production risks with increased benefits for women			• 'CSA-Plan': strategies to put CSA into practice • Decision 1915/QD-BNN-KH of MARD on development of rice production in Mekong River Delta up to 2025 and 2030 orientation under the impact of climate change (in Vietnamese). Further upscaling supported by MARD's Circular 184/TT-CLT instructing provinces developing action plans following the adaptive measures identified based on the Climate-Smart MAP protocol • Guinayangan CSV experience guides the Philippines' Department of Agriculture's development of AMIA villages (the Philippine adaptation of the CSV approach), mobilizing new investments • Synthesis reports planned for 2018 release
	Reduced smallholders production risk		2017 – Lessons learned and knowledge products to overcome barriers to investment and further adoption constraints at local scales	Complete	Multiple studies across the five regions. For example, cost-benefit and adoption studies were conducted in the CSVs in the five intervention countries in WA (Senegal, Niger, Mali, Ghana, Burkina Faso), and this culminated in the assessment of cost effectiveness of the top ten CSA options per CSV. Also, the adoption rates for each of these CSA options as well as the adoption constraints were determined at the CSV level. • Developing CSA to face climate variability in WA: challenges and lessons learnt • Stories describing the lessons learnt on developing business cases in Haryana, Punjab, Bihar, and Bangladesh • The climate smart investment pathway approach and the farmer segmentation tool
FP3	Land, water and forest degradation (Including deforestation)	FP3 Outcome: # of million hectares targeted by research-	2017 – Framework for institutional innovation and monitoring to enhance performance of	Cancelled	Budget cuts led to cancellation of this project.

	minimized and reversed	informed initiatives for restoring degraded land or preventing deforestation	cattle farming in Brazil		

	CC Reduced net greenhouse gas emissions from agriculture, forests and other forms of land-use	FP3 Outcome: # of low emissions plans developed that have significant mitigation potential for 2030, i.e. will contribute to at least 5% GHG emissions reduction or reach at least 10,000 farmers, with all plans examined for their gender implications	2017 – Analysis supporting more ambitious INDC targets and resource guide to LED available to investors, donors and country partners with analysis including gender implications	Extended	• Country-level information (hotspots, priorities, feasibility, investment, suitability maps) was provided to national NDC developers and USAID project designers (2018 report, workshop, emission factors)
					• Colombia RUMINANT model workshop
					• In Tanzania, Kenya and Ethiopia, nutrient gap mapping informed fertilizer companies and the public sector of recommendation domains and priorities for minimal nitrogen use (field days, maps)
					• Methodology for AWD suitability mapping
					• In India, GHG footprints for major food commodities and low emission pathways for rice-wheat crops
					  ○ Sustainable intensification of Basmati rice-wheat
					  ○ Conservation agriculture
					• Emission factors for N_2O in tropics and database
					• The Nature Conservancy's PNAS article on "natural solutions" for meeting the 2°C target, which recommended high impact interventions
					• IRRI and Thai rice NAMA
					• LED readiness indicators 2014 report (see 2014)

	CC Reduced net greenhouse gas emissions from agriculture, forests and		2017 – Improved emission factors and estimation methods for smallholder emissions, for incorporation into	Complete	• Emission factors posted on SAMPLES program website • CLIFF-GRADS program • MRV report, Info Note and workshop

	other forms of land-use		LED planning and prioritization tools		

	CC Reduced net greenhouse gas emissions from agriculture, forests and other forms of land use		2017 – Mitigation hotspots and priorities by sector and country in five to eight countries	Complete	• Country-level information (hotspots, priorities, feasibility, investment, suitability maps) was provided to national NDC developers and USAID project designers (2018 report, workshop)
					• Colombia RUMINANT model workshop
					• In Tanzania, Kenya and Ethiopia, nutrient gap mapping informed fertilizer companies and the public sector of recommendation domains and priorities for minimal nitrogen use (field days, maps)
					• Methodology for AWD suitability mapping
					• In India, GHG footprints for major food commodities and low emission pathways for rice-wheat crops
					  ○ Sustainable intensification of Basmati rice-wheat
					  ○ Conservation agriculture
					• Emission factors for N_2O in tropics and database
					• The Nature Conservancy's PNAS article on "natural solutions" for meeting the 2°C target, which recommended high impact interventions

	CC Improved capacity of women and young people to participate in decision-making	FP3 Outcome: # of organizations adapting their plans or directing investment to increase women's participation in decision-making about	2017 – Gender-disaggregated data on social factors influencing uptake of LED practices for rice and livestock	Complete	• The impacts of high and low use of N-fertilizer use on gender relations in India • Women's participation in paddy rice in Vietnam and opportunities to improve their participation in LED rice, especially AWD • Effect of household methodologies on increasing equity in maize producing households in Malawi • Gender balance in productive and reproductive labor among livestock producers in Colombia: implications for climate change responses

		LED in agriculture			• Six of eleven 2017 CLIFF-GRADS students were women
	CC Increased capacity for innovation in partner development organizations and in poor and vulnerable communities	FP3 Outcome: # of policy decisions taken (in part) based on engagement and information dissemination by CCAFS	2017 – Flagship knowledge products made available for partners including Mitigation Option Tool, online mitigation compendium, primer on LED in agriculture, smallholder emissions estimation platform with training materials and emission factors (SAMPLES)	Complete	• SAMPLES platform • Livestock MRV report • CCAFS-MOT revised, journal article published
	CC Increased capacity for innovation in partner development organizations and in poor and vulnerable communities		2017 – Agricultural LED readiness indicators available	Complete	• LED readiness indicators • 2014 Climate Readiness in Smallholder Agricultural Systems: Lessons Learned from REDD • 2016 WUR Workshop
	More efficient use of inputs	FP3 Outcome: # of agricultural development initiatives where CCAFS science is used	2017 – Network of trial sites for more efficient management options for fertilizer, feed, water, and land use in five to eight countries	Complete	• Trials established in Kenya for livestock and mixed crop-livestock systems • Colombia and Brazil for pasture restoration • EA for N-fertilizer management • Biochar in Sub-Saharan Africa • AWD, rice straw in Vietnam

		to target and implement interventions to increase input efficiency			• CCAFS is linking with WLE to liaise on trials related to soil C sequestration
	More efficient use of inputs		2017 – Identification of food loss and waste (FLW) opportunities for LED and commercially viable interventions in priority product value chains	Extended	Priority value chains were identified only in 2017, in conjunction with another major project being managed by WUR.
FP4	Improved access to financial and other services	FP4 Outcome: 8 million farm households with improved access to capital, with increased benefits for women (millions)	2017 – Flood insurance theoretical and institutional framework, tools, community of practice, public-private partnership model and analysis of scaling potential in SA	Complete	Index-based flood insurance has been piloted successfully India and adopted for pipeline initiatives by the World Bank, Indian Ministry of Agriculture and Farmers' Welfare, and insurance companies in Bihar, India and Sri Lanka.
	Improved access to financial and other services		2017 – Evidence from existing insurance initiatives, capacity development, piloting, and analysis of scaling potential for insurance linked to credit and inputs in EA and WA	Complete	Manobi (a WA company) and West African Development Bank (BOAD) built CCAFS evidence and expertise into new insurance for c. 25,000 cotton farmers in Senegal. Pula Advisors adopted CCAFS tools and bundled insurance assessment results into agricultural insurance services in Nigeria (4000 customers) and Malawi (65,000 commercial customers and an international seed company client).

	CC Enhanced capacity to deal with climactic risks and extremes	FP4 Outcome: 40 institutions or major initiatives that use CCAFS research outputs for services that support farm households' management of climatic risks	2017 – # of institutions or major initiatives that use CCAFS research outputs for climate information, insurance or safety net services that support farm households' management of climatic risks	Complete	Across Africa, four NMS (Senegal, Mali, Ghana, Rwanda) and two regional climate centers (ICPAC, AGRHYMET) developed new high-resolution gridded data and/or derived online climate information products, building on CCAFS research and engagement. Pula Advisors use CCAFS science and guidance in their bundled agricultural insurance (serving 610,000 customers). In WA, USAID's Africa RISING project adopted the CCAFS-supported PICSA approach to manage climate risks. Four USAID Feed the Future projects in Senegal have incorporated CCAFS-led climate services into their strategies. The Esoko ICT company has implemented climate information in their bundle of services to farmers in northern Ghana. AGRHYMET incorporated CRAFT in its pipeline efforts to upgrade its regional food security monitoring and forecasting. In LAM, 18 LTACs were established or strengthened in four countries. In SEA, two provincial Departments of Agriculture and Rural Development (Ha Tinh, Ky Anh) in Vietnam incorporated CCAFS science into their agricultural advisory services. Globally, the London School of Economics' program on index insurance impact assessment adopted CCAFS expertise.
	CC Enabled environment for climate resilience	FP4 Outcome: $ USD new investments by state, national, regional and global agencies, informed by CCAFS science and engagement	2017 – Methodology for economic valuation of climate services reviewed, targeting Africa-focused climate services investors (e.g., AfDB, USAID, DfID)	Complete	A review of literature on cost-benefit analysis studies on agricultural climate services, and their associated methodology, was completed (published as a working paper in early 2018).

	CC Enabled environment for climate resilience		2017 – Preliminary cost-benefit analyses of agricultural climate services provided to climate services investors	Extended	Progress on cost-benefit analysis through the Climate Services for Africa project was slower than anticipated, and objectives scaled back, due to several factors. An ex ante willingness-to-pay choice experiment with Ethiopian farmers, and preparations for an economy-wide model-based climate service valuation study, were initiated. Other contributions to this milestone include: submission of a journal manuscript on willingness-to-pay for climate services in northern Burkina Faso; a willingness-to-pay study on climate-smart agricultural index insurance in India; and engagement of donors around learning and evidence from climate-informed agricultural advisory services in Colombia, Central America and Peru.
	CC Gender-equitable control of productive assets and resources	FP4 Outcome: 20 development organizations adapting their plans and directing investment to increase women's access to, and control over, productive assets and resources through gender-sensitive climate-based advisories and	2017 – Four organizations adapt climate services communication strategy and training to support participation of women farmers. One organization in WA adopts insurance outreach and engagement strategy to support participation of women	Complete	Four organizations are at various stages of adapting CCAFS strategies to better support women farmers' participation in climate services and agricultural insurance. CARE adapted CCAFS' approach and tools to provide rural women with equitable climate services in 89 villages in Cambodia, Laos and Vietnam. Rwanda's national agricultural extension program is scaling up rural climate services through participatory processes that support female and male farmers in an equitable manner. USAID endorsed a CCAFS Info Note on gender-responsive climate services as part of its internal climate information services learning agenda initiative. Pula Advisors is adapting CCAFS' guidance on options for increasing the participation of women in agricultural insurance in Malawi.

		safety nets			
	CC Increased capacity for innovation in partner development organizations and in poor and vulnerable communities	FP4 Outcome: # of policy decisions taken (in part) based on engagement and information dissemination by CCAFS	2017 – Climate services and weather-related insurance are incorporated into training materials and processes (with FP1) to strengthen the capacity of at least one national partner in targeting, priority setting, policy and investment decision making capacities and articulating national priorities in global fora	Complete	Climate services and insurance were incorporated into national priority setting, policy, and investment processes, contributing towards policy in at least four countries. Honduras' Ministry of Agriculture initiated policy to reactivate its national Agricultural Insurance Committee. Nigeria's Ministry of Agriculture endorsed a national agricultural insurance strategy. Colombia established an inter-institutional process (involving three national partners plus NGOs) to support climate-based agricultural advisories through LTACs. Rwanda launched the process of developing a multi-sector national climate services policy framework, under the UN Global Framework for Climate Services.

* Milestones include both outputs, output use and outcomes along the impact pathways.

Table C: Cross-cutting Aspect of Outputs

Cross-cutting	Number (%) scored 2 (Principal)	Number (%) scored 1 (Significant)	Number (%) scored 0	Total overall number of outputs
Gender	8.42%	30.33%	61.25%	689
Youth	0.87%	15.24%	83.89%	
CapDev	4.21%	44.56%	51.23%	

Table D: Common Results Reporting Indicators

Table D-1: Key CRP Results from 2017, in Numbers

Sphere	Indicators *	Data	Comments
Influence	I1/I2. Projected uptake (women and men)/hectares from current CRP investments (for innovations at user-ready or scaling stage only – see indicator C1)	6.5 million farmers receiving climate-informed advisories (Philippines, Rwanda, Colombia; Senegal), receiving climate-smart seed (Ethiopia) or being part of a program that will deliver solar-based irrigation (India). Initial M&E results from Rwanda show that >85% of participating farmers (both women and men) change their farm or livelihood management in response to advisories, and share the information with >10 peers.	These numbers will be verified and benefits quantified through ep-IAs, starting with studies in 2018.
	I3. Number of policies/investments (etc.) modified in 2017, informed by CGIAR research	Two global policies, two regional policies, 12 national policies, two national legal instruments and three sub-national policies were informed in 2017. USD 21.5 billion in investments in solar irrigation and about USD 250 million in other CSA investments were informed.	At the global level, policies which were informed included the UNFCCC decision on agriculture and the implementation of the ITPGRFA, specifically the process of developing a new international system of plant germplasm exchange. At the regional level, the APEC Multi-Year Action Plan for Climate Change and Food Security for 2018-2021 and the CSA regional strategy for the Central American Integration System 2018-2030 were informed. At the national level, Bhutan, Burkina Faso, Costa Rica, Côte d'Ivoire, Guatemala, Nepal, Rwanda and Uganda adopted national policies and laws for implementing the ITPGRFA. In Madagascar and Benin, new laws were passed to enhance capacity to adapt

			to climate change by implementing the ITPGRFA and the Nagoya protocol. Rwanda initiated a national policy framework for climate services under the UN Global Framework for Climate Services, and Kenya launched the Climate Smart Agriculture Strategy 2017-2026. At the sub-national level, policies were informed in Vietnam, Colombia and the Philippines. Investments which were informed included USD 170 million in India for scaling up the Happy Seeder technology, USD 66 million in Colombia for scaling up CSA in Cauca, USD 1.2 million for scaling up UTFI in India, USD 1.6 million for CSA in Niger, USD 2 million for a regional CSA strategy for Central America, and USD 21.5 billion by the Indian Government to provide 2.75 million solar pumps to farmers and farmer cooperatives.
Control	C1. Number of innovations by phase - new in 2017	27 innovations: • One genetic innovation was available for uptake (Stage 4) • One biophysical innovation in piloting (Stage 2) • Three innovations on production systems and management practices (two in Stage 2 and one in Stage 3) • Seven social innovations (four in Stage 1, two in Stage 3, and one in Stage 4) • 15 innovations on research and communications methodologies and tools (five in Stage 1; two in Stage 2;	See table D-2 for details.

		two in Stage 3; and six in Stage 4)	
	C2. Number of formal partnerships in 2017, by purpose (ongoing + new)	195 partnerships: • 75 research partnerships • 24 policy partnerships • 96 delivery partnerships See table G for examples.	Partnerships are facilitated at various levels: globally (e.g. WBSCD), by Flagship (e.g. Global Research Alliance for Agricultural GHGs), and in-country (see examples in Table G).
	C3. Participants in CGIAR activities 2017	59 participants, including 19 women, were supported in long term training programs 14,217 participants (of which 41% were women) were supported in short term programs.	The number of participants supported through capacity development efforts is higher than 2016, when a total of 13,200 participants were supported. This means that efforts have continued to scale up in 2017.
	C4. People trained in 2017	2102 participants were supported through formal training programs, of which 697 participants were women.	Since the categories associated with formal training were not included in previous years, it is not possible to compare the results with previous years.
	C5. Number of peer-reviewed publications	CCAFS scientists produced 168 peer reviewed articles, of which over 88% (147) were published in ISI Journals and 73% (123) were confirmed open access.	CCAFS scientists produced 305 publications in 2017, including peer reviewed journal articles, policy briefs, books, book chapters and working papers. Of 168 peer-reviewed articles, over 88% were published in ISI journals, while 73% were open access. The overall number of peer-reviewed articles and number of publications in ISI journals were both a 25% increase over 2016 (134 peer-reviewed articles, of which 118 were in ISI journals). There was a 71% increase in the number of open access publications (up from 72 in 2016) and the percentage

			of total publications in ISI journals was also a significant increase from 54% in 2016. Overall, the download rates for publications in 2017 were much higher than in 2016. 2017's 25th most-downloaded publication's score is equal to 2016's 14th, and it is three times higher than the score of the 25th most-downloaded from 2016. In addition, CCAFS continued to build and maintain several open-access databases, for example: CCAFS-Climate, MarkSIM, AgTrials, Analogs, etc. In practice this translated into a total of 135,603 files being downloaded from CCAFS-Climate, which contains down-scaled Global Circulation Models (GCM) data (38.19 TB data downloaded; 22,964 total visits in which 55% of visitors were new).
	C6. Altmetric	In 2017, 818 (or 23.7%) of CCAFS' 3445 publications in CGSpace received social attention, according to Altmetric data. There were three publications (from all years) with Altmetric scores above 500 (see 'Top-scoring publications' below), and 25 publications with scores between 101 and 500. Among the 151 publications with mentions from 2017 only, one publication received a score of over 500, and three received scores between 101 and 500.	Social attention for CCAFS publications comes primarily from mentions on Twitter (8769), in news articles (775), in blog stories (576), on Facebook (480), and in policy (395), in that order. There are also a few mentions on Google+ (105). Based on these numbers, it appears that Twitter is the primary driver of CCAFS' Altmetric scores. The top scoring publication of all years, with a score of 1410, was "Planetary boundaries: Guiding human development on a changing planet" (Steffen et al.) in Science, published in January 2015. Mentions came primarily from Twitter (744). The second-highest scoring publication of all years, with a score of 820, was also the top scoring publication from 2017: "Natural climate solutions" (Griscom et al.) in PNAS, published in October 2017. It had the most mentions of any publication on Twitter (883). The score is particularly impressive given the recent publication date.

			Among the top 20 highest-scoring publications, Nature journals were the most common, with six publications in Nature Climate Change, one in Nature, one in Nature Plants, and one in Nature Communications. PNAS was the second most common journal, with four publications. More information is available in CCAFS' 2017 Altmetric analysis.

*Please note: I = Sphere of Influence and C = Sphere of Control

Table D-2: List of CRP Innovations in 2017 (From indicator #C1 in Table D-1)

Title of innovation (minimum required for clarity)	Phase of research	Novel or adaptive research	Contribution of CRP (sole, lead, contributor)	Geographic scope
Activation of subnational platform to broker institutional changes *(relevant outcome case study)*	Stage 4: Uptake by next users	Novel	Lead Contribution	National
Method that improved area selection and consistently enhanced forecast skill *(relevant outcome case study)*	Stage 4: Uptake by next users	Novel	Lead Contribution	National
Voice calls for remote data collection *(relevant outcome case study)*	Stage 4: Uptake by next users	Adaptive	Sole Contribution	Global
Climate Risk Profiles *(relevant outcome case study)*	Stage 4: Uptake by next users	Adaptive	Sole Contribution	Global
CSA Country Profiles *(relevant outcome case study)*	Stage 4: Uptake by next users	Novel	Sole Contribution	Global
Estimating minimum nitrogen requirements (N gaps) for yield gap closure and GHG mitigation *(relevant outcome case study)*	Stage 4: Uptake by next users	Novel	Lead Contribution	Regional
Climate Wizard	Stage 3: Available for uptake	Novel	Sole Contribution	Global

ClimMob, a digital platform for large-N on-farm experimentation with climate adaptation options	Stage 3: Available for uptake	Novel	Partial Contribution	Global
Policy augmented scaling model for a fully validated CSAP – the Happy Seeder technology to curb air pollution and build resilience	Stage 3: Available for uptake	Adaptive	Lead Contribution	Regional
Farm record keeping: A must-have tool for gender-enabled CSAPs scaling strategy for development	Stage 3: Available for uptake	Novel	Lead Contribution	Sub-national
Index measured gender equitable knowledge for CSAPs adoption ensuring food and nutrition security under climatic risks in Bihar, India	Stage 3: Available for uptake	Novel	Lead Contribution	National
Dynamical forecast model skill in the Colombian agricultural context – joint work between Fedearroz, IDEAM, CIAT-CCAFS and University of Leeds	Stage 3: Available for uptake	Adaptive	Lead Contribution	National
Demonstrating utility of global system for sharing genetic resources with national policy makers through local climate change vulnerability analysis	Stage 2: End of piloting phase	Adaptive	Lead Contribution	Multi-national
Innovative underground storage for mitigating water disasters and building climate resilience	Stage 2: End of piloting phase	Novel	Lead Contribution	National
Two-chamber gasifier cook stove	Stage 2: End of piloting phase	Adaptive	Lead Contribution	Regional

Multi-level ICT-based Smart Monitoring to track CSA performance and outcomes	Stage 2: End of piloting phase	Novel	Sole Contribution	Global
Satellite imagery as an alternative to collecting data through surveys	Stage 2: End of piloting phase	Novel	Partial Contribution	National
AloWeather – ICT tool for delivering agroadvisory service to farmers	Stage 1: End of research phase (Discovery/Proof of Concept)	Adaptive	Partial Contribution	Regional
Crop-loss assessment monitor	Stage 1: End of research phase (Discovery/Proof of Concept)	Adaptive	Partial Contribution	Sub-national
Allometric framework for estimating soil C sequestration on smallholder farmer fields	Stage 1: End of research phase (Discovery/Proof of Concept)	Adaptive	Lead Contribution	Regional
The Climate-Smart Agriculture (CSA) Compendium	Stage 1: End of research phase (Discovery/Proof of Concept)	Novel	Sole Contribution	Global
A new global data set on farm size distribution by country	Stage 1: End of research phase (Discovery/Proof of Concept)	Novel	Partial Contribution	Global
Policy-oriented national LED assessments	Stage 1: End of research phase (Discovery/Proof of Concept)	Adaptive	Lead Contribution	Multi-national
One farmer, one loan, one Internet of Things	Stage 1: End of research	Novel	Partial Contribution	Global

(IoT) rain gauge: piloting the industrialization of recyclable, USD 50 connected rain gauges in Africa	phase (Discovery/Proof of Concept)			
Perception of climate change and impact on land allocation and income: evidence from Vietnam's delta region	Stage 1: End of research phase (Discovery/Proof of Concept)	Adaptive	Lead Contribution	National
Assessing the potential of CSA in large rice field models in Vietnam	Stage 1: End of research phase (Discovery/Proof of Concept)	Novel	Lead Contribution	National

Table E: Intellectual Assets*

Year reported	Applicant(s) / owner(s) (Center or partner)	Patent or PVP Title	Additional information*	Link or PDF of published application/ registration	Public communication relevant to the application/registration

*Not applicable for CCAFS.

Table F: Main Areas of W1/W2 Expenditure in 2017

Expenditure area*	Estimated percentage of total W1/W2 funding in 2017**	Space for your comments
Planned research: principal or sole funding source	0%	In general, we do not fund areas of research only with W1/2. We set a strategy, fund them with W1/2 and also mobilize resources around those areas of research.
Planned research: leveraging W3/bilateral funding	62%	We do not like the term "leveraging" as it could imply less strategic use of W1/W2 funds.
Catalyzing new research areas	5%	There is a small amount of money in this, e.g. the new area of climate finance research. But in the future we would expect to also get bilateral funding for this strategic area.
Gender	10%	We expect gender to be mainstreamed in almost all projects; this percentage is only low because there are not many "principle" gender projects.
Youth	1%	We would expect this to grow in future.
Capacity development	5%	CCAFS theory of change requires that capacity development is in almost every project, thus we could say that it is 100% in every activity. Self-standing capacity building projects are not strategic.
Start-up or maintenance of partnerships (internal or external)	1%	Partnerships are in every activity of CCAFS. Very small amounts of funds are used for self-standing partnership activities.
Monitoring, learning and self-evaluation	5%	Each project has to implement MEL; central allocations are very small.

Evaluation studies and impact assessment studies	3%	This number will rise in 2018 as impact studies are identified for implementation.
Emergency/contingency	0%	No emergency/contingency funds.
Other	8%	Management costs, some global events, communications.
TOTAL FUNDING (AMOUNT)***	$18,207.98	

*Use these categories wherever possible, delete unneeded rows and add rows if none of these are suitable.

**we recognize that (i) some funding may fit more than one category but please try to apportion funding to its principal use and (ii) percentages may not add up to 100%

***Figures in thousands of US dollars.

Table G: List of Key External Partnerships

FP	Stage of research	Name of partner	Partner type	Main area of partnership
FP1, FP2, FP3	Phase 1: Research (Discovery/Proof of Concept); Phase 3/4: Scaling up and scaling out	WUR	Academic and Research	The CCAFS PMU was established at WUR and a number of areas of partnership were developed, including work on sustainable intensification of plant production in Sub-Saharan Africa, business models and financial incentives for CSA, biological nitrogen fixation for smallholders, and modelling of CCAFS scenarios.
FP2, FP4	Phase 1: Research (Discovery/Proof of Concept) Phase 2: Piloting Phase 3/4: Scaling up and scaling out	Indian Council of Agricultural Research	Academic and Research	Development, validation and scaling up of climate resilient farming systems. Capacity development and policy engagement for scaling investments for CSA. Development of post-flood management strategy, including index-based flood insurance.
F1, FP3	Phase 3/4: Scaling up and scaling out	FAO	Development organizations	Research, capacity development and policy engagement. Included joint engagement in UNFCCC processes, scaling out CSA at the regional and global levels, elaborating agriculture components of the NAPs and emissions from the livestock sector.
FP3	Phase 1: Research (Discovery/Proof of Concept) Phase 2: Piloting	Vietnamese Academy of Agricultural Sciences	Academic and Research	Joint work on GIS, setting up pilots in provinces, and policy engagement at the national level.

FP4	Phase 1: Research (Discovery/Proof of Concept) Phase 2: Piloting Phase 3/4: Scaling up and scaling out	Columbia University	Academic and Research	Scientific and partnership backstopping to the development of inclusive agricultural insurance products, including index-based insurance (piloting implementation in Honduras). Strategic and applied research, education, capacity building, and provision of forecasts and information products with an emphasis on practical and verifiable utility, and partnership. Participatory evaluation of CSA in different agro-ecological zones of SA. Installation and backstopping of ENACTS in national hydro-meteorological services (Ghana, Mali, Senegal), and yield forecasting with CRAFT.
FP1, FP2, FP4	Phase 1: Research (Discovery/Proof of Concept) Phase 2: Piloting	Institut de l'Environnement et de Recherches Agricoles, Burkina Faso	Academic and Research	Field-level testing of CSA options, and scaling up of efforts including through state funded programs.
FP2	Phase 3/4: Scaling up and scaling out	World Bank	Foundations and Financial Institutions	Linking CCAFS research to World Bank CSA investments, and exploring opportunities to test innovative finance mechanisms for incentivizing CSA activities.
FP1, FP3	Phase 3/4: Scaling up and scaling out	Ministerio de Agricultura y Desarrollo Rural (Colombia)	Government	Formulation, coordination and adoption of the policies, plans, programs and projects for the Agricultural, Fisheries and Rural Development sector, including scaling up of climate actions in agriculture.

FP4	Phase 1: Research (Discovery/Proof of Concept)	MARD (Vietnam)	Government	Development of agro-climate zoning maps and training local partners on seasonal forecasting in Dien Bien and Ha Tinh provinces, and sharing national climate data for the last 40 years.
FP4	Phase 2: Piloting	Agence Nationale de la Météorologie du Mali	Government	Joint agro-meteorological analyses at project sites, capacitation of national hydro-meteorological services in data management and analysis, ENACTS, PICSA, and (with ICRISAT) the Joint Agro-Meteorological Business Services Incubator (JAMSi).
FP2	Phase 1: Research (Discovery/Proof of Concept) Phase 2: Piloting	Centro Agronómico Tropical de Investigación y Enseñanza, Costa Rica	Academic and Research	Field implementation, evaluation and promotion of CSA practices and implementing PICSA. Focus on gender and social inclusion.
FP1, FP2, FP3	Phase 3/4: Scaling up and scaling out	WBCSD	Private sector	Scientific inputs into the CSA program, including metrics for measuring CSA progress, prioritization at the regional level, soil carbon, and global policy engagement.
FP1, FP2, FP4	Phase 3/4: Scaling up and scaling out	Council for Scientific and Industrial Research, Ghana	Academic and Research	Design and implementation of activities that promote the translation of CSA actions into policies, and facilitation of stakeholder engagement in Ghana.
FP4	Phase 2: Piloting	Agriculture Insurance Company of India Limited	Private sector	Development and scaling out of insurance products and engagement with the Ministry of Agriculture, Farmers and Welfare.
FP4	Phase 3/4: Scaling up and scaling out	Secretaría de Agricultura y Ganadería (Honduras)	Government	Technical unit strengthened and positioned in the Secretaría de Agricultura y Ganadería and the agri-food sub-sector, with technical and methodological capabilities that contribute to the sustainability and resilience of the actors.

FP2	Phase 3/4: Scaling up and scaling out	Rainforest Alliance	Development organizations	Incorporation of CCAFS climate science into the Rainforest Alliance voluntary certification scheme.
FP2	Phase 2: Piloting Phase 3/4: Scaling up and scaling out	Root Capital	Foundations and Financial Institutions	Integrating CSA approaches and exposure maps into decision-making by the Council on Smallholder Agricultural Finance responsible for approximately USD 750 million in annual lending to producer organizations.
FP1, FP2, FP3, FP4	Phase 1: Research (Discovery/Proof of Concept) Phase 3/4: Scaling up and scaling out	IIRR	Development organizations	Piloting and implementing CSA technologies and practices in the Philippines and Myanmar, and scaling up best practices to the national level.
FP4	Phase 2: Piloting Phase 3/4: Scaling up and scaling out	Manobi Société Anonyme	Private sector	Encapsulation of climate information and knowledge content generation inside business driven approaches utilizing the AIRMAP, BRISK and TARGET risk control modules of the agCelerant phygital value chain orchestration platform.
FP1, FP2, FP3, FP4	Phase 3/4: Scaling up and scaling out	IFAD	Foundations and Financial Institutions	Learning alliance for adaptation in agriculture, and joint efforts focused on climate-nutrition interface, scaling up private sector investments, gender transformative approaches, and South-South cooperation.
FP4	Phase 1: Research (Discovery/Proof of Concept) Phase 3/4: Scaling up and scaling out	CARE	Development organizations	Research on gender transformative approaches within IFAD's Adaptation for Smallholders in Agriculture program, and joint communications and engagement based on results.

FP1, FP2, FP3, FP4	Phase 2: Piloting Phase 3/4: Scaling up and scaling out	Philippine Federation of Rural Broadcasters	Development organizations	Develop radio campaigns for information dissemination and increased awareness on climate change and CSA in the Philippines.
FP1	Phase 2: Piloting	CSA Youth Network	Development organizations	Jointly address issues relating to youth capacitation for CSA implementation and scale out.
FP3	Phase 2: Piloting Phase 3/4: Scaling up and scaling out	Kenya Dairy Board	Other	Supporting Kenya Dairy Board and State Department of Livestock in developing a dairy NAMA and for submission to the GCF.
FP1, FP3	Phase 3/4: Scaling up and scaling out	GCF	Foundations and Financial Institutions	Informing the GCF strategy for investing in transformative actions in agriculture
FP1	Phase 2: Piloting	Future Earth	Academic and Research	Shaping the global initiative, the Food Water Energy Knowledge Action Network.

Table H: Status of Internal (CGIAR) Collaborations among Programs and between the Program and Platforms

Name of CRP or Platform	Brief description of collaboration (give and take among CRPs) and value added*	Relevant FP
Livestock	As part of the Learning Platform on "ex-ante evaluation and decision support for climate-smart options", work started on the impacts of climate change on feed and forages in livestock systems. This included strategic contributions to ILRI publications as well as dissertation work. Collaboration with ILRI FP5 (Livestock and Livelihoods and Agri-Food Systems) is continuing through joint activities in Ethiopia with USAID funding around the future of livestock systems in selected regions.	FP3 - Livestock Feeds and Forages
Livestock	CCAFS research on gender, livestock and dairy production connects with the Livestock and the CIAT Livestock+ project. Three online discussion forums were organized with Livestock on youth, CSA, agribusiness, ICTs and the SDGs.	Multiple
A4NH	FP1 collaboration with A4NH in 2017 involved work on joint publications on stock-takes on research into, and modelling of, climate change and nutrition in developing country production systems. These will be completed in 2018.	FP4 - Supporting Policies, Programs, and Enabling Action through Research (SPEAR)
Most AFS-CRPs plus PIM	As part of the Learning Platform on "ex-ante evaluation and decision support for climate-smart options", 2017 saw an Agricultural Systems special issue published (“Prioritising climate-smart agricultural interventions at different scales”) with nine papers on different tools with authors from eight CGIAR Centers and four of CCAFS’ strategic partners. A follow-up synthesis journal article was worked on and submitted for publication, describing a framework for assessing CSA research and action investments, involving seven Centers.	Multiple
A4NH	Evaluation of biofortified plant varieties in WA and LAM in the CSVs.	FP2 - Biofortification
PIM	We collaborate with PIM on the Weather-Related Insurance Learning Platform. Major activities include: 1) drafting joint concept paper on where CGIAR-wide expertise can best add value to external index-based agricultural insurance initiatives; 2) Learning Platform side event on Leveraging	FP4 - Social Protection for Agriculture and

	Science in Scaling Agricultural Insurance: Insights from CGIAR Research, at the 14th International Microinsurance Conference in Zambia in November 2018; 3) Insurance Learning Platform launching webinar series starting in August 2018. In addition, a PIM representative attended the Conference on Scaling Up Agricultural Adaptation through Insurance at SBSTA46 in Bonn in 2017 as well as a half-day meeting on partnerships and next steps towards scaling up index-based agricultural insurance.	Resilience
Maize, WLE	Representative from Maize CRP attended the Conference on Scaling Up Agricultural Adaptation through Insurance at SBSTA46 in Bonn in 2017 as well as a half-day meeting on partnerships and next steps towards scaling up index-based agricultural insurance.	FP4 - Sustainable Intensification of Maize-based Systems for Improved Smallholder Livelihoods WLE Variability, Risks and Competing Uses
Livestock	Evaluation of forages in LAM CSVs.	FP3 - Livestock Feeds and Forages
WLE	Evaluations in LAM and SA CSVs of soil efficiency of fertility management options.	FP1 - Restoring Degraded Landscapes
PIM, Wheat, Maize	PIM conducted evaluations in CSVs in SA on technologies/practices involving (Wheat CRP and Maize CRP).	PIM FP1 - Technological Innovation and Sustainable Intensification
WLE, FTA	As part of the Learning Platform on "Identifying priorities and options for low-emissions development including guidelines for GHG measurement," WLE, FTA and CCAFS facilitated 30 CGIAR scientists from seven Centers to exchange for the first time, soil carbon research results and identify future research priorities (June 2017 webinar). Results were shared in a blog widely shared by the CGIAR and in 4p1000 networks. WLE, FTA and CCAFS then held a workshop involving 14 scientists and program leaders from 7	Multiple

	Centers at COP23. Participants identified funding ideas, including carbon gap mapping, a soil carbon green list, and a study on the factors affecting farmers' decisions. Presentations on recent research and updates on soil carbon initiatives were shared. In 2018, WLE and CCAFS produced a needs assessments for a green list and engaged in fundraising conversations with several donors. One donor has asked us to submit a concept note.	
Rice, Livestock, Wheat	Synthesis journal article on synergies between adaptation and mitigation initiated with authors and case studies from six Centers (three CRPs), WUR and IRD. Article to be completed in 2018.	Multiple
Rice	FP3 contributed funds to IRRI for a larger Rice CRP effort to prepare a proposal on low-emission rice cultivars. CCAFS funds were used to review existing literature.	FP3: Sustainable farming systems
Maize, Wheat	CCAFS contributed to a journal article led by the Maize and Wheat CRPs on opportunities to mitigate GHGs through genetic modification of plants to include biological nitrification inhibitors (BNI). This has been part of a longer collaboration to raise attention to BNI and generate funding.	Wheat/Maize FP4 - Sustainable Intensification of Wheat-based/Maize-based Farming Systems
Livestock, FTA, WLE	As part of the Learning Platform on "Identifying priorities and options for low-emissions development (including guidelines for GHG measurement)," FP3 organized a CGIAR-wide webinar on livestock and MRV with the GCF to share results from ILRI, CIAT, CIFOR and UNIQUE Forestry research, and discuss how to best support NDCs and climate finance. This led to further discussion with the GCF and a CCAFS visit to GCF to continue discussions.	Multiple
Livestock, Rice, Wheat, FTA, Grains, Legumes and Dryland Cereals	Five Centers contributed emissions factors to the SAMPLES data platform. Several contributions were based on CLIFF-funded student research. In 2017 CLIFF students were hosted at six CGIAR Centers.	Multiple

Livestock	Representative from WLE attended the Conference on Scaling Up Agricultural Adaptation through Insurance at SBSTA46 in Bonn in 2017 as well as a half-day meeting on partnerships and next steps towards scaling up index-based agricultural insurance.	FP5 - Livestock and Livelihoods and Agri-Food Systems
Maize, Wheat, Livestock	Six Centers contributed journal articles to a special issue on Gender and Transformative CSA.	Multiple
PIM, plus multiple CRPs	The Learning Platform on "Gender, Agriculture and Climate Change" is hosted on the CGIAR Gender Platform. A consultation meeting was held with CRP gender researchers at the annual Gender Platform Conference in December 2017, where the sub-topics and recommendations for Platform focus and support were agreed on.	Multiple

*e.g. scientific or efficiency benefits

Table I: Monitoring, Evaluation, Impact Assessment and Learning

Table I-1: Status of Evaluations, Impact Assessments and Other Learning Exercises Planned in 2017 POWB

Studies/ Learning exercises in 2017	Type	Status	Comments
Responding to global change: A theory of change approach to making agricultural research for development outcome-based	Learning	Complete	Evaluated the theory of change approach to project planning and management. Published as peer-reviewed literature.
National food security act supports CSA in India by stimulating the sourcing of small millets	Impact evaluation	On-going	Initiated in 2017, due to be complete in 2018. The original Bioversity research that informed this policy demonstrated the viability of processing small millets into products with high market potential and high nutritional value, empowering women and reducing their drudgery, while supporting food security and climate adaptation.
CCAFS CSV approach synthesis of lessons learned	Evaluation	Complete	In the Phase II proposal, there was a commitment to do a review of lessons learnt in CSVs, with a view to making directional corrections. Some of the recommendations in this report are already being implemented, while others will be taken into account in the preparation of concept notes for the 2019 portfolio.
Assessing the influence of CCAFS' climate data and tools: findings from an outcome harvesting evaluation	Evaluation	Complete	The study demonstrated that CCAFS' climate data and tools are widely used even without specific promotion, consistent with CCAFS' mandate as a provider of international public goods.
Feasibility and validity of using mobile phone-based monitoring tools	Outcome validation study	Complete	This study was conducted to assess the role of the ICRAF research for the outcome case study: "World Food Programme uses mobile-based monitoring tools to guide programming in three countries, affecting up to 2.6 million persons"

Qualitative cost-benefit assessment of pilot climate information services in My Loi, Vietnam	Learning	On-going	Initial results showed that respondents strongly agreed or agreed that the seasonal forecast and agro-advisories benefitted their farm operations.
Evaluation of institutions, actions, and the political economy of ENSO responses in SEA countries	Learning	Complete	CCAFS-SEA, in partnership with IFPRI, provided detailed discussions on institutions, mechanisms, and past and present actions to build resilience and provide emergency response to ENSO-related shocks in Cambodia, Laos, Myanmar, Philippines, and Vietnam. Findings and recommendations were presented in five country reports. Final reports are currently being reviewed by the World Bank.
Role of different business models in scaling and adoption of Happy Seeder technology in Haryana and Punjab	Learning	Complete	This was linked to the outcome case study "CCAFS evidence on scalable CSA business models drove USD 170 million national policy investment in India to curb crop residue burning". It identified Farmer Service Providers (FSPs) as the key players to scale the use of the Happy Seeder technology, with FSPs to be targeted for policy support, timely subsidy disbursement, capacity building and credit support. FSPs and lead farmers are identified as flag bearers for the expansion of the area under zero-tillage wheat.

Table I-2: Update on actions taken in response to relevant evaluations (IEA, CCEEs and others)

Name of the evaluation	Recommendation	Management response - Action Plan	By whom	By when	Status
Evaluation of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) (facilitated by IEA in 2016).	Amongst others: "publish in peer-reviewed journal critical reviews and lessons regarding CSVs in regard of their effectiveness to support climate smart solutions."	Publications have appeared as well as a more detailed lessons learning document that has been tabled at a CCAFS management meeting.	CCAFS Management	Publication in 2017, lessons learnt document completed in 2017, tabled at management meeting in 2018.	Complete

Table J: CRP Financial Report

	Planned Budget 2017*			Actual expenditure*			Difference*		
	W1/W2	W3/Bilateral	Total	W1/W2	W3/Bilateral	Total	W1/W2	W3/Bilateral	Total
Priorities and Policies for CSA	$3,631.63	$8,580.02	$12,211.64	$3,360.53	$6,977.08	$10,337.61	$271.10	$1,602.94	$1,874.04
Climate-Smart Technologies and Practices	$5,413.07	$24,838.67	$30,251.74	$5,061.03	$17,235.80	$22,296.83	$352.05	$7,602.87	$7,954.92
Low emissions development	$4,578.77	$9,309.18	$13,887.95	$4,223.07	$6,535.30	$10,758.37	$355.71	$2,773.87	$3,129.58
Climate services and safety nets	$3,537.53	$8,494.99	$12,032.51	$3,311.68	$6,374.33	$9,686.01	$225.85	$2,120.65	$2,346.50
Strategic Competitive Research grant	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
CRP Management & Support Cost	$4,485.00	$147.00	$4,632.00	$2,251.68	$436.87	$2,688.55	$2,233.32	($289.87)	$1,943.45
CRP Total	**$21,646.00**	**$51,369.85**	**$73,015.85**	**$18,207.98**	**$37,559.39**	**$55,767.37**	**$3,438.02**	**$13,810.47**	**$17,248.48**

*Figures in thousands of US dollars.