Level n-2 Cluster Activities	Expected results of planned key activities	Actual results
1.1 Adaptation of farming systems	In 2014 the following milestones will be achieved: • Analogue based evaluation and conservation of germplasm and generation of community-level adaptation strategies of at least 2 crops supported in a minimum of 6 analogue sites in Kenya (ICRAF) Uganda, Rwanda, Burkina Faso, Cote d'Ivoire, Costa Rica, Guatemala, Nepal and Bhutan (Bioversity).	• The climate analogue based evaluation of germplasm was conducted in Bihar and Andhra Pradesh (for pigeon pea), in Madhya Pradesh, Uttar Pradesh, Maharashtra (for wheat), and Andhra Pradesh, Karnataka, Maharastra and West Bengal (for Chickpea). Development of risk analogue maps for the selected crops was completed (Bioversity). In Kenya, Uganda and Tanzania, provenance specific recommendation domains for current and future climates of four important tree species were tested using early screening and translocation trials across environmental gradients. These trials have been handed over to the national partners (ICRAF). ICRAF's open source and interactive modelling and mapping system to predict future shifts of suitable cultivation zones for agroforestry fruit species has been tested in Kenya and led to 2 the introduction of 2 new varieties of mango (among others), currently being propagated by the Kenyan Agricultural Research Institute. In Uganda, Rwanda, Costa Rica, Guatemala, Burkina Faso, Cote d'Ivoire, Nepal and Bhutan, potentially well adapted germplasm linked to analogue sites continued to be tested in participatory trials providing evidence on the potential value of facilitated access mechanisms. More than 100 trained government officials, public sector researchers, university professors and technical staff of non-government organizations from these 8 countries are applying geo-spatial tools and data to their national contexts, assessing the changing needs for national and foreign-sourced plant genetic resources, and integrating these new strategies into organizational agendas to be implemented with own resources (Bioversity).
	• Researchers, national and local partners and development agents trained on socially and gender-sensitive methods and strategies for incorporating the gender lens in agricultural innovation, the conservation and policy planning processes within the climate change context in Bangladesh (WorldFish), Colombia, Peru, Senegal, Tanzania, Uganda (CIAT).	• A WorldFish project analyzed intra-household impacts of climate hazards and risk in Vietnam, Cambodia and the Philippines. In the technical report, WorldFish highlighted the internal dynamics of decision-making within the household and among household members. In another activity, WorldFish has put into practice the implementation strategy of Indonesia and Philippines on integrated ecosystem approach to fisheries (EAF). CIAT in collaboration with IITA and ICRAF developed and tested a new CSA Rapid Appraisal (CSA-RA) tool which looks at CSA practices with a gender lens. The tool delivers insight on access to resources, division of labor and decisions making within the families and specifically among men and women. The results of the appraisals are informing two large IFAD investment loans, in Uganda the ASAP PRELINOR project and in Tanzania the SAGCOT corridor investments. In Vietnam, researchers and development agents were trained on socially and gender sensitive strategies using the

		Talking Tool Kit in the climate Change context (ICRAF). Promotion continues with its expected use in the climate-Smart Villages and other CCAFS projects.
	• Gender-sensitive and socially differentiated knowledge, options strategies and guidelines developed for conservation and use of local biodiversity within the climate change context in Bangladesh, Vietnam, Uganda, Kenya, Tanzania, Ghana, Senegal, Morocco, Colombia, Nicaragua (WordlFish, IFPRI, ICARDA, CIAT); findings presented in journal article and policy brief	• Guidelines for collecting data and build an evidence base regarding gender and adaptation to climate change were developed and tested, in the form of a questionnaire (and manual for its implementation). They will then be adapted and implemented in various CCAFS sites to better understand important gender relations that impact women's empowerment and adoption by men and women of various adaptation (or CSA) practices. The piloting in Uganda and Tanzania, involved first identifying sex-differentiated vulnerabilities to climate change and then using that information to evaluate adaptation strategies in terms of equality and empowerment of poor women and men farmers. In the major wheat growing areas of Morroco, an ICARDA project performed a deep gender analysis to understand differential climate change impacts on adaptation strategies in two rural communities where (low and high) male migration has become the only alternative livelihood strategy. This research revealed interesting insights into how gendered roles and norms, and women's empowerment are changing within the communities due to CC related migration. Bioversity based activities on the potential of neglected and underutilized crops to contribute to climate resilience of rural households in Nepal and Bolivia included gender-disaggregated assessments of performance of target crops designed to better understand perceptions by women and men farmers of valuable traits and how these can be leveraged in coping strategies.
	• Accessions identified with potential adaptive traits for climate change adaptation for at least 5 crops (sorghum, pigeon pea and cowpea– durum wheat, buckwheat, oat, common beans) using innovative methods and prioritized on the basis of traits with potential benefits for the poor and women users in Tanzania, Ethiopia, Kenya Rwanda, Uganda, Honduras and China (Bioversity). • Methods and tools for participatory, gender-responsive monitoring of deployment of biodiversity and knowledge by communities for climate change adaptation tested out in Uganda, Rwanda, Burkina Faso, Costa Rica, Nepal (including gender-disaggregated community surveys (Bioversity); findings synthesized in a report	• Multiple adaptation options are at different stages of development, from initial trialling in pilot sites, through to broader scale promotion. Among the suite of technologies and practices assessed are: o In Bihar, India, of 1172 rice crowdsourcing packets, 342 were provided to women farmers (29%), most of them members of a women's group. Of 15 PVS trials in Vaishali, 2 were with women farmers (women farmers' land holdings are generally very small — about 1 hectare — which makes it difficult for them to conduct PVS trials). In addition, women made up about 40% of participants of trainings in situ for seed production and conservation. Data from other areas is forthcoming. o New fodder shrubs species with drought resistance and high nitrogen fixation potential were identified and tested by ICRAF in Kenya and Uganda and are been considered for upscaling through extension strategies and a volunteer farmer trainer approach. o 24, 15 and 9 new genotypes of rice, beans and maize respectively have been

	• Release of a first version of a CSA practices and technologies compilation in web interface, including information on likely benefits to food security, adaptation and mitigation with associated evidence; tool promoted for use by multi-lateral climate finance donors and national governments (CIAT, ICRAF).	evaluated with producer organisations in Colombia, identifying not only best yielding varieties under optimal conditions, but also stable yielding varieties under scenarios of significant climate variability. Some of these genotypes are now undergoing the process of varietal release. o In EA and South Asia, CIMMYT was engaged in targeted dissemination of adapted maize varieties with tolerance to heat and drought and in the testing of CA and CSA portfolios across more than 50 CSVs in India. o Bioversity's Seeds for Needs work aimed to improve farmers' access to information and seed material: More than 400 new farmers from 24 villages in Ethiopia, Kenya, Rwanda, Tanzania and Uganda were trained on the use of crop diversity to adapt terminal drought; durum wheat production practices. Through multi-location trails, 36 accessions (32 landraces and 4 improved durum wheat varieties) were evaluated to identify candidate landraces for national release. Seeds for needs research disaggregated data from male-headed and female-headed households and actively involved women in variety evaluation, especially for culinary aspects of bean varieties in Central America. In Papua New Guinea women participation in germplasm selection and dissemination was ensured by the Women in Agricultural Development Foundation, assisted by private industries such as the Fresh Produce Development Agency (FPDA) and Allele Fresh Produce. In Yunnan and Sichuan provinces in China local women were invited to participate in the evaluation of 6 varieties for each of buckwheat and oat in the field trials. o New ways of trialling adaptation options have also been implemented through research and innovation platforms that systematically learn from the bottom-up. Bioversity work on crowdsourcing now have networks of >10,000 farmers sharing their perspectives on a wide range of seed varieties in different climatic zones across three continents. Testing included the performance and drought resistance of local and improved varieties of dorum wheat (Ethiopia, Kenya, Rwanda, Tanzania and Uganda), wheat (India: in Bihar, Uttar Pradesh, Madhya Pradesh, Chhattisgarh); buckwheat and oat (China, Papua New Guinea) and rice (Laos and Cambodia). • The CSAP toolkit supports wide range of analyses ranging from food security assessment to preparation of climate smart development plans. The national partners from Nepal and Bangladesh are actively involved in preparation of databases and use of CSAP toolkit. Ministry of Panchayati Raj in Gandhinagar, Gujarat. At the meeting, features of the Climate-Smart Agriculture Prioritization (CSAP) Toolkit were introduced to policymakers and it was emphasised how climate-smart agriculture could be integrated into the local development plans in order to adapt farmers to climate change. A number of activities focussed on assessment of

	• Initial identification, evaluation and promotion of CSA practices in Kenya, Philippines, Tanzania, Mali, Vietnam, Nicaragua (ICRAF, CIAT).	application domains of options. A highlight of this work is the Compendium of CSA, a literature-based database of climate smart practices and technologies across developing countries. Structured in a way that permits comparable statistics to be generated on a range of practices and technologies which are organized in a typology, the CSA compendium is making sense of the enormous amount of studies to be able to answer just how climate smart a practice or technology is. In 2014, the Compendium documented 16,254 articles, fully reviewed 6100 and organized them in a formal database. The first articles to come out of this are under preparation. The compendium is also complemented by AgTrials, the CCAFS repository for trial information generated both within the CCAFS program and by partners looking to share trial data publicly. With more than 34,900 trials on 40 technologies Agtrials gathers contributions from 99 countries across the globe. In Kenya, CIFOR and ILRI developed a database and a tool that, combining expert opinion and existing information, can support the targeting of CSA practices and guide the implementation of the Kenyan climate change action plan. The tool captures stakeholders opinion and their ranking of vulnerability to climate change and preference of CSA practices to address the effects of climate change. The climate secretariat selected a real case to apply the method developed with the participation of all the sectors. Results of the last consultative workshop showed that there is interest across the sectors to link vulnerability with CSA, and that the tool and databases can inform ongoing projects at national and more local level. In 2015 the use of the developed products will be explored in Kenya and the applicability tested in Uganda. • Many different activities are being pursued under this set of activities. o Outscaling of adaptation options that have been identified as beneficial through farmer field and experimental plot studies include: o IRRI-CCAFS have taken further steps in disseminating the technology Alternate Wetting and Drying (AWD) of rice by introducing it in the Bac Lieu province through large scale field models (LSFM) and conducting an effectiveness assessment. This has paved the way for easier and faster implementation of the One Must Five Reduction Program of the Department of Agriculture and Rural Development o Laser levelling in South Asia has also been promoted heavily, with significant adoption levels. The benefits of laser land levelling has been well documented in previous years of CCAFS activities, including in climate smart villages. o Supplemental irrigation evaluation took place in previous years in the CCAFS program, and this year ICARDA have been broadening the work to combine with other practices to enhance benefits, and national level promotion of the technology in Morocco to significant success

		○ Previous studies showing heavy impacts of climate change on coffee and cocoa by IITA and CIAT are spurning a range of adaptation efforts in East Africa and Central America, including efforts on intercropping and livelihood diversification.
1.2: Breeding strategies for addressing abiotic and biotic stresses induced by climate change	In 2014 the following milestones will be achieved: • Integrated assessments of climate change impacts on agricultural systems and food security conducted using AgMIP protocols and simulate benefits of plausible adaptation packages at representative sites in Burkina Faso, Ghana, India, Mali, Niger, Senegal, Kenya, Uganda, Tanzania Mozambique, Malawi, South Africa, Zimbabwe (ICRISAT),	• Since the inception of CCAFS, great strides have been made with understanding the impact of climate change on crops, livestock and to a lesser extent, fisheries. In 2014, CCAFS authored a paper in Nature Climate Change which synthesized what we know about impacts on crops. The database behind the paper is currently being incorporated onto an online platform (AgImpacts) for querying climate impacts for specific crops and in specific geographies. Great knowledge on climate impacts have also been produced specifically in 31 crops using the EcoCrop model and applied across Africa to understand the implications of +2^{o}C and +3^{o}C. This work is projected to contribute to a submission to SBSTA in 2015. Training workshops were conducted in Laos and Vietnam.
	• Appropriate protocols, geospatial analysis, web-based platform and crop simulation models in yield gap assessment developed for major staples (at local, regional, and global scales) for assessment of current and future food security and potential for sustainable intensification in Bangladesh, Burkina Faso, Ghana, India, Mali, Niger, Nigeria , Kenya, Uganda, Tanzania (ICRISAT),	• Supporting assessment work for output 1.2 includes integrated assessment modelling approaches to evaluate efficacy of climate smart practices and technologies as well as climate change effects on pest population dynamics. ICRISAT collaborated actively in AgMIP and the Global Yield Gap Atlas (GYGA), which have delivered enhanced modelling capacity for a range of drylands crops across Africa. These approaches are now being used to assess efficacy of specific practice changes (e.g. shifting of planting, incremental changes in fertilizer application rates, etc) and simulate benefits of plausible packages or more drastic systems reconfigurations (technical, institutional and policy options) in adapting to a variable and changing climate. Efficiency frontier analysis has also been carried out in cereal based systems in East and Southern Africa to identify the farm level efficiency to multiple production factors under current and possible future climate scenarios.
	• Models validated, technologies and strategies tested to significantly reduce pest- and disease risks in cereal and legumes induced by climate change in Kenya, Nigeria Tanzania, Uganda, and Peru (soybean rust, tomato bacterial blight and banana weevil- IITA).	• Work on this has been slow to progress.
	• Vulnerability assessment and abiotic constraint identification of 28 globally important crops to provide additional information of traits required to help adapting crops to climate change (CIAT).	• Using the Ecocrop model, the vulnerability assessment of abiotic constraints of 28 globally important crops is still ongoing and it's been done in collaboration with the University of Leeds. Suitability analysis considered both Global and Regional cultivars. Results so far have led to a Report "Sub-Saharan African agriculture in a +4 ºC world" completed and is being reviewed for delivery to key policy / technical bodies (i.e. COMESA) and a paper to be submitted. Also a Master Thesis addressing "What is the extent of transformational adaptation required in Africa : Changes in crop suitability at

		high levels of global warming reveal agricultural cul de sacs. ICARDA have continued to develop the FIGS (Focused Identification of Germplasm Strategy) methodology under CCAFS, including new algorithms and new data sets that enable to efficiently screen for CC related abiotic traits (drought, heat and cold) in germplasm collections. In 2014, this ongoing activity delivered new germplasm subsets grown to identify the sough-after traits (including complex traits such as root traits in relation to salinity tolerance) and launched a new platform for evaluation of PGR subsets involving universities and research institutions globally. The results and potential of the tool were demonstrated in several fora (including the Lillehammer (Norway) International Conference on "Genetic Resources for Food and Agriculture in a Changing Climate") and in a workshop on applied mathematics to genetic resources carried out in Rabat (Morocco) that led to the publication of numerous articles in the media including BBC.
	• Set of "virtual crops" designed and assessed for their efficacy in addressing the likely future conditions in terms of the economic, social, and cultural benefits expected; findings presented in summary report and journal article. Engagement of ARI modelling groups (e.g. Leeds University), NARES scientists.	• CIAT/Leeds work also focused on Assessing robustness of climate impacts using perturbed-parameter and multi- crop model ensembles and a publication on the effects of scale on climate change impacts on crop yields "*Crop yield response to climate change varies with cropping intensity". Research on the u*sefulness of climate information for crop breeding is ongoing and expected to be completed in 2015 and led to 2 journals published in the Special Issue of Journal of Experimental Botany: Developing genotypic adaptation strategies using crop models. *J Ramirez-Villegas and A Challinor;* Variation and impact of drought stress patterns across upland rice environmental groups in Brazil. *AB Heinemann, C Barrios Perez, JC Medeiros, D Arongo, O Bonilla-Findji, J Ramirez Villegas and A Jarvis.*
	• Draft Banana sector climate change adaptation planning strategy developed in Philippines (Bioversity); effects of climate change on geographic distribution and severity of major pests and diseases of banana modeled and validation begun at global, regional and national levels in EA, WA, LAM and SEA (Bioversity)	• Bioversity also developed a simple leaf emergence based model for the banana crop, an important tool for assessing impacts as banana is notoriously lacking of a mechanistic crop model to assess impacts. This model, along with other empirical approaches, is contributing to the delivery of risk profiles for the banana sector in Latin America, Africa and Asia in order to support management decisions under a variable climate.
	• Understanding and evaluating the response of wheat to climate change in time and space, and generating comprehensive breeding strategies for wheat improvement through a combination of modeling, expert consultation and stakeholder dialogue (CIMMYT).	• Further work in Zimbabwe by CIMMYT has also lead to the Crop Breeding Institute incorporating heat tolerance into their breeding activities in maize. CIMMYT research has been instrumental in changing the national crop breeding institute's policy on maize breeding and on the ongoing effort on redefining the 5 natural regions that form the basis of all governmental recommendations to farmers. • CIMMYT evaluated the wheat response to climate change and levels of expression of traits required to maintain productivity across the range of stress profiles in Pakistan and made good progress in model's improvements including the addition of code for the DSSAT-CM-SERES-wheat model which accelerates leaf senescence as a function of

		high temperature. The outputs from crop models will determine which aspects of growth will be most affected which can help define the key characteristics of analogue sites (approximations of a range of target environments). This work is supporting the development of a phenotyping platform with NARS allowing them breeding for plausible future climates.
	• Appraisal of conservation status for 80 crop wild relative genepools and identification of priorities for germplasm collecting in the face of climate change; findings published in journal and datasets available through online interface (CIAT)	• CIAT's efforts with the Global Crop Diversity Trust to identify priority crop wild relative genetic resources for conservation and use finalized the research phase in 2014. A database of <6,000,000 accessions of over 1,000 crop wild relative species of importance to global food security were mapped out and their conservation status established. A high-level paper is currently under preparation summarizing the findings. The outputs of this research are being used to direct collecting efforts by Kew and other partners in 15 priority countries in 2015. • Two major outputs were achieved in terms of breeding strategies. In partnership with EMBRAPA, CCAFS developed a target population environment modelling framework for assessing impacts of climate change on specific breeding target populations, and the means to evaluate different breeding objectives and understand the impacts in terms of mitigating climate impacts. This work, developed for rice in Brazil and Colombia, is influencing the breeding priorities for the EMBRAPA rice program, and the FEDEARROZ and CIAT rice programs in Colombia.

1.3 Adaptation strategies: policy and institutional frameworks	In 2014 the following milestones will be achieved: • Socially and gender- disaggregated participatory methods tested in Kenya, Ghana for grounding climate change model results to community-level decision making processes that address food security issues; Policy recommendations on livelihood-based gender-equitable risk management strategies aiming at reducing vulnerability to climate change in rural small-scale maize households in Kenya.	• As part of the efforts to improve adaptation planning capacity, CIAT and CCAFS East Africa in collaboration with the Agricultural Research Institute (ARI) held a new Analogue training workshop in Tanzania to build capacity of p*olicy makers and researchers from National Agricultural Research and Extension Systems (NARES), Universities and Government Ministries on the* potential applications of the tool that now allows the inclusion of socio-economic data. At the local level, farmers and stakeholders from 2 climate-smart villages in Kenya moved towards its implementation to explore future climate change scenarios and impacts on their resources and held a pre-planning workshop leading to the design of a new farmer exchange visit to analogue sites with possible learning opportunities
	• Development and testing of a national CSA prioritization tool for targeting climate adaptation investment in Mali, Vietnam and Nicaragua; Mainstreaming climate science (scenarios, CSA-technologies and practices) into the national sectorial policy plan for agriculture in Mali, Senegal and Burkina Faso.	• In Guatemala and Mali, in collaboration with national level government stakeholders, the development and testing of a national CSA prioritization framework and tool for targeting climate adaptation investment was initiated. Both pilots finalized the first phase of the prioritization process which produced a wide range of outputs such as Guidebooks, Workshop reports, Lessons learned; Communications products. Following the piloting of the CSA prioritization approach in Mali, the European Union, Swedish Embassy, Sikasso regional Council, Sahel Eco (NGO), Coordination group for arid zones, have expressed strong interest to use the results to guide their investment in agricultural development in Mali, with a strong risk-reduction focus. The process is coordinated by the Mali science-Policy dialogue platform, facilitated by CCAFS. Vietnam work is ongoing. Some early outputs of a suite of planning and prioritization approaches were also produced in 2014: CSA country profiles and the CSA prioritization process. CIAT and CATIE, with the support of the World Bank and the active participation of government ministries and agencies , private sector and civil society from Argentina, Colombia, Costa Rica, El Salvador, Grenada, Mexico, and Peru, jointly developed 7 country profiles "knowledge baselines" and two sub-national ones, that assess the current CSA environment in the region.
	• Systemic Framework for Integrated Adaptation Planning into the resilience and adaptive capacity of socio-ecological systems to climate change across social, institutional, economic and environmental scales and levels, successfully piloted in Ghana and Nepal.	• The final year of the Systemic Framework for Integrated Adaptation Planning- (SIA) project jointly developed with the University of Adelaide and the University of Oxford, produced site specific contextual insights as well as drawn out scalable and replicable features which can guide regional, national and international climate adaptation policy, planning and decision-making processes. The social lens analysed the socio-cultural, class, caste and gender components of adaptation and food security. As part of the Ghana piloting, a Multi-level Adaptation Planning Workshop was held in Ghana, in partnership with CSIR aiming to overcome disconnects in the flow of knowledge, experience and resources across levels -from households, district, region to national- and co-identify opportunities for greater alignment in Ghana's climate adaptation

		regime. Three CCAFS Working Papers and 3 journal articles came out of this work (Nepal and Ghana cases). The Toolkit produced (Systemic Integrated Adaptation: Community Diagnostic, Prioritization and Planning Toolkit: A guidebook for researches and adaptation practitioners working with local communities) has been integrated into a UNEP World Conservation Monitoring Center (WCMC) program in West Africa. 20+ Government agency staff persons in Senegal and Gambia were trained on the use of the methodology for use with communities living in protected area.
	• Climate change vulnerability analysis and set up of CSA R4D engagement platform to inform NAMA and NAPs and to guide IFAD national investment programs in Uganda and Tanzania (CIAT).	• ILRI conducted a systematic literature review on local vulnerability to climate change which found substantial heterogeneity in frameworks, concepts and operationalizations, and highlighted the need of greater conceptual coherence and empirical validity to ensure comparability of vulnerability measurements. The main outputs of this work, published as working paper # 97, include: the recommendation of a systematic program of testing and validating vulnerability measures before institutionalizing them in programmatic contexts, and the proposal of an approach to track vulnerability through a set of indicators that mix some form of (objective) asset/ poverty measures at the household level with (subjective) governance and policy factors at community and national levels • Using the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) as case study, CIAT in collaboration with IFAD, developed and tested the CSA Rapid Appraisal (CSA-RA) methodology designed to assess key barriers and opportunities to CSA adoption across landscapes. An interactive platform for feedback loops and a mobile application for the monitoring of demo plot activities in ongoing CIAT led projects were also developed and tested. The results of the appraisal are informing two large IFAD investment loans, in Uganda the ASAP PRELINOR project and the SAGCOT corridor investments in Tanzania.
	• Community-based holistic adaptation options trialed in at least three sites in Kenya, Bangladesh, Uganda and Vietnam, in order to understand the social (including gender), cultural, economic and institutional barriers to effective adaptation; outcomes presented in summary report (WorldFish, CIAT, IFPRI)	• The social barriers and gender dimensions of these practices and technologies are also being assessed in India and East Africa (Bioversity). In 3 countries (Ghana, Colombia and Tanzania), CCAFS evaluated the primary socio-economic barriers to adoption of best bet adaptation options and publishing the findings in a series of working papers. The gender dimensions of water-related management technologies were also comprehensively assessed through household surveys in Nepal, Bihar and West Bengal.
	• Sector specific adaptation strategies and plans produced based on socially and gender-differentiated adaptation options using cost/benefit analysis in at least 4 countries, results shared with key policy makers in target countries.	• Several activities and outputs were completed: o Multi-year efforts came to fruition in Colombia during 2014. Research outputs were used in the Colombia National Adaptation Strategy by the National Planning Department (DNP), the Institute of Hydrology, Meteorology, and Environmental Studies (IDEAM), and the National Disaster Risk Management Unit (UNGRD). They also led to DNP and the Ministry of Agriculture and Rural Development (MADR) to

		draft a proposal to invest on adaptation and mitigation and to include a strategy for CSA in the National Development Plan 2015-2019. o In 2014, IWMI contributed to Sri Lanka 3rd national communication on climate change and to the formulation of the National Adaptation Plan. Sustainable water storage scenarios for the country to adapt to current and future climate variability are under evaluation using two contrasting river basins as case studies with a vision to design a storage development plan for the entire country. o CCAFS SEA was given the opportunity to contribute in the finalization of Cambodia's action plan on the impact of climate change in agriculture, fisheries and forestry. This action plan has now been adopted by the country and CCAFS is participating in implementing it by helping Cambodia link up with donors. CCAFS SEA was also involved in the drafting Myanmar's country CSA strategy wherein a draft is ready for wider circulation. It also worked closely with national government partners Laos, Philippines and Vietnam in strengthening programs on climate change in agriculture through dialogues and active engagements; and with the ASEAN GIZ/ GAPCC program on climate change to advocate link up of the CCAFS program in the proposed 10 year strategy paper of the ASEAN on Food, Agriculture and Forestry (ASEAN Guiding Paper). o Additionally, adaptation strategies and policies at the national level of Vietnam were analyzed by IFPRI and in the Philippines; CIP integrated a climate change perspective in the Farmer Business School (FBS-CC) with the engagement of government institutions, CC experts, NGOs, and local government units.
	• Technical contributions to international processes support the development of international policies enabling access to and use of genetic resources in climate change research and adaptation strategies (Costa Rica, Guatemala, Uganda, Rwanda, Burkina Faso, Cote d'Ivoire, Nepal, Bhutan (Bioversity).	• In Burkina Faso, Bhutan, Costa Rica, Cote d'Ivoire, Guatemala, Nepal, Rwanda, and Uganda important efforts to strengthen national capacities to implement the International Treaty on Plant Genetic Resources for Food and Agriculture translated into the training of more than 100 practitioners (government officials, public sector researchers, university professors and technical staff of non-government organizations) on the use of geo-spatial tools (incl. Climate Analogue) to design new strategies, to identify, access and evaluate potentially adapted germplasm for future climate scenarios. • Bioversity worked to influence development of policies to support increased availability and use of agrobiodiversity to adapt to climate change led to the production of Technical inputs to inter- sessional ITPGRFA processes and to a comparative analysis of the current mechanisms under the international agreements, and the degree to which they contribute to capacity building, technology transfer and information exchange. The analysis also included the role and involvement of the CGIAR centres. A side event on 'Mutually supportive implementation of the Nagoya Protocol and the Plant Treaty', was also held at the Convention on Biological Diversity

		- COP12, Biodiversity for sustainable development in Pyeongchang, Republic of Korea. • As part of its work on enabling environments and supporting government and non-government agencies on the planning, implementation and regular monitoring of CSB activities, Bioversity provided technical inputs to Bhutan's National Biodiversity Centre (NBC) that led to the production of Guidelines for CSB. In Central America, Bioversity contributed to the 'Strategic Action Plan for Strengthening the Role of Mesoamerican Plant Genetic Resources for Food and Agriculture in Adapting Agricultural Systems to Climate Change,' which was approved in 2014 by the ministers of agriculture of six countries, and it included the community seed banks central as a key adaptation strategy. • In 2014, Bioversity completed a global review on community seed banks and produced more than 40 detailed case studies which reflect promising policy changes taking place around the globe in support of community seed banks (CSB) and their roles in adapting to climate change. This work published in a book chapter and peer reviewed article, identified strengths, weaknesses and opportunities of CSBs, analyzed effects of current policies and suggested strategies and ways forward to improve them.
	• Knowledge generated in Nepal and India to provide policy support for community genebanks: using diversity for climate risk management (Bioversity). • Model-generated simulation of climate-change driven impacts on key sectors of India's agricultural economy and policy implications determined for interventions at the micro and macro level (IFPRI)	• Outcomes were also reached at national level in Nepal with the adoption of the National Agricultural Biodiversity Policy and the National Biodiversity Strategy and Action Plan (NBSAP), which creates a legal space for implementation of the multilateral system of access and benefit-sharing. In Uganda, an interministerial policy across three ministries was proposed to allocated mandates for mutually supportive implementation of the Nagoya Protocol and the ITPGRFA. • In India, as a result of research and policy engagement by Bioversity International and its partners, showing the value of small millets, the government started to implement the National Food Security Act, targeting more than 800 million people. This new law supports CSA by stimulating the inclusion of several food grains (called "coarse grains") which are more resistant to climate-induced stresses than wheat and rice, into publicly funded food distribution schemes. Analysis of other sectors is ongoing.
2.1: Innovations that enable rural communities to better manage climate-related risk	In 2014 the following milestones will be achieved: • Synthesized knowledge incorporated into climate risk management practice through: (a) publications on regional risk management strategy comparison, gender-based risk preference implications, and gender-differentiated risk management strategies in E Africa maize-legume systems; (b) publications, manual (Malawi) and demonstration of	• For E Africa maize-legume systems, CIMMYT submitted journal manuscripts on regional comparison of farmer adaptation strategies to drought, and gender-differentiated risk management strategies. ICRAF produced a manual and draft journal article on resilience through agroforestry in Malawi; and conducted training workshops on enhancing adaptive capacity of smallholder farmers in the Philippines. ILRI produced a draft journal paper on determinants and patterns of demand, and report on remote sensing

	government land use planning (Philippines) around resilience through agroforestry; and (c) process manual, and publications on gender, determinants of uptake, and index design for index-based livestock insurance for Ethiopia.	contributions to index design for index-based livestock insurance for Ethiopia.
	• Analyses of climate-related vulnerabilities incorporated into strategic planning and policy through: (a) regional action plans for improved resilience to cyclone/typhoon impacts in S and SE Asia; and (b) flood impact mapping, globally and particularly South Asia, formulated for use in flood insurance.	• For S Asia, IWMI published regional flood risk maps, advanced development of a regional drought monitoring system, and engaged several initiatives connected with the global disaster risk reduction community. IRRI made progress in analyzing cyclone impacts on rice-based systems, but did not report progress on integrating it into regional action plans.
	• Household bioeconomic modeling applied by 4 Centers to assess ex-ante and inform design of suites of risk management strategies at 6 locations in E and W Africa, and S Asia	• ILRI worked with T4, the Humid Tropics CRP, 4 Centers and 3 external research organizations to improve household modeling tools and methods; publish collaborative household modeling analysis of how alternative strategies impact food security and livelihood resilience in 9 CCAFS locations in E and W Africa; and initiated plans for similar analyses in 2 countries in LAM.
	• Model-based decision support tools developed for farm livelihood diversification for household and community resilience.	• Bioversity made progress in developing a CSA diversification planning tool initially targeting Central American coffee landscapes, including producing dynamic motion charts the relationship between crop portfolios and income and production stability for 111 countries, and databases for modeling suitable tree species for diversification of Central American coffee landscapes. A validated decision support tool, and a conceptual framework journal article are delayed until 2015.
	• Participatory evaluation of promising gender-equitable risk management strategies for aquaculture-based livelihoods in Bangladesh and Malawi, synthesized and shared through a web portal.	• In Bangladesh, WorldFish identified demonstrated and evaluated a suite of risk management interventions for rice-aquaculture systems prone to coastal flooding, including: vertical gardening, landscape modifications for water control, and more resilient housing design. Ongoing WorldFish participatory work on risk management strategies for aquiculture in Malawi includes: Gender Transformative Approaches (GTA) training; drafting Lake Chilwa Fisheries Management Plans; training women fish processers in village savings and loans; and fisheries and water monitoring. Plans for a web portal on gender-equitable risk management strategies for aquaculture were cancelled, as relevant reports and blogs are already available online.
	• Community insurance products evaluated with farmers and insurance industry in India and Nepal.	• In India, the S Asia RPL led a major effort to develop improved insurance products for farmers in Punjab and Haryana, working with industry partners and farming communities to develop improved rainfall indices for wheat and potato crops, and develop and test new contract designs with farmers, with a view to improving the current weather-based crop insurance scheme across India. While farmers have been enthusiastic about the new insurance options, the work identified several technological, operational and legal issues that need to be addressed prior to scaling up.

	• Scaling up of weather/climate based agricultural advisories underway in Tanzania, Senegal and Kenya.	• Work continues with good progress in many countries on agricultural advisories. A study was completed evaluating the role CCAFS has played in Senegal in reaching farmers with seasonal advisories. In Kenya work with extension agencies has resulted in 34,000 farmers receiving advisories, with half of them using them. Evaluation of this work continues.
2.2: Managing climate risk through food delivery, trade and crisis response	In 2014 the following milestones will be achieved: • Enhanced food system interventions or information systems for responding to climate shocks tested in four countries; Integration of new climate-related information or decision support tools into national food security decision-making processes.	• IRRI and the TL held a workshop on integrated food security modeling for E and S Africa, with relevant humanitarian organizations and CGIAR Centers, building on pilot activity in the Philippines. The concepts were incorporated into the design of a CIMMYT-led Flagship2 project (2015-2018) with WFP and FEWSNet (informing USAID) as partners.
	• Enhanced information systems for food security assessment and inputs will be tested (Guatemala) and evaluated (Ethiopia) with one journal article on the Ethiopia evaluation.	• In partnership with GEOSAS and key government agencies, Theme 2 conducted a consultative review of decentralized decision processes within the Ethiopian government to identify critical decision points that impact budget allocation, agricultural planning and risk management. Key entry-points and timing for the delivery of advanced information were identified and the government has invited the team as an observer for the planning and budgetary process. A planned journal article has been delayed. Bioversity adapted the methods used in Ethiopia to assess opportunities to improve food security management, within an ongoing IAI-funded project, and a new Flagship 2 project (2015-2018).
	• Two global humanitarian agencies will evaluate integrated food security modelling for early warning based on findings in the Philippines.	• Progress with this work has been slow.
	• Two reports on climate information and early warning systems in Southeast and South Asia.	• A CIMMYT study of current India government policies for managing impacts of climate shocks, and farmer coping strategies at CCAFS CSV locations, and promising strategies for managing resulting price volatility produced two draft publications.
	• Publication on the price transmission mechanism and policy approaches for managing food crises and price volatility- across states in IGP and disaggregated by Gender.	• Progress with this work has been slow.
		• Additional work: In South Asia, CCAFS explored the degree to which seed banks are needed to buffer against climate extremes (and replanting). Results indicate that among the seven countries studied, there were no requirements for seed banks in Afghanistan, Bhutan, Sri Lanka and Nepal because climatic risks needing replanting did not exist. Only a limited area in central India showed the need of replanting and hence need new seeds. Even here cost-benefit analyses indicate that establishing Seed Banks for crop replanting may not be economically viable.
2.3: Enhanced	In 2014 the following milestones will be achieved:	

prediction of climate impacts on agriculture, and enhanced climate information and services	• CRAFT crop production forecasting tools refined, generalized to work with multiple families of crop models, documented and shared. Crop and rangeland forecasting capacity enhanced in 4 countries in S Asia (India, Bangladesh, Nepal, Sri Lanka), Colombia, and regionally in W Africa.	• CRAFT crop production forecasting tool generalization to work with multiple crop modelling families was delayed. CRAFT was used by partners in Nepal, India, Bangladesh and Sri Lanka; and incorporated into the design of new Flagship 2 projects (2015-2019) targeting W and E Africa and Latin America. CIAT production forecasting methods for use in Colombia.
	• Tools developed and institutional capacity enhanced to produce downscaled climate information (historic, monitored, seasonal forecast) tailored to needs of farmers and other agricultural decision-makers in Tanzania, and regionally in W Africa through AGRHYMET.	• The W Africa RPL partnered with AGRHYMET to develop the capacity of national meteorological services in Ghana, Burkina Faso, Mali, Niger and Senegal to produce downscaled seasonal climate forecasts for communication with smallholder farming communities at CCAFS sites. CCAFS supported training workshops in statistical downscaling methods for partners in Tanzania and Colombia; and assisted the Tanzania Meteorological Agency and AGRHYMET to develop high-resolution historic meteorological data sets and derived products.
	• Synthesis of approaches to communicating climate information with rural communities, and to recognizing and overcoming gender and social equities, completed and published in the form of a sourcebook for training agricultural extension and other intermediaries.	• Development of training and support materials continued, targeting: (a) expert trainers developing training programs for intermediary organizations; (b) staff who will work directly with farmers to deliver climate services; and (c) farmers themselves. A field manual is complete, while lecture materials for trainers and course materials for trainees are under development. Work has been delayed on a sourcebook that synthesizes a range of communication approaches, for organizations wishing to develop their own climate communications training programs.
	• Training programs for climate service intermediaries piloted and evaluated in Tanzania, Senegal, Kenya, Burkina Faso and India.	• Through training and engagement, CCAFS has enhanced the capacity of communication intermediaries (agricultural extension, development NGOs, national meteorological service staff, radio journalists) to communicate climate-related information and advisories to rural communities in Senegal (TL and WA RPL), Tanzania (TL, EA RPL, U. Reading), Kenya (EA RPL, ICRISAT), Zimbabwe (ICRISAT), India (ICRISAT), Ghana, Mali and Burkina Faso (AGRHYMET and WA RPL).
	• Innovative, equitable mechanisms to deliver climate services for farmers demonstrated and evaluated in Tanzania, Kenya, Uganda, Senegal, Burkina Faso, India, Zimbabwe.	• Scalable mechanisms for communicating climate information and advisories have been demonstrated and evaluated through rural radio and incorporation into the national agricultural plan in Senegal (WA RPL); through mobile phones and call-in service in India (CIMMYT); and through training agricultural extension officers and other intermediaries in Tanzania, Uganda, Kenya and Zimbabwe.
	• Strategies for scaling up climate services for farmers refined and documented, and teams resourced through small grants, in E and W Africa, and S Asia.	• CCAFS partnership with USAID and Climate Services Partnership (CSP) led to design and funding of 5 ongoing small grant projects in E and W Africa and S Asia. The regional and cross-regional planning and seed grant process processes, and preliminary roadmaps for strengthening rural climate services in East and West Africa, and South Asia, were published in a Working Paper.

	• CCAFS will inform the agriculture and food security strategy of the UN Global Framework for Climate Services, across regions.	• Efforts to develop the Global Framework for Climate Services (GFCS) strategy for agriculture globally are incomplete, as the GFCS Agriculture and Food Security working group did not continue. The TL participated and shared our portfolio of activities at a GFCS stakeholder workshop, and is in contact with its leadership.
3.1: Impacts of alternative agricultural development pathways	In 2014 the following milestones will be achieved: • Comparative analysis of mitigation trade-offs for agricultural development pathways across 3-6 countries, with a focus on sustainable intensification and trade-offs with adaptation. • Capacity building of decision makers and national stakeholders in use of appropriate tools, data, and knowledge.	Analysis of mitigation trade-offs: • Model-driven analyses of LED pathways using IMPACT and land use modelling in Vietnam and Colombia. • Colombia: Economic analysis associated with restoration of degraded lands and fruit tree agroforestry systems, for incorporation into a NAMA. • CIAT's work on eco-efficiency and low emission development includes the assessment of climate change impacts on smallholder systems (Baca et al 2014) and the subsequent identification of low emission adaptation options for coffee (van Rikxhoort et al 2014) and cocoa (Schroth et al 2014) and carbon insetting schemes (Rahn et al 2014, Banerjee et al 2013) in general.[1] • Global analysis of 2-degree agricultural pathway and regional implications for mitigation. • Precision nutrient management in conservation agriculture based wheat production of Northwest India: profitability, nutrient use efficiency and environmental footprint.[2] • Business case analysis of a dairy NAMA and commitment among decision-makers in Kenya • IFPRI developed guidance for integrating REDD+ and agricultural emissions reductions. Modelling framework and tool to project future agricultural land use patterns is being developed. Capacity building of decision makers: • An IITA workshop, with FTA co-support, to assess drivers of deforestation in the Congo Basin: A.G. Kehbila, M. Yemefack, B. Vanlauwe, P. VanAsten, N.Mahungu, and P. Matungulu (eds). 2015. Charting Multidisciplinary Research and Action Priorities towards sustainable agricultural livelihoods and forest conservation in the Congo Basin, 13-14 November, 2014, Kinshasa, the Democratic Republic of Congo

[1] Baca et al, 2014: http://dx.doi.org/10.1371/journal.pone.0088463
van Rikxhoort et al, 2014: http://dx.doi.org/10.1007/s13593-014-0223-8
Schroth et al, 2014: http://dx.doi.org/10.1007/s11027-014-9570-7
Rahn et al, 2014 http://dx.doi.org/10.1007/s11027-013-9467-x
Banerjee et al, 2013: http://hdl.handle.net/10568/45990
[2] Sapkota et al. 2014: http://dx.doi.org/10.1016/j.fcr.2013.09.001

	• Decision support tool for geographic optimization of mitigation options, to be trialled in Colombia, Kenya, and/or Vietnam. • Case studies from Cambodia, Honduras, and Bangladesh and publication of framework for scaling up women's innovations in low-emissions agriculture.	• Workshop on low cost greenhouse gas emission estimation in agriculture.[3] • Training workshops directed to policy-makers and extension service on climate change constraints and opportunities for development and interpretation and appropriate use of LEDS, Vietnam, Bangladesh, Colombia, and Zambia. Decision support tools: • Alpha version of mitigation optimization tool for decision support completed. • SHAMBA tool and manuals completed.[4] • Scientific articles on emissions factors Case studies and framework for scaling up women's innovations: • Three-day workshop on climate change, innovation and gender held in Cambodia • Guidelines for supporting women's innovation in mitigation (Case Box 5) applied in action research projects at three sites (Bangladesh, Honduras and Cambodia); case studies to be published in 2015 • Journal article on framework for scaling up women's innovations prepared, to be published early 2015
3.2: Institutional arrangements to reduce GHGs and improve livelihoods	In 2014 the following milestones will be achieved: • Analysis of economic incentives and benefits of mitigation practices, including analysis of social and gender differentiation for conservation agriculture in rice-wheat systems in South Asia, sustainable land management in maize-legume systems and pastoral systems in East Africa, and cocoa and coffee in West Africa and East Africa.	Analysis of economic incentives and benefits of mitigation practices: • Indo-Gangetic Plain: CIMMYT i) reviewed adaptation and mitigation options in smallholder production systems; ii) examined economic costs-benefits of CSA practices to identify adaptation and mitigation benefits using field trials data in the case of zero tillage wheat and using household survey of 2011 and CCAFS baseline survey 2013 for laser land levelling; iii) examined whether agricultural policies or climate policies related to agriculture in India are appropriate to support CSA practices and iv) analysed institutional incentives and policy instruments that can enhance climate change mitigation in agriculture in India. The analysis includes a framework of considerations that incentives must exist, including gender and social differentiation and state/community dynamics. 1 journal paper published online,[5] 5 additional papers in process. • Africa: CIAT's work on eco-efficiency and low emission development includes the assessment of climate change impacts on smallholder systems (Baca et al 2014) and the subsequent identification of low emission adaptation options for coffee (van Rikxhoort et al 2014) and cocoa (Schroth et al 2014) and carbon insetting schemes (Rahn et al 2014, Banerjee et al 2013) in general.

[3] http://ccafs.cgiar.org/quantification-data-unveils-opportunities-low-emissions-agricultural-development
[4] https://shambatool.wordpress.com/
[5] Aryal et al, 2015: http://dx.doi.org/10.1017/S001447971400012X

	• Testing of institutional arrangements for carbon finance and markets and mitigation standards.	Institutional arrangements for carbon finance • With leveraged funds, initiated the Coffee and Cattle certification in Brazil project, with the following outputs: (1) Research on the social and procedural on-farm impacts of SAN (Sustainable Agriculture Network) coffee certification. Research paper is in preparation. (2) Report analysing certification audit data (in the context of tea production systems in East Africa) demonstrating a methodology that the project is now adapting for coffee in Brazil. • Agriculture and climate change readiness guidelines and indicators produced to support climate finance and policy planning, with working paper and information posted as a "Big Fact" on the CCAFS website.
	• 2 scientific publications on improved institutional interventions for landscape governance in Indonesia and Brazil	Improved institutional interventions for landscape governance • A special section of Global Environmental Change with five articles was published on the governance of mitigation of forest–agricultural landscapes. • Brazil and Indonesia: Case studies of sustainable oil palm and cattle certification completed, published in 1 working paper and 1 journal article.[6]
	• Lessons on carbon project design in East Africa shared in 1 scientific publication and a policy brief	Lessons on carbon project design in East Africa • Through a three-year partnership with EcoAgriculture Partners, Vi Agroforestry and EcoTrust, CCAFS research informed the scaling up of two agricultural carbon projects in Eastern Africa contributing to an additional 2,000 farmers joining the projects. Lessons shared in training manuals for carbon projects.[7] • Article published on enabling communities to benefit from REDD+[8]
	• Scientific publication on costs of achieving a 30% reduction in emissions.	Scientific publication on costs of achieving 30% reduction in emissions • IFPRI, with ClimateFocus, analysed 2010 to 2012 climate finance for adaptation and mitigation. • CIFOR's work in Indonesia integrated community-based monitoring results into regional and national MRV systems. One peer-reviewed paper on REDD+ MRV and two working papers were published.
	• Monitoring, reporting, and verification (MRV) design for an agricultural NAMA in Kenya.	MRV design for Kenya NAMA: • UNIQUE report on feasibility of an agricultural NAMA in Kenya.

[6] Newton et al. 2014 http://dx.doi.org/10.1111/conl.12116
Alves-Pinto et al. 2013 http://hdl.handle.net/10568/34063
[7] Recha et al. 2014: http://ecoagriculture.org/documents/files/doc_588.pdf ; Masiga et al. 2014 http://ecoagriculture.org/documents/files/doc_681.pdf
[8] Berry et al. 2014: http://dx.doi.org/10.4155/cmt.13.62

	• Feasibility analysis for fruit tree and silvopastoral systems to participate in mitigation incentive systems (e.g. NAMA) in Colombia.	• Stakeholder consultations at county and national level on dairy NAMA (Case Box 4). Feasibility analysis for fruit tree and silvopastoral NAMAs • CIAT conducted economic analysis associated with restoration of degraded lands and fruit tree agroforestry systems, for incorporation into a NAMA. • Other results: • Project initiated with the Climate and Clean Asia Coalition to test the scaling up of mitigation in rice in Vietnam, Colombia and Bangladesh. Launch workshop held. Co-funded by CCAC. • ICRAF organized workshop and expert consultation in Peru to design a landscape NAMA. • Analysis of global mitigation targets and sustainable intensification, presented at CSA Conference in Montpellier[9]
3.3: On-farm practices and their landscape-level implications	In 2014 the following milestones will be achieved: • Impact and trade-off analysis of farm management strategies, for C sequestration and nutrient management in rice-wheat and maize-legume systems; (ii) water and nutrient management and avoided straw burning in rice-based production systems (including socioeconomic analysis of women's involvement in these practices), (iii) coffee and cocoa agroforestry systems at landscape level, (iv) pasture and coffee systems; (v) land use change, land rehabilitation, and peatland management under oil palm, (vii) wood energy and agroforestry, analysis of biomass for efficient pyrolysis liquid fuel production; and pasture, rangelands.	Impact and trade-off analysis of farm management strategies • Precision nutrient management in conservation agriculture based wheat production of Northwest India: profitability, nutrient use efficiency and environmental footprint (Sapkota et al., Field Crops Research) • Limited potential of no-till agriculture for climate change mitigation (Powlson et al., Nature Climate Change) • Methane and nitrous oxide emissions from flooded rice fields as affected by water and straw management between rice crops (Sander et al., Geoderma) • Identifying secure and low carbon food production practices: A case study in Kenya and Ethiopia (Bellarby et al., Agriculture, Ecosystems and Environment) • Cocoa intensification in S. Cameroon (Magne et al, 2014) • MS thesis on land use and carbon stock changes in Rakai district (IITA) was completed • Carbon footprints and carbon stocks reveal climate-friendly coffee production (van Rikxoort et al., Agronomy and Sustainable Development) • Challenges and opportunities for improving eco-efficiency of tropical forage-based systems to mitigate greenhouse gas emissions (Peters et al., Tropical Grasslands) • Cornell Ph.D. dissertation draft completed, including three articles on Analysis of the potential for smallholder communities to provide sufficient biomass for efficient pyrolysis liquid fuel production • The potential of agroforestry in the provision of sustainable woodfuel in sub-Saharan Africa. (Miyuki et al., Current Opinion in Environmental Sustainability) • Agroforestry with N2-fixing trees: Sustainable development's friend or foe? (Rosenstock et al., Current Opinion in Environmental Sustainability)

[9] http://www.slideshare.net/cgiarclimate/will-sustainable-intensification-help-us-avoid-exceeding-2-c

		• 7 other CCAFS publications on impacts and trade-offs of agroforestry published in a special issue of Current Opinion in Environmental Sustainability[10] • Revised emissions factor was published in the IPCC Wetlands supplement, as guidance for reporting emissions • Research completed for carbon sequestration potential of different forage based systems in Eastern Colombia, but no outputs yet. • In CCAFS climate-smart villages in East Africa and South Asia, low emissions approaches implemented, tested and results shared with policy makers.
	• Draft protocol for improved GHG quantification methods, and data for whole farm and landscape GHG emission quantification in 7 countries, published as an edited book and shared in online database.	Outputs related to protocol, improved GHG quantification methods: • SAMPLES protocol available on a new website.[11] Book draft is complete published in book form in early 2015. • Common practices for manual greenhouse gas sampling in rice production: a literature study on sampling modalities of the closed chamber method. • Methane and nitrous oxide emissions from flooded rice fields as affected by water and straw management between rice crops (Sander et al., Geoderma) • Optimal measurement strategies for aboveground tree biomass in agricultural landscapes (Kuyah & Rosenstock, Agroforestry Systems) • Greenhouse Gas Measurement from Smallholder Production Systems: Guidelines for Static Chamber Method (Sapkota et al., CIMMYT publication). • IRRI developed a 'low emissions manager' for rice-based production systems. It is integrated in the beta-version of the mobile phone apps.
	• Field testing of methods and capacity building of researchers in Kenya, Uganda, Vietnam, Colombia, Nicaragua, and Philippines.	Multiple data sets of GHG measurements from SAMPLES completed and will be made publicly available in a database in 2015: • Maize under conservation agriculture, forages, tea, and vegetables in Kenya and Tanzania • Nutrient management in Nyando, Kenya • Precision N management in India • N management in Mexico • Alternate wetting and drying, rice straw and water management in fallow, rice straw burning in Philippines • Field testing of methods and capacity building of researchers: • 9 PhD students completed scientific partnerships with CGIAR centers in 2014 as part of the Climate, Food and Farming Network (CLIFF), administered by Aarhus University. An

[10] http://www.sciencedirect.com/science/journal/18773435/6
[11] http://www.samples.ccafs.cgiar.org/samples-guidelines.html

		additional 8 grants were awarded (6 women, 2 men) in late 2014 for scientific partnerships in 2015. Previous CLIFF students published 8 journal articles in 2014.[12] • CIMMYT trained national partners in GHG quantification at a knowledge-sharing workshop in Bihar, India in January 2014.[13] Additional major results • A map of global emissions and mitigation hotspots under SAMPLES was completed and will be published in 2015. • CCAFS and FAO hosted a workshop for policy makers and scientists to identify action points on how to reduce the cost of estimating greenhouse gas emissions from agriculture. We funded 11 country representatives.
4.1: Approaches and methods that enhance knowledge to action linkages	In 2014 the following milestones will be achieved: • Trainings and action research implemented in all Regions, with continued learning & evaluation of climate smart village approach; • Hundreds of women's and other groups trained in CSA practices across 5 Regions with extensive media coverage; • Development of scaling up of PAR approaches and synthesis of insights in learning briefs, web and media stories, widely disseminated into regional and national policy processes, with explicit recognition of social differentiation and gender. • Partners monitoring gender-disaggregated indicators measuring uptake and benefits of CSA practices • Innovative communication efforts widely disseminating farmer-led innovation in CSA practices in East and West Africa	• CCAFS developed in earlier years the concept of climate-smart villages (CSVs), where a portfolio of options is implemented through action research with farmers. This concept has been documented and shared with policy makers, in over 15 countries in five regions (WA, EA, SA, SEA, LAM). The CSV approach includes attention to gender and social inequality. Through sharing with policy makers, the concept has been embraced and resulted in significant investments. • See capacity development report in main annual report. • Social learning community of practice was very active in 2014 – with blogs, resources and papers – see entry under 4.2 • Little progress made on this in 2014 • Innovations in climate change research and communication for agriculture and food security has been a focus of attention in all regions where CCAFS works. Innovations explored include: supporting and scaling out local farmer innovation; scaling out CGIAR innovations and knowledge through innovative communication partnerships and approaches including TV, radio, cell phones; generating evidence regarding benefits of social learning approaches with novel partnerships. For example, CCAFS partnered with

[12] http://ccafs.cgiar.org/climate-food-and-farming-network
[13] http://blog.cimmyt.org/climate-change-mitigation-social-learning-in-smallholder-systems

		Shamba Shape Up (SSU), a private agricultural television edutainment program to air CSA technologies from elven CGIAR scientists to millions of smallholder farmers in EA, youth via the SSU website and YouTube and children via the Africa Knowledge Zone.
	• Support to global climate change and gender and social learning platforms and new CCAFS case studies for global cross-CG study. • Regional capacity in gender and climate change action research, and new qualitative and quantitative tools being implemented by partners in at least 3 Regions, and partner institutions implementing more gender and pro-poor targeted activities. • 2 scientific publications with a focus on gender-CC evidence from 4 CCAFS sites/regions.	• Building from the FAO-CCAFS training guide (60,000+ downloads), the Gender and Inclusion Toolbox (2,000+ downloads) was published in October 2014, co-developed using social learning processes with ICRAF, CARE and many local partners. A website-launch, live-event launch and webinar were held in Nairobi (50 key stakeholders attending; 300 web views). The co-development process was documented in CCAFS working paper 99. Since 2013, 61 unique partners in 19 countries were engaged to help co-develop content. Components of the toolbox have been integrated into 5 organizations (ICRAF, FTA, SIA, CARE, Emory University) and prompted gender action-planning across CSV sites in CCAFS SEA.
	• Gender impact pathways and strategies for implementation developed with partners in all 5 regions.	• Gender impact pathways completed
	• Gender-CC practitioners guide launched with development partners	• See bullet point above on FAO-CCAFS training guide.
	• Support to regional and global processes to clarify the ecological footprint of agriculture and how it can be reduced without compromising poverty and equity objectives; and building the links to the post Rio+20 process.	• CCAFS supported national science-policy dialogue platforms in about 15 countries to foster knowledge sharing among key national stakeholders involved in national policy processes for climate change adaptation and mitigation. Through these platforms, key priority needs have been identified (technologies and practices, approaches for effective policy making...) for the mainstreaming of climate change into national agricultural strategies. • CCAFS worked with partners including country governments, international organisations, civil society organisations and the private sector to realize the concept of a global coalition for “action on the ground”, with the launch of a Global Alliance on Climate-Smart Agriculture (GACSA).
	• Many and diverse sub-national and national partners are using CCAFS scenarios and related knowledge in adaptation and mitigation forward-planning exercises and in engagement in global climate change and food security processes	• The main scenarios development processes were completed in EA, WA, SA, SEA, the Andes and Central America in 2013, but a large number of deliverables were produced in 2014 and the momentum of specific policy engagement processes was maintained where there were promising outcomes. The quantification of scenarios in all CCAFS regions has been completed. The quantified scenarios have been used in short summary formats to successfully inform scenario-guided policy processes throughout all CCAFS regions. A synthesis working paper with core results in all regions has been published. Working papers elaborating further results per region are being finalized and

		next phase work includes the creation of combined global scenarios from all regional scenario sets. The stakeholder-driven scenarios that provide the basis for the quantitative scenarios include assumptions on gender dynamics in all regions. • Capacity in futures planning under climate change has been built in all CCAFS regions, and key national and regional agencies have used the CCAFS scenarios approach to inform forward-looking agricultural development, food security, and climate change-related policies and programs. Partner-led engagement and communication approaches, knowledge networks/platforms, and strengthened capacity of farmers' organizations, government and regional organization partners has helped to facilitate evidence-based and forward-looking CCAFS-related strategies and planning. Several scenario-guided policy processes were organized for the case study-based research (Cambodia, Honduras, Bangladesh, Uganda, Peru, and ECOWAS / Ghana).
4.2: Data and tools for analysis and planning	In 2014 the following milestones will be achieved: • Regional site characterizations and baseline data analyses initiated in two new target regions (LAM and SEA) at three levels: household, village, and institution. Cross-regional comparisons for all five target regions will be initiated, and further gender-disaggregated analyses published from the baseline data collected for EA, WA and SA.	• Baseline data collection activities took place at new CCAFS core sites in two regions, Latin America and South-East Asia. The baselines at household, village and organisational levels are allowing CCAFS to explore gender and other social differences in target populations. The baseline data and related materials were heavily accessed by partners and others not affiliated with CCAFS through Dataverse during the year. A paper on the baselines process was published in a peer-reviewed journal, along with a Working Paper on some of the findings regarding gender. A synthesis paper of the baseline results from the three initial CCAFS regions was updated, while a more comprehensive synthesis paper from all five CCAFS regions will be written during 2015.
	• Innovative climate data and products investigated and developed to improve downscaling, set priorities and evaluate national and local impacts of climate change. Comparisons of CMIP5 and CMIP3 climate model data for the new target regions (LAM and SEA), along with comparison of different downscaling methodologies in different regions.	• CMIP5 climate model data is now incorporated into the stand-alone version and the Google-Earth-based version of MarkSim, a stochastic weather generator that is being used widely in the agricultural modelling community. CMIP5 downscaled data are now fully available on ccafs-climate.org for 4 RCPs, 4 future periods, 105 Global Climate Models (about 25 GCM by scenario) and 5 climatological variables. Oxford University assembled a report on the ability of the new generation of climate models to reproduce current climate in SE Asia. EMBRAPA delivered a similar report for Latin America. This work was complemented by activities at the University of Cape Town; CMIP3 and CMIP5 data were compared for Africa and Asia, the major result being that there are relatively few differences between the two generations of climate model output. UCT also compared CORDEX regional climate model outputs with CMIP5 data, and again found little improvement.
	• Toolkits and databases modified, based on interaction with and feedback from users, to enable and train stakeholders to assess climate change impacts and evaluate options, including yield gap analyses (WA, EA) and vulnerability and hotspot	• Innovative work continued on the Geo-Wiki Platform by IIASA. New global percentage cropland maps for 2005 are available at 1 km resolution, as is a new global field size map available at 1 km resolution. A pilot report was published by ILRI and CSIRO that contains evaluations of a range of different technologies at the household level for

	assessments (SA, EA, WA, LAM) to prioritise future research, new models and tools applied to evaluate different adaptation options in croplands and rangelands (global, EA, WA, LAM, SA), and regional policy makers engaged via quantified, participatory scenarios to consider alternative development futures (EA, WA, SA, LAM, SEA)	farms at the CCAFS site in northern Burkina Faso. The quantification of scenarios in all CCAFS regions has now been completed by global impact modellers at IFPRI and IIASA. The quantified scenarios have been used in short-summary formats to successfully inform scenario-guided policy processes in all CCAFS regions. The regional scenarios continue to be used as a platform for the exchange and application of knowledge and experience between CCAFS researchers and policy makers, the private sector, NGOs, and other societal actors. A range of vulnerability assessments were carried out, and different tools developed and applied in W Africa, E Africa and S Asia to assess mitigation and adaptation potential at the national level to target CSA alternatives.
	• A climate change and social learning community of practice supported by social learning case studies implemented in several CCAFS sites and by other CCAFS partners such as CARIAA, IIED and CSIRO, at different scales in EA, WA, SA, SEA	• The Climate Change and Social Learning (CCSL) Initiative continued to develop, including a broadening of the base of the CCSL sandbox, an online community of practice. The CCAFS strategy on social learning and climate change decision-making continues to guide the CCSL work, and it is currently being implemented through partners that include IIED, ILRI, IDS, IDRC, and Euforic Services. A major focus of the CCSL work during 2014 was the construction of a framework for monitoring and evaluating social learning that can be applied across a wide range of initiatives to assess good social learning practice and its added value in research for development activities to strengthen outcome contributions.
	• Documented dialogues on institutional learning and an evidence base designed and implemented; sets of guidelines developed, disseminated, evaluated, and refined on learning in rice systems (SEA) and on monitoring and evaluating CCAFS interventions in WA	• In West Africa, stories of change by farmers as mechanism of participatory M&E have been developed to support the evaluation of outcomes of CCAFS interventions at sub-national level, focusing on vulnerability reduction and adaptation plans. Monitoring and evaluation plans were developed and validated with the partners in Niger, Burkina Faso, Ghana and Senegal. The work includes PICSA, an innovative approach to support smallholder decision-making and planning through the use of climate and weather information, with close engagement and capacity strengthening of meteorological and extension services staff, as well as NGOs and smallholder farmers themselves in Tanzania and Malawi. Work continued with National Meteorological Services in Tanzania, Kenya, and Ghana, and activities on capacity building and product development are leading to small but important behavioural changes in these organisations.
4.3: Frameworks for policy analysis	In 2014 the following milestones will be achieved: • Improvements (water model, new livestock, aquaculture, nutrition modules) to a modelling environment for ex-ante assessment and policy evaluation and, designed to examine socially differentiated alternative futures for global food supply, demand, trade, prices, and food security, under different climate change, population and GDP growth scenarios. Connection to a land use module to augment the ex-ante	• Throughout 2014, IMPACT 3 had been going through iterations of calibration and validation. Model improvements and methodological developments of the IMPACT database management and model systems, included progress in relation to the livestock module, the aquaculture module, nutritional dimensions, and a new land-use module. Significant progress was made in the development of an IMPACT web portal (to be released in 2015), which is consolidating all of the work being done on the IMPACT model, accompanied by the provision of online documentation and training.

	assessment policy evaluation tools with the capacity of analysing food security/adaptation/GHG emissions trade-offs	
	• Global Report on Food Security, Farming and Climate Change to 2050 (scenarios, modeling results, policy options) using IPCC AR5 scenarios, new SSPs, estimates of GHG emissions, and updated scenarios for population and GDP growth.	• Not completed – instead the focus was on OECD. Through the above process a variety of outputs have been generated that have begun to lay the foundation for a new research monograph on future scenarios under climate change, which will materialize in 2016. A report on "Modelling Adaptation to Climate Change in Agriculture" was published by OECD, and was discussed in a meeting at OECD's Joint Working Party on Agriculture and the Environment. A policy brief focusing on promising technologies was presented at the Strategic Foresight Conference in Washington DC, communicating key outputs from "Global Futures For Agriculture" Phase 1, prepared in collaboration with CIAT, CIMMYT, CIP, ICRISAT and IRRI. The report illustrates the potential impact on yields, production, consumption, prices and trade of agricultural technologies that are currently being developed for maize, wheat, rice, sorghum, potato, groundnut and cassava to help mitigate the adverse effects of climate change in a series of regional adoption scenarios. Additionally, IFPRI (along with other members of the AgMIP Global Economics team) designed and analyzed scenarios to explore the global and regional impacts of climate change on yields, area, production, consumption, trade and prices for major commodity groups under a range of plausible socioeconomic and emissions pathways. Results of this work are currently in review for publication.
	• Regional assessments of the impact of changing socio-economic conditions and climates on production, prices, food availability and nutritional security in Latin America and South East Asia. Study of aquaculture adaptation options in South East Asia.	• The impacts of climate change on the agricultural sector through the use of modeling tools, have been under assessment in 8 countries in LAC (2 country reports have been completed by IFPRI in 2014). WorldFish conceptualized the analytical framework for assessing vulnerability of aquaculture to climate change impacts in sub-national level of Vietnam. Databases related to this work have been designed and populated.
	• Analysis of Technology, Production and Trade scenarios for cassava and potato in global and regional economies as part of the Global Futures For agriculture project.	• Not completed. But under the Global Futures and Strategic Foresight project (GFSF) project, CIAT continued to work on three crops, rice, common bean, and cassava. Cassava work on progress includes improvement of the cassava model in DSSAT, to use the model to quantify the impact of climate change on different value chains in systems in Asia, Africa and LAC with IMPACT. CIP's crop growth models have being used to assess the performance of “virtual cultivars” under different environmental conditions. Bio-economic technology assessment methods are targeting to influence strategic research planning and decision making through the development of new virtual crop parameters for assessment of potential investments to improve resilience to climate change for potato and sweet potato.
	• Capacity building activities held at CGIAR Centers, national/ regional/ international organizations, to utilize the modeling	• All CGIAR centers participating in the GFSF project had at least one participant attend one or more of the 3 IMPACT training workshops in 2014. Non-CGIAR participants also

	tools developed.	attended, including collaborators from Oxford University and four Central Asian countries. In addition, one-on-one assistance and technical support in use of the IMPACT system of models was provided to collaborators at OECD. Capacities were built at ICRISAT and regional NARS partners on crop, livestock and economic modeling, by application of the AgMIP multi-modeling framework, and training of students.
5.1 Equitable food system policies for climate smart practices	Expected outputs in 2014: • Stakeholder and policy analyses conducted in 5 regions • Learning alliances formed in all 5 regions where activities are being carried out • Improved models for assessing climate change impacts in Southeast Asia, West Africa and East Africa • Baseline reports of current policies in all countries where activities are taking place • Country reports for Latin America on current level of gender inclusion Expected outcomes in 2014: • Policy makers in target regions have a better understanding of the impacts of climate change on agriculture and food systems • Scientists are more engaged with policy makers through learning alliances which are set up as key mechanisms for science-policy dialogue	This clusters of activities under 5 is part of the results-based management trial CCAFS has led and some changes were made to the clustering, based on ongoing stakeholder consultations in regional planning workshops. 5.1 was renamed: Improved national planning processes through policy analyses, (re)formulation and implementation; and stakeholder analysis and engagement through scenarios, learning alliances and science-policy dialogues • Baseline activities have taken place in all regions (EA, SA, SEA, WA, LAM) including stakeholder mapping and policy analyses in all regions, as well as gender focused meta analysis of climate change policies (Latin America and East Africa). • In LAM, progress is being made towards informing ongoing adaptation policy development processes in Colombia through improved models allowing for comprehensive impact analysis and adaptation options tailored to local needs; developing and implementing a drought simulation exercise in Guatemala leading to its adopting by the ministry; and informing the Costa Rican position in COP negotiations through CCAFS research. • Learning alliances and stakeholder platforms at national level are being strengthened (or initiated, e.g. in EA), complemented by sub-national mobilization and sensitization workshops in WA to facilitate more locally embedded climate change policies at the sub-national level. In East Africa, participatory scenario development workshops are supporting policy engagement processes in Tanzania and Uganda. In Southeast Asia, strategic rice alliances are being initiated; while collaboration with the Philippine government is helping to assess the impacts on agriculture, to inform policy change in 2015. • In South Asia, CCAFS research has informed the Indian subsidy policy for the promotion of solar pumps – research that is informing similar processes in Bangladesh and Nepal. • Early outcomes have been achieved in LAM, using CCAFS science: the Colombian government prioritizes one NAMA for reconverting pastures into fruit crops. The Colombian adaptation to climate change strategy and National Development Plan 2015-19 have been informed by CIAT/CCAFS science. The Guatemalan Ministry of Agriculture Guatemala adopts participatory simulation as an approach for climate disaster preparedness. • Overall, progress is being made in engaging with policy makers through alliances and in providing better evidence of the impacts of climate change on food systems. Research

	• Stakeholder and policy analyses lead to improved program design through adaptive management	is being made available to inform policy formulation, implementation and evaluation, in WA while focusing on linkages between national and local scales, in SA by preparing policy inventories to promote CSA, in EA by prioritizing specific policy processes to engage with, and in SEA by building foundations to inform rice sector restructuring processes that are ongoing.
5.2 Increased investment in equitable food system institutions	Expected outputs in 2014: • National platforms in West Africa trained on the CCAFS CSA prioritization toolkit, laying the groundwork for increased investment in CSA among food system institutions • First round of position papers on opportunities for CSA in Latin America, including perceptions of the potential contribution of CSA to mitigating climate change in selected countries • Improved relations with Philippines NEDA, paving the way for rollout and uptake of 2015 results from improved IMPACT model, expected to drive increased investments in CSA technologies beyond 2015 • A decision support tool in South Asia to help prioritize investments for CSA, leading to increased investments in later years The work in this cluster of activities will contribute to outcomes in subsequent years.	5.2 was renamed: Priority setting contextualized with national stakeholders and capacity strengthened to apply outputs in policy formulation; including trade-off analyses, foresight activities and quantification of regional socio-economic scenarios • Decision support tools on CSA prioritization are being developed and capacity of national partners enhanced to utilize these tools. A case study application of CSAP (the CSA Prioritisation tool) was undertaken for Bihar State in India to address the trade-offs and synergies between food production, food security and environmental costs, and results are being documented and disseminated. National platforms and learning alliances will be using these kinds of outputs to inform investment decisions in CSA in WA, SA. • In LAM, climate smart agriculture country profiles for Latin America and the Caribbean assesses where countries are in terms of CSA and what enablers are helping them move forward into integrating CSA in their policies and actions. In EA, the participatory scenarios are helping to prioritise invest options in CSA. • NEDA has taken on responsibility for coordinating activities involving IFPRI and national government agencies in the Philippines. Analyses are being carried out for a range of future scenarios, and results are being documented for dissemination in 2016, including the completion of a book on the future of agricultural adaptation in the Philippines.
5.3 Global bodies engaging member countries on climate smart food system priorities	Expected outputs in 2014: • Priority setting workshop with key Future Earth and CGIAR participants to develop an innovative research agenda for Flagship 4 on governance and institutions across scales in climate smart agriculture • Novel partnerships and scoping activities on governance and institutions initiated • Course on negotiation dynamics and up-to-date science on climate and agriculture for Latin American COP 20 delegates	• A stock-take of research niches was undertaken, published as two working papers, leading to a workshop to identify the processes, capacities and institutional arrangements needed to facilitate successful contribution of research outputs to development outcomes (such as the sustainable up-scaling of climate smart technologies) and how these conditions can be developed and strengthened at different scales. This includes investigating the role of local institutions in constraining/ enabling adaptive capacity at three CCAFS sites, while engaging local stakeholders in testing an approach to institutional/ governance assessment. The approach identifies governance-related indicators to use in assessing impact of adaptation interventions. • In Latin America, the negotiation capacity of the UNFCCC COP 20 presidency and Peruvian negotiation teams were strengthened, using CCAFS science to explain countries' positions in global climate negotiations related to REDD+, LULUCF and AFOLU as well as the importance of considering agriculture in efforts to approach climate change. A secondment to CAC is opening channels for communication with regional policy makers in Central America. • In Southeast Asia, the IRRI team has been given a leading role in the ASEAN Climate

		Resilient Network as a result of its scientific contributions to the ASEAN Technical Working Group on Agricultural Research and Development (ATWGARD) on Climate Resilient Practices. • Progress towards outcomes has been made by enhancing the capacity of negotiators at the COP and informing the process with CCAFS science • An innovative governance research agenda has been set with partnerships to leading research partners in this field established.
	Expected outcomes in 2014: • An innovative governance and institutions research agenda developed for Flagship 4 • Inclusion of viewpoints in COP 20 negotiations facilitated by the CIAT LAM Flagship 4 project team	
5.4 Trial management and evaluation	Expected outputs in 2014: • The theory of change and impact pathway for the Phase 2 Flagship 4 finalized • A monitoring and evaluation system designed and implemented that allows on-time monitoring and reporting; including a baseline implemented • An on-line wiki space for sharing and learning among the FP, the projects and the centres and partners involved Expected outcomes in 2014: • Lessons learned from Flagship 4 trial incorporated into planning process for the rest of CCAFS Phase 2 Flagship Programs	• Major assistance was provided during the year to the six regional projects under Flagship 4 that constituted a trial of Results-Based Management (RBM) - as part of a process of institutional learning. A series of workshops was held to assist project leaders plan activities, develop impact pathways and theories of change, and put in place feasible plans for monitoring progress towards outcome targets. Assistance was also provided to other themes and regions in CCAFS on helping to define a small set of outcome targets for 2019 and 2025 that all projects can work towards. A considerable number of learning briefs and other publications were produced that document the processes undertaken for both the RBM trial projects and for setting in place a relatively "light" M&E system for all projects, flagships and regions in CCAFS. These documents are available through the CCAFS website and through the CCSL and RBM trial wikis. A short report on the one-year RBM trial was submitted to the Consortium Office in December, containing the key lessons learnt in the process so far. Considerable progress was made on developing and using an integrated online platform (called the Planning & Reporting system or P&R) for CCAFS project planning and reporting. As well as embodying a system for monitoring, learning and evaluation, the system also helps to identify key CCAFS data products so that they can be streamed for open access through CCAFS's channels of dissemination.

Table 2 – Planned CRP gender research budget: expected gender research results and associated budget

Level of organisation within the cRP	Expected Gender research results as described in Table 1	Actual results
Theme 1: Adaptation to Progressive Climate Change	Increased data and knowledge synthesized on changing gender roles, sex-differentiated vulnerabilities and adaptation strategies in response to climate change (Vietnam, Bangladesh, Morocco, Kenya and Tanzania); better understanding on constraining factors for technology adoption among women, youth and other socially disadvantaged groups (Vietnam, Mali, Nicaragua); Assessment of different factors (social, economic, cultural and attitudes) that influence rural women's empowerment and recommendations to address these factors with practical interventions; Adaptation strategies evaluated in terms of equality and empowerment of poor women and men farmers in East Africa, leading to gender equitable CSA options identified across different CCAFS regions; Strengthening of researchers, national and local partners' capacity on socially and gender-sensitive methods and strategies for incorporating the gender lens in agricultural innovation and policy planning processes (Colombia, Peru, Senegal, Tanzania and Uganda)	Sex-differentiated vulnerabilities to climate change identified; Gender-disaggregated assessments of performance of target neglected and underutilized crops; Participatory varietal evaluation involving women; disaggregated data from male-headed and female-headed households as well as gender differentiated preferences; social barriers and gender dimensions of CSA practices, technologies and water-related management technologies assessed; improved impact pathways for climate-proofing and nutritional enhancement of bean legumes particularly focused on improved nutritional status for children in first 1000 days; Analogue training workshops; researchers and development agents trained on socially and gender sensitive strategies in Vietnam, Senegal and Gambia trained; Guidebook for researches and adaptation practitioners working with local communities; Guidelines for collecting data and build an evidence base regarding gender and adaptation to climate change; CSA Rapid Appraisal (CSA-RA) tool with gender lens; Talking Tool Kit used in CVs in the climate Change context; Gender surveys in LAM; Master thesis and peer reviewed publications; initial reviews of national adaptation policy documents for treatment of gender.
Theme 2: Adaptation through Managing Climate Risk	Knowledge synthesized and capacity enhanced to understand and address gender and social equity challenges in the areas of: (a) gender-targeted risk management strategies in E Africa maize-legume systems; (b) equitable risk management strategies for aquaculture-based livelihoods in Bangladesh and Malawi; (c) index-based livestock insurance for Ethiopia; and (d) climate services for farmers in Tanzania, Kenya, Uganda, Senegal, Burkina Faso, India, Zimbabwe.	Gender-disaggregated household surveys of climate vulnerability and coping strategies in E Africa maize-legume systems. Analyses of gender role in use and benefit of climate-smart aquaculture technologies completed and reported for Bangladesh. Women's groups organized and trained in fisheries post-harvest management in Malawi. Role of gender in demand and uptake of livestock insurance analysed for southern Ethiopia. Gender-based climate information and communication needs identified and addressed in India, Senegal, Tanzania and Malawi.
Theme 3: Pro-Poor Climate Change Mitigation	Increased knowledge and awareness of the opportunities and challenges for women of different technical options and livelihood strategies for mitigation; a tool for assessing the multiple dimensions affecting gender inequities in low emissions development published in a high impact journal and applied in three countries; improved awareness and role of women in scaling up technologies for	Improved information on gender in rice-wheat systems of the IGP and in irrigated rice in the Philippines, indicating norms that women would not be involved in potential mitigation activities. PROLINNOVA work in Cambodia, Honduras and Bangladesh demonstrated however the enabling of women's innovation for technologies relevant to

	rice-based mitigation, agroforestry, sustainable land management and soil amendments in seven countries. Budget planned 1,018,000	women and that women had input to other decisions. Gender strategies and impact pathways have been developed for all CCAFS focus regions. Budget expended 1,084,000.
Theme 4: Integration for Decision Making	Capacity strengthening of partners in gender research; cross-centre and CRP collaboration on new gender-CC methods, a gender-CC platform, gender impact pathways and strategies in each CCAFS region, and cross-regional gender-CC empirical studies undertaken in CCAFS sites with results published in high impact journals, The use of CCAFS gender tools by large NGOs and development programs upscaled via training and dissemination activities through strategic partnerships in CCAFS target regions	Building on the FAO-CCAFS training guide (60,000+ downloads), the Gender and Inclusion Toolbox (2,000+ downloads) was published and disseminated in October 2014, co-developed using social learning processes with ICRAF, CARE and many local partners. The co-development process has been widely documented. Since 2013, 61 unique partners in 19 countries were engaged to help co-develop content. Components of the toolbox have been integrated into five organizations and prompted gender action-planning across CSV sites in CCAFS SEA. Gender strategies and impact pathways have been developed for all CCAFS focus regions.
5 RBM trial (Future Flagship 4): Policies and institutions for climate-resilient food systems	Increased knowledge and awareness about the gender-differentiated impacts of climate change on agriculture and food security. Better understanding of the gender-based biases that may affect women's access to resources and institutional support. Better understanding of the current levels of gender inclusion in food security policies and plans in several countries	All trial projects have undertaken some meta-analyses of climate change related policies in their target countries to evaluate the level of gender integration in national strategies, plans, and policies on agriculture, food security and climate change. Data were assembled and tools developed for evaluating gender-differentiated impacts of climate change in CCAFS sites.
Level n-2: Cluster of activities	**Expected research outcomes and outputs that have a gender/equity dimension (from Table 1).**	

1.1 Adaptation of farming systems	In 2014 the following milestones will be achieved: • Researchers, national and local partners and development agents trained on socially and gender-sensitive methods and strategies for incorporating the gender lens in agricultural innovation, the conservation and policy planning processes within the climate change context in Bangladesh (WorldFish), Colombia, Peru, Senegal, Tanzania, Uganda (CIAT).	• In Vietnam, researchers and development agents were trained on socially and gender sensitive strategies using the Talking Tool Kit in the climate Change context (ICRAF). Promotion continues with its expected use in the climate-Smart Villages and other CCAFS projects. • LAM-Gender survey developed as part of the collaborative work between CIAT and the University of Florida collaboration and implemented in Colombia, translated into English and adapted for implementation in Nwoya, Uganda and in Tanzania Tanzania as part of the IFAD-funded project, Increasing food security and farming system resilience in East Africa through wide-scale adoption of climate-smart agricultural practices; 2 UF Master thesis; 3 per-reviewed publications published; 1 Working Paper in prep " Talking about the Weather in Chiapas, Mexico: Women Farmers' Perceptions of and Adaptions to Climate Change - to be published in 2015. • The Toolkit produced (Systemic Integrated Adaptation: Community Diagnostic, Prioritization and Planning Toolkit: A guidebook for researches and adaptation practitioners working with local communities) has been integrated into a UNEP World Conservation Monitoring Center (WCMC) program in West Africa. 20+ Government agency staff persons in Senegal and Gambia were trained on the use of the methodology for use with communities living in protected area
	• Gender-sensitive and socially differentiated knowledge, options strategies and guidelines developed for conservation and use of local biodiversity within the climate change context in Bangladesh, Vietnam, Uganda, Kenya, Tanzania, Ghana, Senegal, Morocco, Colombia, Nicaragua (WordlFish, IFPRI, ICARDA, CIAT); findings presented in journal article and policy brief.	• Guidelines (questionnaires and manuals) developed and piloted by CIAT in Uganda and Tanzania for collecting data and build an evidence base regarding gender and adaptation to climate change. This involved identifying sex-differentiated vulnerabilities to climate change and then using that information to evaluate adaptation strategies in terms of equality and empowerment of poor women and men farmers. The guidelines will be adapted and implemented in various CCAFS sites to better understand important gender relations that impact women's empowerment and adoption by men and women of various adaptation (or CSA) practices. • In the major wheat growing areas of Morroco, an ICARDA project performed a deep gender analysis to understand differential climate change impacts on adaptation strategies in two rural communities where (low and high) male migration has become

		the only alternative livelihood strategy. This research revealed interesting insights into how gendered roles and norms, and women's empowerment are changing within the communities due to CC related migration. • A WorldFish project analyzed intra-household impacts of climate hazards and risk in Vietnam, Cambodia and the Philippines and highlighted the internal dynamics of decision-making within the household and among household members. • Gender dimensions of water-related management technologies comprehensively assessed through household surveys in Nepal, Bihar and West Bengal. • Analysis of the socio-cultural, class, caste and gender components of adaptation and food security in Pilot Systemic Framework for Integrated Adaptation Planning (SIA) program carried out in Nepal and Ghana. • In rice-based farming systems in Vietnam, studies demonstrated how men and women have different risk coping mechanisms under unpredictable weather; Men have more decision-making power on choices for farming strategies of the household; Farmers, especially the women, lack access to farming information and climate change coping strategies. • The social barriers and gender dimensions of CSA practices and technologies assessed in India and East Africa (Bioversity). Socio-economic barriers to adoption of best bet adaptation options also evaluated in Ghana, Colombia and Tanzania (CIAT). Findings published in a series of CCAFS Reports including the identification of practices with high potential for further CCAFS investigation and/or on-farm participatory trials.
	• Accessions identified with potential adaptive traits for climate change adaptation for at least 5 crops using innovative methods and prioritized on the basis of traits with potential benefits for the poor and women users. Methodology to select gene bank material adapted to local current climate conditions and future climate shifts developed and tested and crop suitability atlases for priority crops (as defined by fraction of total production accounted for) produced; findings presented in reports and journal articles.	• Gender-disaggregated assessments of performance of target neglected and underutilized crops in Nepal and Bolivia designed to better understand perceptions by women and men farmers of valuable traits and how these can be leveraged in coping strategies (Bioversity). • Bioversity Seeds for needs research gathered disaggregated data from male-headed and female-headed households as well as gender differentiated preferences by actively involving women in variety evaluation in Central America, (especially for culinary aspects of bean varieties), Papua New Guinea, China,

		India… • Agricultural research for development and training carried out to facilitate more sustainable and climate-resilient nutrition of rural smallholders (particularly women) through development, dissemination and utilization of drought-tolerant bean varieties (foods) with enhanced micronutrient content (NUI- GALWAY Partnership). This ongoing work includes research on how facilitate improved impact pathways for climate-proofing and nutritional enhancement of bean legumes for improved smallholder food and nutritional security, particularly focused on improved nutritional status for children in first 1000 days;
	• Methods and tools for participatory, gender-responsive monitoring of deployment of biodiversity and knowledge by communities for climate change adaptation tested out in Uganda, Rwanda, Burkina Faso, Costa Rica, Nepal (including gender-disaggregated community surveys (Bioversity); findings synthesized in a report	• New CSA Rapid Appraisal (CSA-RA) tool developed and tested by CIAT in collaboration with IITA. It looks at CSA practices with a gender lens, delivering insight on access to resources, division of labor and decisions making within the families and specifically among men and women. The results of the appraisals are informing two large IFAD investment loans, in Uganda the ASAP PRELINOR project and in Tanzania the SAGCOT corridor investments.
1.3 Adaptation strategies: policy and institutional frameworks	In 2014 the following milestones will be achieved: • Socially and gender- disaggregated participatory methods tested in Kenya, Ghana for grounding climate change model results to community-level decision making processes that address food security issues; Policy recommendations on livelihood-based gender-equitable risk management strategies aiming at reducing vulnerability to climate change in rural small-scale maize households in Kenya.	• As part of the efforts to improve adaptation planning capacity, CIAT and CCAFS East Africa in collaboration with the Agricultural Research Institute (ARI) held a new Analogue training workshop in Tanzania to build capacity of p*olicy makers and researchers from National Agricultural Research and Extension Systems (NARES), Universities and Government Ministries on the* potential applications of the tool that now allows the inclusion of socio-economic data. At the local level, farmers and stakeholders from 2 climate-smart villages in Kenya moved towards its implementation to explore future climate change scenarios and impacts on their resources and held a pre-planning workshop leading to the design of a new farmer exchange visit to analogue sites with possible learning opportunities
	• Community-based holistic adaptation options trialed in at least three sites in Kenya, Bangladesh, Uganda and Vietnam, in order to understand the social (including gender), cultural, economic and institutional barriers to effective adaptation; outcomes presented in summary report (WorldFish, CIAT, IFPRI).	• The social barriers and gender dimensions of these practices and technologies are also being assessed in India and East Africa (Bioversity). In 3 countries (Ghana, Colombia and Tanzania), CCAFS evaluated the primary socio-economic barriers to adoption of best bet adaptation options and publishing the

		findings in a series of working papers. The gender dimensions of water-related management technologies were also comprehensively assessed through household surveys in Nepal, Bihar and West Bengal.
	• Sector specific adaptation strategies and plans produced based on socially and gender-differentiated adaptation options using cost/benefit analysis in at least 5 countries, results shared with key policy makers in target countries	• Meta analysis of state of NAPs in 11 countries presented in SBSTA, including some analysis of gender treatment. Detailed review of Ghana national policy including gender components published as working paper. Initial detailed reviews of national policy documents for opportunities to strengthen gender transformation underway in Latin America.
2.1 Innovations that enable rural communities to better manage climate-related risk	In 2014 the following milestones will be achieved: • Synthesized knowledge incorporated into climate risk management good practice guidelines that addresses social and gender equity, and communicated to development and policy stakeholders including: (a) publications on regional risk management strategy comparison, gender-based risk preference implications, and gender-differentiated risk management strategies in E Africa maize-legume systems; and (c) process manual, and publications on gender, determinants of uptake, and index design for index-based livestock insurance for Ethiopia.	• CIMMYT completed gender-disaggregated household surveys of climate vulnerability and coping strategies, but did not complete planned gender-focused synthesis or capacity-building activities.
	• Participatory evaluation of promising gender-equitable risk management strategies for aquaculture-based livelihoods in Bangladesh and Malawi, synthesized and shared through a web portal.	• WorldFish analysed how gender influences use and benefit from a suite of climate-smart aquaculture technologies and implications for scaling out in Bangladesh. Impacts of climate hazards differ within households, and adaptive strategies often emanate from a consensus among household members. Women play a greater role in coping saltwater intrusion, while the role of men is more prominent in coping with flooding and typhoons. • In Malawi, WorldFish organized and trained women's groups on lake fisheries post-harvest technologies.
2.3: Enhanced prediction of climate impacts on agriculture, and enhanced climate information and services	In 2014 the following milestones will be achieved: • Sourcebook for training agricultural extension and other intermediaries to provide climate services for farmers will have a strong component on recognizing and overcoming gender and social equity challenges.	• CIMMYT completed gender-disaggregated household surveys of climate vulnerability and coping strategies, but did not complete planned gender-focused synthesis or capacity-building activities.
	• Training programs for climate service intermediaries, incorporating gender/social equity, piloted and evaluated in Tanzania, Senegal, Kenya, Burkina Faso and India.	• Men and women farmers trained in Senegal, Kenya, Tanzania, Zimbabwe, and India; with gender analysis integrated into participatory and training work in Senegal.

	• Innovative mechanisms to deliver climate services for farmers will be demonstrated and evaluated, with a focus on gender and social equity, in Tanzania, Kenya, Uganda, Senegal, Burkina Faso, India, Zimbabwe	• In India CIMMYT analyzed and addressed the information and communication needs of women farmers in a mobile phone-based agro advisory service demonstration that reached about 1200 farmers in more than 60 villages at CCAFS CSV sites across the states of Haryana, Bihar and Punjab (India). • Gender-disaggregated M&E baseline survey and climate information and communication needs assessment completed and reported for target districts in Tanzania and Malawi (ICRAF, Farm Radio Int'l.) is informing strategy for further investment in climate services and communication channels in the GFCS Adaptation Program in Africa.
	• Journal paper on gender and social equity challenges in climate services.	• Two Working Papers published on addressing gender and social equity challenges in climate services. A submitted journal paper is being revised to incorporate Senegal gender research.
3.1: Impacts of alternative agricultural development pathways	• Case studies from Cambodia, Honduras, and Bangladesh and publication of framework for scaling up women's innovations in low-emissions agriculture.	• PROLINNOVA completed the second phase of 3 small-scale action research pilots in Cambodia, Honduras and Bangladesh and analyses to demonstrate the enabling of women's local low emission agricultural innovation. They have produced a draft academic article on the innovation framework and its application, draft policy brief on supporting farmer-led innovation, and plan to publish an article on how innovations can be "scaled up" without compromising locally-led, contextually appropriate changes in gender relations
3.2: Institutional arrangements to reduce GHGs and improve livelihoods	In 2014 the following milestones will be achieved: • Analysis of economic incentives and benefits for mitigation practices, including analysis of social and gender differentiation for conservation agriculture in rice-wheat systems in South Asia, sustainable land management in maize-legume systems and pastoral systems in East Africa, and cocoa and coffee in West Africa and East Africa. • Decision-makers in target Regions better informed about policy options and gender implications for incentivizing smallholders for GHG emission intensity reductions	• CIMMYT completed comparative research (survey, focus groups) on differences between men and women farmers in conservation agriculture in in Bihar and Haryana, India, regarding their ability to select and adopt climate-smart agricultural practices (CSAPs). Results show that gender, caste and tribal status affect adoption and that men and women alike disparage women's actual and potential role as key farmers and decision-makers. In another activity, women are recording farm activities, expenses, and outputs to develop evidence-based understanding about which technologies and practices are most relevant and profitable. Women's participation is being monitored and tracked. Budget: $202K spent, 102K planned) • ICRISAT conducted participatory tests of crop intensification and integrating crop and livestock production in Makueni, Kenya.

		Budget $60K spent, 68 Kplanned. • IRRI assessed women's role in AWD and the socioeconomic impacts of AWD on women, finding that women were generally not involved in physical farm production in the Philippines and difficult to engage in trials. The project concluded that it will offer training on AWD for women to empower them to make sound decisions on intra-household resource allocation and farm management. Gender strategies and impact pathways have been developed for all CCAFS focus regions. Budget: $43K spent, 39K planned. • ICRAF's pro-growth pathways research in East Asia identified technical and institutional options with attention to gender impacts. Report and policy brief with relevant gender findings will be produced in 2015. Budget: $171 spent, 107 planned. • CIAT identified barriers to implementing NAMAs in the fruit sector by region, including gender, and will publish this in 2015. Budget %338K spent, 297K planned. • Findings to date indicate the role of gender in agricultural mitigation is relatively weak. The issue going forward is to support women to understand the implications of mitigation practices and to try to channel new benefits to women; we have hired a gender specialist to examine this question for three projects in 2015.
4.1: Approaches and methods that enhance knowledge to action linkages	In 2014 the following milestones will be achieved: • Trainings and action research implemented in all Regions, with continued learning & evaluation of climate smart village approach; hundreds of women's and other groups trained in CSA practices across 5 Regions; development of scaling up of PAR approaches and synthesis of insights widely disseminated into regional and national policy processes, with explicit recognition of social differentiation and gender. Partners monitoring indicators measuring uptake and benefits of CSA practices • Regional capacity in gender and climate change action research, and new qualitative and quantitative tools being implemented by partners in at least 3	• Innovations were made in climate change research and communication for agriculture and food security in all regions where CCAFS works. These included scaling out CGIAR innovations and knowledge through innovative communication partnerships and approaches including TV, radio, cell phones; and generating evidence regarding benefits of social learning approaches with novel partnerships. For example, CCAFS partnered with Shamba Shape Up, a private agricultural television edutainment program to air CSA technologies from eleven CGIAR scientists to millions of smallholder men and women farmers in EA, youth via the SSU website and YouTube and children via the Africa Knowledge Zone. • The Gender and Inclusion Toolbox (2,000+ downloads) was published and disseminated in October 2014, co-developed using

	Regions, and partner institutions implementing more gender and pro-poor targeted activities • Support to regional and global processes to clarify the ecological footprint of agriculture and the ways it can be reduced, without compromising poverty and equity objectives; and building the links to the post Rio+20 process. Many and diverse sub-nat'l and nat'l partners are using CCAFS scenarios and related K in adaptation and mitigation forward-planning exercises and in engagement in global climate change and food security processes	social learning processes with many local, regional and international partners (61 unique partners in 19 countries). The toolbox is prompting gender action-planning across several CSV sites. • CCAFS supported national science-policy dialogue platforms in 15 countries to foster knowledge sharing among key national stakeholders involved in national policy processes for climate change adaptation and mitigation. Key gender and pro-poor needs have been identified for mainstreaming climate change into national agricultural strategies.
4.2: Data and tools for analysis and planning	In 2014 the following milestones will be achieved: • A climate change and social learning community of practice built, supported by social learning case studies implemented in selected sites	• The Climate Change and Social Learning (CCSL) Initiative continued with a broadening of the base of the CCSL sandbox, an online community of practice. With partners that include IIED, ILRI, IDS, IDRC, and Euforic Services, a framework has been constructed and is being implemented for monitoring and evaluating social learning around gender and other issues that can be applied across a wide range of initiatives.
4.3: Frameworks for policy analysis	In 2014 the following milestones will be achieved: • Improvements (water model, new livestock, aquaculture, nutrition modules) to a modeling environment for ex-ante assessment and policy evaluation and, designed to examine socially differentiated alternative futures for global food supply, demand, trade, prices, and food security, under different climate change, population and GDP growth scenarios. • Regional and national studies complementary to the global policy study, in Latin America, South East Asia and Central Asia (tbc). Gender analysis of agroforestry adaptation options in Africa. Study of aquaculture adaptation options in South East Asia (Cambodia and Vietnam). Analysis of Technology, Production and Trade scenarios for cassava and potato in the global economy	• Under the GFSF project, ICRAF has produced datasets that can be used to analyze the effect of agroforestry on crop production and yields, whereas agroforestry models for foresight analysis, and gender analysis of agroforestry and maize yields in Malawi, are under development. • Insufficient progress in 4.3
5.1 Equitable food system policies for climate smart practices	In 2014 the following milestones will be achieved: • Baseline analyses and country reports conducted that include information on current levels of gender inclusion (LAM, WA) • Improved models for assessing gender-differentiated impacts of climate change Expected outcomes in 2014: • Policy makers in target regions have a better understanding of the impacts of climate change on agriculture and food systems	• Initial meta-analyses of climate change related policies in several target countries in most of the CCAFS focus regions were undertaken to evaluate the level of gender integration in national strategies, plans, and policies on agriculture, food security and climate change. Several projects are working to address these gaps. • Household data were collected in other sites in Latin America, S Asia and SE Asia on gender preferences and participation in climate-smart agriculture, and these are contributing to

		databases and tools to evaluate gender-differentiated impacts of climate change in selected CCAFS sites.