Report of the
Third Annual CCAFS Science Workshop Agenda
Copenhagen, Denmark, 1-2 May 2012

Summary

The Third Annual CCAFS Science Workshop focused on consolidating research and fostering collaboration across the CGIAR. Day-1 plenary presentations along four themes identified issues including:

• Opportunities to deliver messages to UNFCCC through SBSTA;
• The challenges of communicating science;
• The multiple scales of climate variability, stakeholder engagement, and adaptation options;
• Whether adaptation and mitigation are synergistic or conflicting;
• Participation as an opportunity to give respect, voice and choice – without precluding the impact of scientific knowledge.

Day-2 parallel sessions enabled knowledge sharing and planning around topics of strategic interest to CCAFS. Opportunities for cross-Center follow-up actions include:

• Developing a community of practice and web portal around diversification and climate risk; and projects that use household modeling to design diversification strategies;
• Development of a simple, rigorous, consistent protocol for GHG measurement in smallholder agriculture.
• A workshop to address results of a scoping study and launch a community of practice on modeling climate impacts on pests and diseases.
• Development of a proposal for CCAFS to catalyze new work on gender and Climate-Smart Agriculture coordinated across centers and CRPs.
• Synthesis of knowledge about costs and benefits of Climate-Smart Agriculture practices; and evidence about what triggers change among smallholder farmers.
• A Science magazine article on the concept of Climate-Smart Agriculture.
Overview

The purpose of the meeting was to share exciting results, generate new ideas, refine plans, and further develop collaboration in areas of strategic importance to CCAFS – with particular emphasis on consolidating research and fostering collaboration across the CGIAR. The two-day program included thematic plenary sessions on day 1, and parallel sessions proposed and convened by participants on day 2:

Day 1, 1 May 2012

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<tr>
<th>From</th>
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| 8:30   | 9:00     | **Session 1: Science-Policy Interface**  
*Chair: Lindiwe Sibanda (FANRPAN)* | Bruce Campbell (CCAFS) |
| 9:00   | 9:30     | Linking CCAFS science to international negotiations | Ian Christopolos (DIIS) |
| 9:30   | 10:00    | Institutional requirements for adapting to a variable and changing climate |                                     |
| 10:00  | 10:30    | Coffee                                        |                                              |

**Session 2: Adapting to an Uncertain Future**  
*Chair: Roberto Quiroz (CIP)*

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<td>Diagnosing future climate</td>
<td>Lisa Goddard (IRI, Columbia U.)</td>
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<td>Social returns on investment for adaptation</td>
<td>Ariella Helfgott (ECI, Oxford U.)</td>
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<td>12:00</td>
<td>Conjunctive water storage for climate risk management</td>
<td>Vladimir Smakhtin (IWMI)</td>
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**Session 3: Evaluating Adaptation and Mitigation Options**  
*Chair: Alex Pinto (IFPRI)*

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<tr>
<td>13:30</td>
<td>14:00</td>
<td>Economic framework for assessing adaptation and mitigation options</td>
<td>Jeimar Tapasco (CIAT)</td>
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<td>14:00</td>
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<td>Household modeling for ex-ante evaluation and targeting</td>
<td>Mario Herrero (ILRI)</td>
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**Session 4: Fostering Participation**  
*Chair: Peter Craufurd (ICRISAT)*

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<tr>
<td>15:30</td>
<td>16:00</td>
<td>Successes in linking science to action through participatory action research</td>
<td>Jonathan Hellin (CIMMYT)</td>
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<td>16:00</td>
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<td>Key questions for a gender-focused climate change research program</td>
<td>Jacqui Ashby (CGIAR)</td>
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| 17:00  | 17:45    | **Wrap Up and Overview of Day Two Parallel Sessions**  
*Chair: Holger Meinke (ISP, U. Tasmania)* |                                              |
| 18:30  | 20:30    | Reception and Poster Session                  |                                              |
# Day 2, 2 May 2012

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<td><strong>Session 5: Parallel sessions (A)</strong></td>
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<td>1. Diversification and intensification at the field and household level</td>
<td>Fabrice DeClerck</td>
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<td>for climate risk management and adaptation</td>
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<td>2. Integrated climate change impact assessment and adaptation</td>
<td>Jerry Nelson (IFPRI) and</td>
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<td>priority setting: Combining AgMIP and Global Futures for strategic</td>
<td>Lieven Claessens</td>
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<td>foresight analyses</td>
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<td>3. Toward a protocol for measuring mitigation in smallholder systems</td>
<td>Todd Rosenstock (ICRAF) and</td>
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<td>Mariana Rufino (ILRI)</td>
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<td>4. Managing floods and droughts</td>
<td>Vladamir Smakhtin</td>
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<td><strong>Session 6: Parallel sessions (B)</strong></td>
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<td>1. Agricultural intensification for climate change adaptation and</td>
<td>Piet van Asten (IITA) and</td>
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<td>mitigation: synergies and trade-offs</td>
<td>Peter Laderach (CIAT)</td>
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<td>2. Modelling climate impacts on pests and diseases</td>
<td>Juergen Kroschel (CIP)</td>
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<td>3. Designing and implementing innovative gender-focused research</td>
<td>Patti Kristjanson</td>
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<td>across CG sentinel sites</td>
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<td>4. Incentives for adoption of climate smart innovations</td>
<td>Jonathan Hellin*</td>
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<td><strong>Session 7: Parallel sessions (C)</strong></td>
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<td>1. Crop and rangeland forecasting</td>
<td>Jim Hansen (CCAFS/IRI,</td>
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<td>2. Building on farmer's adaption knowledge and experience</td>
<td>Ariella Helfgott (ECI,</td>
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<td>3. What does climate-smart agriculture mean for us? Research needs</td>
<td>Henry Neufeldt (ICRAF)</td>
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<td>**Session 8: Parallel session wrap up and discussion: Implication for</td>
<td>Chair: Bruce Campbell (ISP)</td>
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<td><em>Chair: Bruce Campbell (ISP)</em></td>
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Day 1 Plenary

During the first day, a series of invited plenary presentations identified priority issues for discussion. Four thematic sessions were designed to draw attention to emerging issues that are important to achieving CCAFS objectives and outcomes, but that have not yet been mainstreamed across the CGIAR.

Science-Policy Interface

The first session included presentations on global climate negotiations and on the institutional requirements for climate adaptation. Discussion focused on two key questions: “What messages should CCAFS deliver to SBSTA?” and “How can science be best communicated?” The 36th session of the Subsidiary Body for Scientific and Technological Advice (SBSTA) (Bonn, 14-25 May 2012) is an immediate opportunity for CCAFS to bring key messages into the UNFCCC. Discussion on how to communicate scientific knowledge in a way that can impact policy focused on how much the messages can be, and need to be, simplified.

Adapting to an Uncertain Future

One participant noted that the three session presentations; on advances in climate science relevant to adaptation, a framework for evaluating adaptation options, and water storage options for adaptation, captured the essential elements of an adaptation framework. This prompted discussion on how to effectively link these three elements: understanding of climate variability, technical adaptation options, and decision-making. One line of discussion focused on the multiple scales of climate variability and their implications for adaptation. “Informed uncertainty” was proposed as a goal for climate science. Discussion also highlighted the need to evaluate where participatory action research has been successful and what it has accomplished.

Evaluating Adaptation and Mitigation Options

Two presentations covered a framework for evaluating adaptation and mitigation options, and use of household-level modeling to evaluate adaptation options ex ante. The session considered whether adaptation and mitigation are necessarily synergistic, or if there are examples where they are conflicting. This has important implications for Climate-Smart Agriculture, when it assumes they do not necessarily entail tradeoffs. There was a suggestion that GHG mitigation targets cannot be met without widespread changes in food consumption.

Fostering Participation

The final session included presentations on participatory action research, and on gender challenges. Discussion raised unanswered questions about the impacts of participatory research approaches relative to their cost. Despite the costs and challenges, participatory action research was seen as empowering rural communities – giving respect, voice and choice – and contributing to more relevant interventions. On the other hand, rural communities do not have all the solutions, and can benefit from scientific knowledge.

Day 1 Wrap Up

The closing session of the first day reviewed a few highlights from session presentations and discussion. According to moderator Holger Meinke, it is phenomenal that the program, and CCAFS research, spans from global negotiations to farmer participatory research. Evaluating options at multiple scales, and the research challenge of how to link the different scales, was highlighted. The importance of the multiple scales of climate variability was also emphasized.
While stakeholder participation and innovation was an important theme throughout the day, participation does not preclude scientific knowledge having impact. Holger called on the group to distinguish between tradition and bad habits, noting that there is sometimes good reason to change what people have been doing. At level of global negotiations, the moderator asked participants to consider what is the right level of simplicity, given the complexity of the issues. The closing discussion also noted the challenge to re-think large-scale water storage, and consider alternatives. Tools that can help answer questions about tradeoffs and synergies between adaptation and mitigation were cited as an immediate need, to support investment planning.

**Day 2**

The second day gave participants the opportunity to convene sessions within their interests. The eleven sessions were intended to enable sharing of results of ongoing work and planning for future work around topics that are of strategic interest to the CCAFS program across Centers. Several of the sessions reported concrete plans for follow-up actions involving multiple Centers. Reports submitted by session conveners are included in this report as appendices.

**Diversification and intensification at the field and household level for climate risk management and adaptation**

Several Centers are collaborating on a systematic literature review of how various diversification strategies contribute to managing climate risk among smallholder farmers. Action points from the workshop include: adjustments to the study methodology and search strategy; development of a community of practice and web portal around diversification and climate risk; and development of projects that move toward “designed diversification” that incorporates CCAFS work on household modeling.

**Integrated climate change impact assessment and adaptation priority setting: Combining AgMIP and Global Futures for strategic foresight analyses**

The AgMIP and Global Futures projects both aim to develop and apply integrated assessment modeling tools to look at a climate change and adaptation impacts at different temporal and spatial scale levels. Biophysical (crop, livestock, climate) and economic models are combined for regional to global impact assessments. The goal of this session was to update CCAFS workshop participants on the progress of these projects and to stimulate discussion and collaboration on the methodologies under development.

**Toward a protocol for measuring mitigation in smallholder systems**

The goal of the session was to plan for development of a simple, rigorous, consistent approach for GHG measurement of mitigation potentials of whole farms and landscapes to support wider data collection among smallholders in the tropics. Session outputs include an outline of a 3-5-year project, and criteria for selecting test sites.

**Managing floods and droughts**

Climate change leads to increasing frequency, magnitude and extent of floods and droughts – i.e. weather and water-related extremes – in most parts of the world. These extremes are not

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1 No report or summary was submitted for the session, “Building on farmer’s adaption knowledge and experience.”
managed properly even under current climates, causing billion dollar losses annually to crops, infrastructure, as well as human lives. Participants were invited to share their knowledge on technological innovations and non-structural measures that increase resilience of farming communities to these extremes, and examples of their successful implementation in various geographical settings.

**Agricultural intensification for climate change adaptation and mitigation: synergies and tradeoffs**

Intensification may be required to encourage climate change adaptation at the plot level, and climate change mitigation at landscape level. Technical solutions have to be supported by the development, public and private sectors. Policies and trade have to consider trade-offs across scales. A working group (Alex, Todd, Dave, Leuven, Piet, Peter) will reflect on a coherent framework for analyzing trade-offs across scale and time as a research issue. A concept note for a workshop on this topic will be submitted to CRP 1.1. (Dryland farming systems), CRP1.2 (Humidtropics farming systems) and CRP7 (CCAFS), with the expectation that it will lead to a cross-center initiative.

**Modelling climate impacts on pests and diseases**

The session reported on a scoping study commissioned by Themes 1 and 2. Three presentations presented research on insect and disease modeling. Subsequent discussion revealed a lot of interest and relevant activity across Centers. The main outcomes of the session was agreement about the need for a community of practice to take advantage of the complementary capacities across Centers; and plans for a workshop to assemble and review existing resources related to the main results of the scoping study.

**Designing and implementing innovative gender-focused research across CG sentinel sites**

The session reported on the outcome of: a recent CRP gender focal point meeting, including a proposal for establishing cross-center/CRP work in 3-4 ‘gender sentinel sites’ in 2012; and gender and climate change-related work that is going on across the centers. The group enthusiastically supported a proposal for CCAFS to catalyze new gender work coordinated across centers and CRPs, focused on Climate-Smart Agriculture practices and interventions that are most likely to benefit women.

**Incentives for adoption of climate smart innovations**

Understanding incentives for change can help identify interventions that will support farmers. The session aimed to share work across centers, and identify key research questions and areas for collaboration. Proposed action points include: consolidating information across the CGIAR about costs and benefits of Climate-Smart Agriculture practices; literature review about what triggers change; and analyses of relevant actors and of examples of positive and negative incentives.

**Crop and rangeland forecasting**

Following a brief overview of the current Theme 2 vision and strategy for crop and rangeland forecasting, discussion highlighted work that addresses gaps in meteorological input data incorporating rangeland modeling for pastoralism systems, opportunities to link with pest and disease modeling, and interest in forecasting weather effects on aquaculture fish production. Promising areas of follow-up include: comparison of methods for reconstructing historic meteorological data, exploring the link with pest and disease modeling through a wheat or rice
blast case study, collaborative use of ICRISAT's on-station pest and disease data in southern India, and systematically sharing tools and data.

**What does Climate-Smart Agriculture mean for us? Research needs and collaboration in CCAFS**

Discussions focused on several driven by the underlying question: What is the substance of the Climate-Smart Agriculture (CSA) concept? ...and the resulting question: What does CCAFS understand as climate-smart? Some noted that CSA had already become a negatively charged term, which might require better ways of communicating, to make the term more concrete to climate change negotiators. Many simply wanted to learn more about the term and its implications. The group proposed a set of research questions, and outlined issues for a proposed paper.

**Day 2 Wrap Up**

Each convener gave a very short summary of outcomes and action points that came out of their parallel session. Session moderator Bruce Campbell highlighted differences between this meeting and the two previous CCAFS Science Workshops, a few key issues that came out of discussions, and plans for collaborative follow-up activities that came out of the workshop. The previous Science Workshop focused on ESSP collaboration. About 40% of proposed projects moving well, 40% moving slowly, 20% did not continue. This year, the meeting focused on bringing the CGIAR together for more effective action. Bruce cited examples to illustrate how discussions at meetings like this can shape the agenda. The discussion on Climate-Smart Agriculture is at the heart of CCAFS efforts to influence global climate policy negotiations. Commenting on the mitigation measurement session, he suggested that the best prospect for incorporating mitigation incentives that require measurement into UNFCCC protocol is for the whole CGIAR system to get behind it.

**Workshop Evaluation**

Participants were invited to fill out a workshop evaluation, to provide input for improving future CCAFS Science Workshops. Seventy-eight percent of the participants found the value received from the meeting very good or excellent, 22% found it satisfactory and none found it unsatisfactory. The majority of participants appreciated the networking possibilities, the quality and diversity of the presentations and the open way of discussions. Regarding the parallel sessions on day two, the opinions were more divided. While some participants expressed their appreciation for the opportunity to discuss specific science issues, others felt that the sessions lacked structure and called for clear instructions in what the outputs should be. Also many mentioned that the schedule was very packed, and there was a widespread agreement that the 8:00 am start on day two was too early. Some suggested the plenary presentations and parallel sessions should be split over both days to avoid a full day of either. In the question regarding what kind of sessions to include in future workshops participants pointed to activities promoting interdisciplinarity, partnerships and linkages between centers and individuals. Some participants also suggested inviting external speakers in form of NGOs and non-research partners. With regard to the venue facilities many disliked a meeting room with no windows and a venue with no open spaces.
Appendix 1: Report on the session, Diversification and intensification at the field and household level for climate risk management and adaptation

Fabrice DeClerck, Ashley DuVal and Jacob VanEtten

Background:

Questions remain as to how biological, ecological and socio-economic diversification contributes to risk management and adaptation to climate change of smallholder farming systems. We conduct a systematic literature review to determine how diversification has been used by small-holder farmers as a means of risk management. We focus on the forms of diversification in response to specific climate threats, and highlight mechanisms and direction of the contribution made by diversification. A primary objective of the review is to develop a typology of diversification options at the appropriate scope and scale for farmers in developing countries. We aim to answer two specific questions:

1. How does biological/ecological diversification contribute to managing climate risk and to adaptation to climate change at the field to landscape level?
2. How does economic/social diversification at the household and the community level contribute to managing climate risk and adapting to climate change?

Summary Report of Copenhagen Meeting Outcomes

The systematic review on diversification made substantial progress during the CCAFS meetings in Copenhagen as a result of feedback and discussion during three events: a Friday workshop amongst group members; Monday’s closed session reports amongst contact points; and Wednesday’s working group break out sessions. At all three meetings, a thorough presentation on the preliminary results of the systematic review built upon these definitions, opening a discussion on the methodology used in coding and databasing studies, as well as an overview of the structure and preliminary results of a meta-analysis built from a subset of the data for which average change in yield and income data were available.

The review uses Campbell Collaboration Guidelines for systematic reviews. These generally must have: 1) Clear inclusion/ exclusion criteria; 2) An explicit search strategy; 3) Systematic coding and analysis of included studies; 4) Meta-analysis (where possible). This study considers papers that feature: 1) risk management by smallholder farmers (particularly those risks related to weather, climate, pests, diseases) using diversification of crops, farms or households; 2) adaptation of agriculture to climate change in which diversification is a relevant part; 3) how diversification at the field, farm/household, community/landscape level can enhance resilience and ecosystem services; 4) how diversification of livelihood strategies can reduce climate-related risks and facilitate adaptation to climate change; or 5) how diversification can reduce resilience and increase vulnerability. At the time to of the meeting our database contained data and case studies from 142 studies in 45 countries as well as 17 regional and global reviews. Preliminary findings from this review suggest several key points. The majority of the studies found considered how diversification at the field, farm/household, community/landscape level can enhance resilience and ecosystem services (the third of the five inclusion criteria mentioned above). The majority of studies found focused on semi-arid regions, particularly of Africa, and targeted drought risks over other types of climate risks. Numeric data for increase in yield or income following one or more diversification interventions was available for 46 coded studies in contrast, increase in household income was only available for 8 coded studies. For the studies that included a single diversification element, there was a highly variable effect on yield that was dependent on the context, scale and nature of diversification. The effects of multiple diversification elements on yield, though reliant on few data points, exhibited an increasing upper bounds with increasing diversification (up to 900% increase). The same trend was found
for income diversification, but with a smaller number of studies, and a maximum 300% increase report. There appears initially to be an additive effect whereby the impacts of combining different site-appropriate diversification measures at different scales may merit further review.

**Discussions and Comments from Copenhagen Meetings**

The Copenhagen CCAFS meetings presented an opportunity to get feedback from CCAFS scientists. Below we highlight primary comments made:

- It was agreed upon that the concept of “social diversification” is poorly defined if it has appeared at all, and that too broad of a set of criteria considered to be diversification could make the results of the review less relevant. The social relationships, structures and processes relevant in particular case studies will be inventoried within the matrix. Similarly it was suggested that there was no use for the term livelihood diversification.
- Having the database georeferenced and easily searchable would add value to the project.
- Several participants at all three meetings urged not making diversification a bin in which all interventions are placed. The study should give the state of the evidence on how diversification helps to manage risk. It should be broad in scope: households, livelihoods, resilience, etc. On the other hand, it should be narrow in specifying the evidence of impact. In the selected studies we should be able to clearly identify what is being diversified (diversification units), and what is the result of that diversification is (increase in yield, cash, number of livestock?).
- Several comments were made targeting the search terms used. Recommendations were made that specific climate risks be including in the search terms. For example: Weather, rainfall, precipitation, heat wave, frost, hail, storm, drought, cyclone, variability (drop papers that don’t include these). Others suggested expanding the search terms with specific searches for agricultural adaptations to specific climate risks: drought, etc.
- Regarding the diversification search terms, recommendations were made to Reduce terms here unless well justified. Reviewers should resist temptation to include studies that focus on adaptation strategies that aren’t diversification e.g.: zai pits, irrigation, etc. (unless they have a specifically biotic component)
- Several new coding columns were added to the data extraction matrix including: units of variable and response; For example, it was suggested that we add indicator terms such as indicators of benefits with regards to household, livelihood, risk and resilience (income, production, assets, food security, poverty, poverty traps, adaptive capacity, risk resilience. Filter by farm/household outcomes and impacts); and Types of Risk including outcome/impact indicators- could narrow to climate/weather risks.
- Some participants requested clarity of terms, particularly relating to scale. For example that we clearly define scale vs. level & scope vs. extent. Similarly we were asked to be clear about genetic versus varietal diversification; and landscape diversification versus land use diversification.
- Other possible uses for such a dataset were discussed, including a searchable web portal, peer reviewed paper, and a flow chart of diversification options given pre-existing conditions
- The database is growing quite large, but there is a need to consider mechanisms. What are the ways in which diversification contributed to adaptation to climate risks? There needs to be a consideration of what these mechanisms might be. Adoption is a second criterion that may need to be more explicitly considered, what are the cases where diversification strategies were readily adopted, and what were the enabling conditions behind these adoptions? Related, some mentioned that diversification is a strategy used by the wealthy, or the extremely poor. Consideration of how social status interacts with incentives to diversify merit attention.
- Some suggested that the CCAFS and WOCAT databases might have additional information or insights on types of diversification strategies and merited some exploration.
• It was suggested that the benefits that ‘simplification’ has brought to agricultural systems (particularly yield benefits) be taken into account and the interaction between diversification and ‘simplification’ at different scales/levels.

Next Steps
As a result of the workshop, several key next steps were identified:

• Concern was expressed that we did not have enough data to draw conclusions. In light of this limitation, and the new search terms mentioned above, we have agreed to continue to populate database; extension of Ashley’s contract by 4 weeks to allow the time for this and the writing.
• CART analysis on the database to identify pathways of diversification strategies.
• Analysis of successes and failures by region, what do these lessons suggest about geographic transfer of diversification strategies.
• Once completed, upload the database to the AMKN database giving access to studies by topic, climate risk and geographic location.
• Pull out the particularly relevant papers and studies and conduct and in-depth read of their methodologies in order to guide CCAFS research on diversification and CC.
• CCAFS working paper and publishable article detailing process and results.
• Development of a Portal/Community of Practice on Diversification and Climate Risk Management of which the first draft has already been circulated.
• Proposal writing for follow up projects moving towards designed diversification. In collaboration with CCAFS Theme 4’s work on household level modeling, proposals will seek field and model based research in learning landscapes that move away from “random diversification” to diversification by design. That is, taking advantage of a clearer understanding of the ecological and economic drivers of successful diversification strategies, combined with existing models of regional climate risks to move towards a climate smart agriculture.

Timeline for Moving Forward

• **End of May**: conclude review and coding of literature; summary and basic statistics
• **June 7th**: more advanced statistical techniques, and qualitative summary
• **June 14th** – circulate draft of systematic review to team members
• **June 20th**: deadline for comments to draft
• **End of June**: Submission of final document
Appendix 2: Report on the session: Toward a protocol for measuring mitigation in smallholder systems

Todd Rosenstock and Mariana Rufino

Participants: Reiner Wassman, Henry Neufeldt, Michael Peters, Mario Herrero, Lini Wollenberg

Purpose of Session: Discuss plan for consistent measurement protocol within CGIAR

Goal of project: Produce simple, rigorous, consistent approach for GHG measurement of mitigation potentials of whole farms and landscapes to support wider data collection among smallholders in the tropics.

Long term goal (3-5 years): Testing and refinement of protocol, data collection and capacity building

Short term goal (18 months): Preparation and design of protocol

- Produce review/inventory of what CG is doing, what others are doing and other lit reviews. Identify gaps (IRRI has useful lit review for rice already)
- Compendium of current methods in use by CG scientists as best practices: including both state of the art and robust simplified methods with cost data; web-based “best practice manual” that can be updated.
- Produce spatial analysis of priority systems, scales and sites for initial protocol application; methods should be useful for others as decision-making tool.
- Design protocol
- Identification of operational sites and partners

Notes from discussion:

These are not prescriptive, but rather methods for use in the CG. That said, there is huge demand for CG to take leadership and make available best practice methods. This project could provide a reference. The document should show the extent to which there is consensus or justification. We should produce basis to justify methods as well.

Need to take care to coordinate with other efforts to establish standard methods right now.

The manual should aim to make it easy for other to not have to invent methods from scratch. We can make suggestions in terms of spatial scales, experimental design, decision trees, technologies, etc., that are known/expected to result in high confidence data. Include examples for how you would set up in different systems and regions; SE Asia, key systems.

Is there a need to distinguish intense versus non-intensive systems?

Regarding site/scale/hotspots: CG has standard methods for recommendation domains and is good at it. Spatial analysts at consortium level have spatial information.

Focus on mitigation potential; but consider that these can also be applied to country inventories.

Proposed criteria for selecting sites:

- T CO₂ eq/ha, capita, kg mitigation potential
- Sites with potential for growth: sustainable intensification; expansion; Yield gaps
- Income and food security
- Representation - AEZ
- LT vs. ST
- Environmental impact globally
Consider whether large-scale systems like 150 M ha grasslands will be included in the hot spots analysis, not just smallholders in poverty.

**Logistics**

Work with existing labs- and post-docs; need logistic support on the ground. Ask if they need support. Involve ILRI An Noughton priority setting; spatial analysis. Contact the three spatial modelers at ILRI (An Naughton,...), CIAT (Aracelli). I. Rao, Glenn Hyman) and ICRAF (Tor) for recommendations about GIS specialists. Position post-docs to have balance across lab (e.g. 1) and regions (e.g. 2). Use inventory of CG activities to identify where researchers are investing in measurements already and build in these efforts to extend work.
Appendix 3: Report on the session, *Modelling climate impacts on pests and diseases*

**Convener:** Jürgen Kroschel - CIP  
**Note taker:** Roberto Quiroz - CIP  
**Participants:** Manuel Tamu – IITA; Jacob van Etten – Bioversity; Jill Cairns – CIMMYT; Pramod Aggarwal CCAFS; Andrew Jarvis – CCAFS; Fabrice de Clerck – Bioversity; Paul Kiepe – AfricaRice; Karen Garrett (Kansas State University, KSU)

The program of this session included two presentations on insect modeling (Modeling climate impacts on insect pests – J. Kroschel-CIP; Obvious and less obvious effect of climate change on pest and diseases – M. Tamo-IITA) and one presentation via Skype on disease modeling (Disease modeling and the CCAFS pest/disease scoping study - K. Garret-KSU). After the presentations followed discussions and some planning of joint activities between centers.

**Discussion**

Although global warming is predicted to increase temperature relatively more in temperate regions of the northern hemisphere warming seems to affect pests more in tropical regions due to continuous favorable conditions for development and the higher metabolism of organisms in a warmer environment. Warming is predicted to increase the abundance of pests but the models do not yet account for inter-species competition or for precipitation, and it will be crucial to link these models to crop growth models to assess yield impacts. Machine learning approaches could be applied in the interface of pest and crop growth models and in platforms to infer about management needs. The pest risk assessments will be used for informing and preparing national programs on possible changes of pest distribution and abundance and for preparing and planning pest management interventions. Further, the phenology models can be used to assess within season pest population growth and determine timing of interventions (e.g., application frequencies of biopesticides). Models for control agents can be used for a joint distribution analysis with its related hosts or assessing the potential of biological control agents (e.g., parasitoids) to establish in new regions as part of classical biological control programs. Risk assessment in developing countries are lacking, so these tools are a good way for building capacity and develop the capacity of analyzing climate change related pest risks.

**Conclusions**

There is a lot of interest at different centers to include pest risk assessments in their working plans. CIMMYT, for instance, has collected phenology data for maize pests and would like to collaborate with CIP to develop models and conduct risk assessments. Bioversity would be interested in working on banana pest modeling. ILCYM is built on R-codes, which is a common language used by most centers, so other applications could be developed by other centers.

The main conclusion is to take advantage of each other center capacities and bring the pest and diseases modeling group together to expand models and tools. A workshop will be planned and used to assemble and review existing resources related to the main 5 results of the scoping study and to plan for the development of new shared resources.
Appendix 4: Report on the session, *Designing and implementing innovative gender-focused research across CG sentinel sites*

*Patti Kristjanson*

**Key Outcome:**

The group discussed and enthusiastically supported pursuing a proposal that CCAFS play a catalytic role in coordinating new gender work in collaboration with multiple CG centres and CRPs, addressing the following overarching questions key for CCAFS and other CRP’s: *Which Climate Smart Agriculture (CSA) practices and interventions are most likely to benefit women? Where and how will women be benefited? What interventions, actions, strategies and approaches will help stimulate CSA activities?* The idea is to build on the highly collaborative work being led by multiple CRPs on improved varieties, livestock, fish, AF, land and water management, improved climate services, etc., in areas/hubs and make them CG ‘gender sentinel sites’.

**Follow-up Action Points:**

- A Technical Advisory Group made up of experienced gender analysts from IFPRI, ILRI, and U. of Minnesota is being established to help CCAFS identify research gaps, review approaches, refine tools, and train implementing partners in CCAFS regions.
- Follow up with potential hub coordinators (CRP’s); as well as potential gender coordinators (CRP gender network).
- Advisory group to review ongoing and proposed site and regional action research and ensure the gender component is strong.
- Plan for gender analysis of CCAFS household-level IMPACT work; start with Nyando data to show what questions we are already able to address.
Appendix 5: Report on the session, *Incentives for adoption of climate smart innovations*

*Lini Wollenberg*

**Facilitator:** Jon Hellin

Understanding the incentives for change can help identify interventions that will support farmers to innovate and change practices. The purpose of this session was to better understand existing work across CCAFS among centers and develop a shared understanding of key research questions and areas for collaboration. The session reviewed existing data sources for understanding incentives, and identified key hypotheses and action points to guide future research.

**Existing research**

**CIMMYT:** CSISA and SIMLESA surveys in S. Asia and E and S Africa have comprehensive costs, benefit and agronomic survey data at plot, household, community scales, that includes 12,000 households. Also DTMA work which is relevant. Includes varieties of different crops, fertilizers, rotations, SWCTs, tillage practices, breeding practices, crop residues and their use (types of climate smart innovations they look at). We also look at nutritional parameters. Much of data overlaps with CCAFS sites. Data are cross-sectional, although include historical information, but all recall. Could we turn some of these sites into sentinel sites? That would be great.

**ILRI** has a lot of similarities with SIMLESA (systematic approach). Collecting household IMPACT data in all CCAFS action sites (15 in total, approx. 200 households in each – total 3,000 households). Data useful for studying internal household dynamics related why people adopt certain practices (decision-making). Also cross-sectional – but asks what have been people doing in the past. Other studies looking at the determinants of adaptation (Kenya, Mozambique, Mali, Tanzania, Ethiopia) = what is driving adoption of CC practices, what are the perceptions etc. Used original vulnerability maps to select places for data collection. Info on what are people doing in terms of changes in crops as adaptation practices, what are they doing with water management, feed sources for animals, transhumant migration etc. Systems classifications – what differences between systems, what role of market access? ILRI also doing data rescue to create repository that could be useful for future studies. There is a lot of data in these areas in the CGIAR. HARVEST Choice/ STANWOOD data rescue. This could be more of a collective effort to get the repositories together.

**IFPRI** as well has a lot of survey data.

**CIAT:** Colombia data but on a regional level, municipality level (not household). Information about socio-economical information, implications of implementation of alternatives (both adaptation and mitigation).

**Issues Raised in Discussion**

- Needs for:
  - More longitudinal/panel data
  - Going beyond economic data
  - Understand the reasons why people legitimately don’t adopt (and should not adopt)
  - Debate about the role of economic benefits as primary driver
  - Mismatch between what the donors ask about impact pathways and the resources of researchers for monitoring change over time.
  - Need to focus on innovation systems, not necessarily adoption alone.
• The CG should consider how to integrate/collect incentive and adoption work across the system. This also relates to the sites which are common and could be managed across and within CCAFS.
• There is a lot of knowledge and insights from work that has been done that is not necessarily climate change related (e.g. from the 80s-90s) and we should make sure this knowledge is not lost.
• What hypotheses can we bring out from our experience around incentives: Research needs, questions and hypotheses

**General discussion**

• Pressures for intensification are driver of adoption/innovation – e.g. high protein diets for livestock. The more market-oriented system, the more push for intensification.
• How have the farmers to whom we have introduced agroforestry data used it? Here we have a lot of gaps in research. Time-lapse concern.
• DFID and other donors are very keen on assessing impacts. This could be a valuable source of information about adoption. But the studies are often done need to be more focused on the impact (of extension) research further. But how can we differentiate between the impacts of the extension and the research?
• Value of large surveys for being able to calculate benefits, costs, barriers etc. which can inform climate finance, as we can understand the relative costs as well.
• Longitudinal adoption issue and social tipping points. What causes people to behave in different ways. What data is there that would convince us that certain practices will be adopted? Cigarette smoking example – there could be more layers of tipping points.
• Why not look at climate champions? Understand how are they different from farmers in similar socio-ecological systems? Why not go in depth there?
• Cultural norms, behavioral change and subjective factors.
• CCAFS-CARE study about the political ecology of adoption looking at the cultural issues as well. Concern that large-scale adoption could be of detriment to the farmers. IDS skepticism about promoting climate-smart technologies at the large scale.
• How does CCAFS community connect to broader agricultural communities and research related to adoption pathways? Maybe also look to what has happened in developed economies for lessons-learned. Would be valuable in terms of looking at the whole theory of adoption. Useful to look at some of the theories around adoption.
• Rigorous science is missing on the reasons why technologies stay or die out after project stops (beyond research projects but also development projects). What makes certain technologies go beyond the stage of the project to spread across other scales? What are the ingredients for making this change happen more often?
• When we are thinking about incentives, shouldn’t we be thinking about the whole innovation systems within which farmers will be adopting? Relates to Mary’s comment that when we do PAR we shouldn’t focus just on farmers but also private sector, distribution, cooperatives, decision-makers etc. Role of different agencies and political environment.
• Adoption will take place if there is an immediate and ongoing benefit. Should focus on the immediate benefit NOW. Things can actually be simple.
• Although quick fixes is not the way to go. If a technology is not adopted by a farmer it doesn’t mean it cant generate social benefits. Then maybe countries and governments should be incentivized to support such practices through subsidies etc.
• The issue of climate – in preparing for drought and pushing for drought-resistant seeds (e.g. extension services pushing them) the inter-annual and decadal variability should also be considered. Meteorologists should be part of the system to advice on what kind of seeds to push for in different years. Use of information technologies to support this – Global Framework for Climate Services.
• We are not just interested in adoption but causal factors of innovation as well.
**Key hypotheses identified by group:**

- What is the role of social benefits in incentivizing adoption? What is the role of those benefits that go beyond the private benefits?
- Understanding what social tipping points consist of? What are the critical junctions about a major change?
- What is necessary for transformational change? Test hypotheses of paper on transformational adaptation in agro-ecological systems (attached to these notes).
  - What is transformational?
  - Different responses – e.g. a crisis happens and smallholders give up farming altogether and move into the city.
- Should we focus on incremental change building on local practices?
- How to connect and match micro and macro analyses, so that micro level data can fit into macro level analysis (frequently the information does not match).
- Incentives are different for technologies that bring immediate and more delayed or long-term benefits. Technologies with delayed benefits should be coupled with other incentives.
- Critical farm size beyond which adoption of climate smart technologies will not take place. Size could be a proxy for issues like poverty, part-time farmers etc. Assets are critical – below a certain level, implementation of new strategies might be impossible.
- We need to understand dynamics and trade-offs over time. Household modeling presented by Mario/ILRI could be very useful for this. Managing welfare-environmental trade-offs over time.

**Action points**

Areas that we might want to pursue:

- Consolidate data from around the CGIAR on the cost and benefits of different climate-smart agricultural practices. Based on such data, examine what additional incentives are required for different types of farmers in different systems.
- Literature review on what triggers change? Changes in agricultural practices. But first consider a conceptual framework around agricultural change & climate change – what would be important to consider when examining change related to agricultural practices. Need to be clear about what kind of change we are talking about (e.g. changes in income at local level?). Clear about the triggers/incentives at different scales from local to global (e.g. policy changes). Analysis of the actors and institutions. Analysis of the uptake environment.
- Examples of when people have been forced or bribed into adopting strategies. What are also the positive incentives (beyond “force”)? Subsidy programmes?
- Analysis of actors and institutions at multiple scales.
Appendix 6: Report on the session, What does climate-smart agriculture mean for us? Research needs and collaboration in CCAFS

Henry Neufeldt

Participants: Lini Wollenberg, Gerald Nelson, Maren Radeny, Patti Kristjanson, Alex de Pinto, Peter Laderach, Lieven Claessens, Jon Hellin, Jill Cairns, Helen Leitch, Michael Peters, Lisa Goddard, Lindiwe Sibanda, Jürgen Kroschel, Peter Craufurd, Holger Meinke, Todd Rosenstock, Mary Scholes, Fabrice De Clerck, Sonja Vermeulen, Bruce Campbell, others I have missed (sorry, I forgot to have an attendance list made, please add).

Expectations of the group participants

Many of the participants simply wanted to listen and learn more about the term, including research on climate-smart agriculture, possible impacts on agricultural productivity, knowledge management tools for CSA and how climate science can inform it. There were several statements around the questions: Is there climate-smart agriculture? What is climate-smart agriculture, or better, what is not climate-smart agriculture? And what would be climate-dumb agriculture? This was driven by the underlying question: what is the substance of the concept? There were also comments indicating that CSA had already become a negatively charged term, which might require better ways of communicating CSA, in particular to make the term more concrete to climate change negotiators. The resulting question was: what does CCAFS understand as climate-smart?

New definition of CSA: Agriculture that sustainably increases food security through adaptation to and mitigation of climate change.

What CCAFS means by CSA and what it can and cannot deliver, for Science magazine Policy Forum

• Criteria what is CSA (for C-market, insurance)
• Short-term (risk) vs. long-term climate trends
• How practices play out over time
• Address the landscape scale (what is dumb at one scale can be smart at another)
  o What are the right indicators to measure these things
  o Ultimately: A + M are needed to achieve FS
• Use case studies: local, national, global for illustration
• Timeline: paper should be ready by COP18 (early December)

Longer-term research questions and actions:

• Permanence and additionality
• What is the impact of including or not landscape scales?
• What are the key indicators to describe CSA?
• What are the patterns / options that are appropriate for given conditions?
• What are the drivers and indicators of change to introduce CSA?
• What are the short-term vs. long-term benefits and tradeoffs (at different scales interacting with each other)?
• What does CSA look like under alternative scenarios?
• What is really feasible by 2050 in terms of CSA (building on scenarios)?
• Meta-analysis of our knowledge of CSA
• Collect missing key data (e.g. N, P fertilizer)