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The Agricultural
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and Improvement Project

PHASE 2

Fundamentals Workshop Report

Regional Integrated Assessments of Farming Systems in Sub-Saharan Africa and South Asia

JUNE 24-30, 2015

A'ZAMBEZI HOTEL | VICTORIA FALLS, ZIMBABWE

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The AgMIP Coordination wishes to thank the Leaders, Resource Persons, Researchers, and Stakeholder Liaisons for their interest, patience, commitment, and effort that make AgMIP such a great community.

AgMIP The Agricultural Model Intercomparison and Improvement Project

Phase 2 Fundamentals Workshop Report

June 24 - 30, 2015 | A'Zambezi Hotel | Victoria Falls, Zimbabwe

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A cool bright June morning greeted the researchers arriving at the A'Zambezi Hotel in Victoria Falls, Zimbabwe late last month as they joined over 80 participants from 24 countries in attending the Agricultural Model Intercomparison and Improvement Project (AgMIP) Regional Fundamentals Workshop. Inside the large meeting hall filling up with participants, Cynthia Rosenzweig and John Antle (AgMIP Co-PIs) were ready to kick-off Phase 2 of the AgMIP regional research projects.

Since 2012 AgMIP Regional Research Teams from institutions in Sub-Saharan Africa and South Asia along with AgMIP leaders have been co-developing protocols for integrated assessments of the impacts of variable and changing climate on regional food security. The resulting Regional Integrated Assessment Protocols link climate, crop, livestock and economic models for mid-century projections of agricultural productivity, income and poverty rates. The assessment process includes interactions with regional Stakeholders who provide guidance on planning or policy actions and adaptations to test in future model runs. Findings are shared with stakeholders from Sub-Saharan Africa and South Asia, who help to further define and refine key messages based on the scientific results.

In the first phase of activity the Regional Research Teams completed integrated assessments for specific climate scenarios, crops, economic indicators, and localities and shared findings with stakeholders. Now in a second phase, the teams will strengthen the systems approach by expanding investigations to include current and future timeframes for multiple sites and/or combined crop/livestock systems, additional crops and adaptations. Along with these improvements, the processes of engagement with stakeholders will be advanced with more specific intent, learning documented and shared. To enable this effort a Stakeholder Unit has been included on the Leadership Team and designated Stakeholder Liaison members on each of the regional teams. The new team members will help facilitate information exchange among the stakeholders and researchers in their regions.

Also new for phase 2 is the rendering of a conceptual web-based tool proposed in Phase 1. Named the AgMIP 'Impacts Explorer' this functional prototype for scenario and infor-

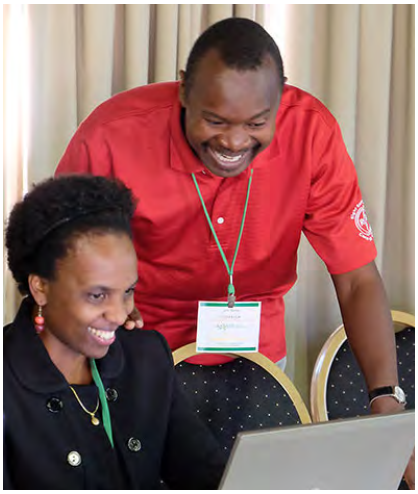
mation visualization will also support information exchange among stakeholders and researchers. The tool is being designed with user groups from key stakeholder areas to assist policy makers, planners and other interested parties in their exploration of data and results to inform decisions, and to help researchers better understand how to describe their findings for experts in other professions.

The workshop in Victoria Falls brought together members of the regional teams with AgMIP Principal Investigators and discipline experts for technical training, stakeholder engagement planning, Impacts Explorer development, and refinements to individual team's work scope. New team members learned about Regional Integrated Assessments and built skills in their disciplines. Returning team members expanded their skill base to include additional or complementary components – whether in economic, livestock, crop, or climate facets – and also learned about the stakeholder engagement team, the Impacts Explorer, and workflow management tools to help along the way.

The workshop began on Wednesday, June 24 with Rosenzweig and Antle welcoming the participants and thanking the local hosts Kizito Mazvimavi, Sabine Homann and Cordeliah Ndwalaza (all from the International Crops Research Institute for the Semi-Arid Tropics located in Bulawayo, Zimbabwe). Rosenzweig commented, "Phase 2 is very exciting, we are able to continue the very strong foundation of work from Phase 1 in creating the methodology for the Regional Integrated Assessments and the first manifestations of the new methodology."

Mazvimavi also welcomed the group and noted that in Zimbabwe, "Agriculture is the backbone of the economy and provides a living for more than 70% of the population. More than a third of the land is semi-arid/arid – our farmers in these areas are at the forefront of dealing with the challenges of climate change." He continued, "ICRISAT welcomes and supports AgMIP as an important initiative that places research at the priorities of national and local specific interests."

Following the introductions, Rosenzweig presented the State of AgMIP and Antle presented an overview of Phase 2. In his presentation Antle prioritized the main goals of the new Phase 2 research projects. The



first priority, he explained, is answering Stakeholders' questions including the development of the Impacts Explorer and knowledge products such as briefs. The second priority is "finding the answers" by improving the core activity of Regional Integrated Assessments. This can be accomplished by extending regional coverage, using new development pathways and scenarios, and testing more adaptations co-developed with stakeholders. Finally Antle stressed the importance of improving the science to provide better answers through more robust projections of climate change impacts and benefits of adaptation and thus increase the reliability of results.

In Phase 1, Antle continued, researchers worked to answer three core questions: What is the sensitivity of current agricultural production systems to climate change? What is the impact of climate change on future agricultural production systems? And what are the benefits of climate change adaptations? For the Phase 2 research an additional question will be included in response to Stakeholders' requests: What is the effect of adaptations applied in the current climate? By adding this question the future benefit of adaptations can be compared to the benefit for present-day farming systems.

Each of the research teams from South-eastern Africa, Southern Africa, West Africa, East Africa, Pakistan, Indo-Gangetic Basin, and South India then presented their team's plans for Phase 2 research. The detailed plans included proposed sites, crops, livestock, models, data and timelines to be included in the work over the next two years.

In the afternoon the workshop participants focused on stakeholder engagement and Phase 1 messaging. The teams broke out separately to discuss prioritizing audiences, distilling findings and designing appropriate messages and visualizations. The Impacts Explorer was also discussed by the teams as a tool for stakeholder use, introduced by Sander Janssen.

The next two days of the workshop were devoted to technical training sessions led by discipline experts. Antle and Roberto Valdivia led TOA-MD training sessions for the economists, Cheryl Porter and John Dimes held crop-modeling and IT training, Katrien Descheemaeker and Ramilan Thiangajarah introduced livestock-modeling, and Alex Ruane and Sonali McDermid conducted climate-modeling sessions.

Concurrently Wendy-Lin Bartels, Amy Sullivan and the Stakeholder Liaisons met with the Janssen and other members of the Impacts Explorer group from Wageningen University in the Netherlands and with local stakeholders from Zimbabwe. In small groups the stakeholders and researchers discussed elements of the Impacts Explorer development and likely users. This interaction will help the development team target appropriate stakeholders and provide information visualizations that can be useful for decision-making.

On day four of the workshop the participants met once again in the morning as a group to discuss pro-

tocols and how results from the different models would be brought into the Regional Integrated Assessments. Ruane, also AgMIP Science Coordinator, spoke about configuration of the climate protocols that will be followed by each of the teams.

In the afternoon each regional team met to create a stakeholder engagement strategy and define messaging. The preliminary strategies were then reported back to the group. The Stakeholder Liaisons will continue to develop these strategies with their teams and plan interactions with regional decision makers on an ongoing basis.

On Sunday, June 28, workshop attendees visited the Africa Center for Holistic Management, a nearby ranch that is implementing holistic livestock management strategies to reduce land degradation. The center gave a short introduction to the concepts of holistic livestock management and then demonstrated the field setup and herding. AgMIP workshop participants were able to ask questions and also provide scientific feedback to the center.

On Monday and Tuesday, June 29th and 30th, the teams met separately again to finish up their planning, which they shared in individual sessions with the AgMIP Leaders, including Antle, Ruane, Sullivan, and Carolyn Mutter (International Coordinator). On Monday afternoon Alison Brizius from the Chicago Computation Institute demonstrated FACE-IT, a cloud-based model workflow tool that will be helpful in improving the teams' computing capabilities and reducing the amount of time it will take for model runs to be completed.

The workshop wrapped up on Tuesday afternoon with team presentations outlining their work-plans including modifications made during the week, a timeline, and milestones. Each team left the workshop with clear research goals.

Several participants commented on the workshop experience expressing that they now clearly understood the AgMIP protocols and learned how to use the Face-IT tool. It was suggested to plan webinars in the coming months to share results, successes, questions, and discuss crop modeling, data and stakeholder communications.

The next workshop, to include new results from the second phase of Regional Integrated Assessments, is in planning for a Western Africa location in late February 2016.

A workshop attendee said about priorities in the next phase of work, "One of the most important things we need is feedback from our stakeholders. We have to track and find out if the policy makers are able to use our findings or our key messages to develop policy and how the policies have helped our farmers adopt some of the adaptation packages that we are developing."

The project is funded with the direct support of UK aid, the United States Department of Agriculture, The CGIAR Research Program on Climate Change, Agriculture and Food Security, USAID and the indirect support of numerous others.

AgMIP The Agricultural Model Intercomparison and Improvement Project

Phase 2 Fundamentals Workshop

June 24 - 30, 2015

A'Zambezi Hotel • Victoria Falls, Zimbabwe
Lodging at A'Zambezi Hotel and Rainbow Falls Hotel
Free shuttle service (5km transit)

Workshop Goals

1. Link lessons learned in Phase 1 to improved protocols and understanding in Phase 2.
2. Establish process for stakeholder input and feedback in AgMIP research framework.
3. Advance individual and collective project scope and deliverables.
4. Build skill in modeling, interpretation and messaging; enable teams to extend learning with counterparts in study regions.

Anticipated Workshop Outputs – RRTs – Updated Scope of work, to include:

1. RRT Indicators and Measurements for Success
2. Updated Roster of Team Members and Responsibilities, with verified Contact Information.
3. Stakeholder Engagement Plan (including Roles of Team Members); Communications Plan; Outreach Plan (including sharing of learning with other Team members)
4. Project schedule; Metadata and Data Upload Plan; Contributions to Prototype AgMIP Impacts Explorer; other 'Whole of Project' contributions
5. Updated Crop, Livestock, and Economic Model Setup for Baseline, RAPs, and Climate Adaptation; Updated Crop-Livestock Modeling Plan; CTWN Sensitivity Simulation Plan

Anticipated Workshop Outputs – Leaders – Guidance and Resources, to include:

1. Schedule and Location of RRT Workshops
2. Whole of Project Indicators and Measures of Success
3. Schedules of Web, Print or other Publication - Protocols and Guidelines; Data Management or Tool Updates; Prototype Impacts Explorer Milestones; Blogs, Newsletters, Updates.
4. Guidelines on Partnering and Leveraging; 'Evolution' strategy

WORKSHOP AGENDA

Day 1 – Wednesday, June 24, 2015

8:30 am: Plenary – Welcome, charge to workshop
9:00 am: Phase 2 Overview – *Cynthia Rosenzweig, John Antle*
9:30 am: Brief (10 minute) updates from each Team:
CLIP, Pakistan, East Africa, South India, CIWARA, IGB, SAAMIIP
10:00 am: Coffee and Tea available
11:00 am: Discussion
12:00 pm: Lunch
1:30 pm: Plenary – Enhancing the uptake of AgMIP outputs by stakeholders – *Wendy-Lin Bartels, Amy Sullivan*

- Translation: Prioritizing audiences, distilling findings & designing appropriate messages & visualizations
- Iteration: Building feedback & negotiation into the engagement process
- Tools: Envisioning the AgMIP Impacts Explorer

2:30 pm: RRTs & Leadership Breakouts: Developing plans for regional engagement

- **CLIP, Pakistan, East Africa, South India, CIWARA, IGB, SAAMIIP, Leadership**

3:00 pm: Coffee and Tea available
5:00 pm: Plenary

- **Report Back**
- **Overview of Day 2 & 3 Technical Breakouts** – *Alex Ruane*

6:00 pm: Adjourn
6:30 pm: Transport to Workshop Dinner

Day 2 – Thursday, June 25, 2015

8:30 am: Charge to Day 2 – *Cynthia Rosenzweig*
8:45 am: Technical breakouts

- **Crop Modeling and IT** – Configuration, setup, and calibration of historical simulations
- **Livestock Modeling** – Overview of LivSim model structure, main functions, input and output data
- **Climate** – overview of approaches and methods
- **Economics TOA-MD** – Protocols for implementing economic analysis using TOA-MD
- **Stakeholder Unit** – Reflections on Phase I, documenting lessons learned

10:30 am: Coffee and Tea available
12:00 Group Photo
12:15 pm: Lunch
1:30 pm: Technical breakouts (continued)

- **Crop Modeling and IT** – Configuration, setup, calibration, and IT Tools
- **Livestock Modeling** – Configuration, setup, and calibration of LivSim
- **Climate** – using AgMIP climate tools to create scenarios
- **Economics TOA-MD** – Protocols for implementing economic analysis using TOA-MD
- **Stakeholder Unit** – Eliciting stakeholder preferences for Impacts Explorer

3:00 pm: Coffee and Tea available
5:30 pm: Report Back
6:00 pm: Adjourn
6:30 pm: Leader check-in

Day 3 – Friday, June 26, 2015

8:30 am: Charge to Day 3 – *John Antle*
8:45 am: Technical breakouts
- **IT, Climate, and Crop modeling** – CTWN sensitivity analyses
  (Using one farm, analyze 20 GCMs, 32 CTWN and 99 C3MP analyses.)
- **Livestock Modeling** – protocols for simulating baseline, RAPS and climate adaptations
- **Economics** – TOA-MD and RIA
- **Stakeholder Unit** – Eliciting stakeholder preferences for Impacts Explorer

10:30 am: Coffee and Tea available
12:00 pm: Lunch
1:30 pm: Technical breakouts (continued)
- **IT, Climate, and Crop modeling** – CTWN and C3MP sensitivity analyses
- **Livestock Modeling** – Simulating rangeland biomass dynamics and grazing
- **Economics** – TOA-MD and RIA
- **Stakeholder Unit** – Process design & implementation for Phase 2

3:00 pm: Coffee and Tea available
5:30 pm: Report Back
6:00 pm: Adjourn
6:30 pm: Leader, ARP and RRT PI check-in

Day 4 – Saturday, June 27, 2015

8:30 am: Morning Re-group and charge for the day – Cynthia Rosenzweig
9:00 am: Disciplinary Integration for Implementing the RIA Protocols – *John Antle, Roberto Valdivia*
- Configuration of RAPs and adaptation packages

10:30 am: Coffee and Tea available
12:00 pm: Lunch
1:30 pm: Plenary - Charge to RRT Breakouts – *Alex Ruane, Wendy-Lin Bartels*
- Interpretation of results from Phase 1
- Planning and determination of roles for Phase 2
- Stakeholder engagement strategy
- Update of expected time-line for deliverables
- Communication plan

2:00 pm: RRT breakouts (AgMIP leaders float among groups)
- **CLIP, Pakistan, East Africa, South India, CIWARA, IGB, SAAMIIP PI meetings**

3:00 pm: Coffee and Tea available
5:30 pm: Report Back
6:00 pm: Adjourn
6:30 pm: Leader, ARP and RRT PI check-in

Day 5 – Sunday, June 28, 2015

8:15 am: Convene in your hotel lobby
8:30 am: Buses depart from A'Zambezi and Rainbow Hotels
9:00 am: Field Trip – Africa Center for Holistic Management
- **Bring sunscreen, hat, camera, small notebook, pen, spending money**
- **Transport, lunch, water and guide provided**

3:00 pm: Board buses to return to hotels or continue to view Victoria Falls
6:30 pm: Leader check-in

Day 6 – Monday, June 29, 2015

8:30 am: Morning Re-group and charge for the day
9:00 am: RRT breakouts
(IT rotates through RRTs to discuss metadata and input/output coordination)
9:15 am: CLIP
9:45 am: Pakistan
10:15 am: East Africa
10:45 am: South India
11:15 am: CIWARA
11:45 am: IGB
12:15 am: SAAMIIP
10:30 am: Coffee and Tea available
12:30 pm: Lunch
1:30 pm: Cross-disciplinary breakouts
- **Crop, Climate, IT, PIs** – FACE-IT workshop for crop and climate analyses.
- **Livestock** – Modeling effects of variability and extreme events
- **Economics** – complete work
- **Stakeholders** – complete work
- **PI Pullouts to preview advancements in RRT work plans, milestones, deliverables**
    - 1:45 pm: SAAMIIP
    - 2:15 pm: IGB
    - 2:45 pm: CIWARA
    - 3:15 pm: South India
    - 3:45 pm: East Africa
    - 4:15 pm: Pakistan
    - 4:45 pm: CLIP

3:00 pm: Coffee and Tea available
5:30 pm: Report Back
6:00 pm: Adjourn
6:30 pm: Leader, ARP and RRT PI check-in

Day 7 – Tuesday, June 30, 2015

8:30: Morning Re-group – Report Backs and RRT Breakouts charge
- Connections between crop, livestock, and economics models to address stakeholder questions

9:30 am: RRT breakouts
- **CLIP, Pakistan, East Africa, South India, CIWARA, IGB, SAAMIIP**

10:30 am: Coffee and Tea available
12:00 pm: Lunch – **Updated RRT Work Scope Documents Due**
1:30 pm: Afternoon Plenary – final presentations, and way forward
- **SAAMIIP, IGP, CIWARA, South India, East Africa, Pakistan, CLIP**

3:00 pm: Coffee and Tea available
5:30 pm Workshop Adjourn
6:00 pm: Leader check-in

2015 REGIONAL MEETING
VICTORIA FALLS, ZIMBABWE, JUNE 24-30

STAKEHOLDER UNIT REPORT

Wendy-Lin Bartels wendylin@ufl.edu & Amy Sullivan amysullivan3@gmail.com

30 July 2015

BACKGROUND ON THE STAKEHOLDER UNIT (SU)

The Stakeholder Unit (SU) has been created within AgMIP in order to increase the utility and relevance of the project's science outputs. As set out in the SU Outcome Logic Model, the unit's vision of the future is that *AgMIP contributes to evidence based decision making at continent, region, country and local levels by generating more relevant and robust projections of climate impacts on agricultural systems—of use to decision makers. AgMIP's Stakeholder Unit has enhanced the willingness and ability of leadership and teams to plan and implement projects with users' needs and frame of reference at the forefront--scientists build models that generate outputs or results of use to stakeholders*.

The SU has established a number of principles that guide its on-going work:

- Sustainability — building a foundation
- Engagement — on-going communications for building trust and relationships
- Partnerships — essential for getting to outcomes
- Transparency — informed decisions to meet needs
- Inclusivity — all team members must contribute

The SU has designed four main pathways for achieving anticipated outcomes:

1. Capacitate a cohort of scientists who are willing and able to engage decision makers in meaningful ways to increase the relevance of their models to climate/crop/livestock decisions.

2. Develop capacity of all AgMIP project members to build users into the research design and development processes. SU activities contribute to models that are well integrated, coherent, inter-dependent. SU helps change the way models are planned, developed and rolled out -- with particular attention to relevance and context—contributing to their success.

3. Document best practice for building the capacity of researchers to: understand importance of stakeholder engagement; engage next users and end users of scientific research products from inception, and document stakeholder feedback to be incorporated into the research process.

4. Contribute to early generation AgMIP Impact Explorer (and possibly other tools) whose legacy is still relevant to climate change adaptation decision making.

As part of the SU's documentation and reflection this report documents activities and observations from the SU during the recent AgMIP regional meeting in Victoria Falls, Zimbabwe. The report consists of a summary of what was accomplished, insights into the significance of select aspects of learning, reflection on RRT progress throughout the course of the workshop, and implications for activities going forward.

This report is not meant as a verbatim record of session outputs, although some of those are included, but rather a more selective account of significant aspects of SU/AgMIP learning and implications for increasing the relevance of AgMIP outputs to a wide range of stakeholders. Therefore the report is not structured for uptake by wide audiences beyond AgMIP participants.

HIGHLIGHTS

WHAT DID WE ACHIEVE IN VIC FALLS?

Exploring "Meaningful" Stakeholder Engagement in AgMIP

The SU focused a significant amount of time building a more nuanced, relevant and profound understanding of "stakeholder engagement" among participating AgMIP scientists. Two plenary sessions with the whole group (Wednesday and Saturday afternoon) and two technical sessions (Thursday and Friday) for Stakeholder Liaisons (SLs) presented diverse interactive learning spaces to advance conceptual understandings. Such understanding resulted in deeper consideration of stakeholder engagement within teams when planning activities for Phase II. Work plans that RRT PIs presented on the final day of the workshop indicate that all teams advanced in their thinking and some teams managed to express clearly the specific objectives for different stakeholder-related activities on their timelines. Identifying particular objectives for each event is essential so that SLs can guide teams to design appropriate spaces, ensuring meaningful interaction among scientists and stakeholders -- with the ultimate goal of increasing relevance of AgMIP outputs to a range of stakeholders—including development of the Impact Explorer.

Although significant progress has been made increasing understanding of the many possible manifestations of stakeholder engagement, considerable work remains. The challenge includes the wide range and evolving nature of meaningful stakeholder engagement in AgMIP—it is –and should be considered a moving target. Therefore principles and process are key.

- **Interpreting Outcomes of Phase I and Refining RRT Messages**
  Team members worked across disciplines to consolidate key messages from AgMIP Phase I findings (See pg. 11). In sharing these across teams, they reflected on the pros and cons of being very specific vs. too general in terms of expected changes. Some messages appear very generic, such as: *climate change will have detrimental effects on agriculture.* Some participants wondered whether such findings would captivate the attention of stakeholders, or what use that message might be to any particular stakeholder.

  > ***"Climate change is a crowded space. How can you add something that they don't already know?"*** - question from an invited expert crop modeler.

  The CLIPS team shared their experience of co-developing Phase I messages through discussions with collaborating CG-system researchers as well as with non-scientist stakeholders. This example demonstrated the importance of planning for several iterations of message framing in order to situate AgMIP science within local stakeholder' contexts and transform research findings into more relevant and salient information. Appropriately translating AgMIP science is less about finding the right words to create a message and more about determining what stakeholders care about in order to frame the message within that specific context. This process can be considered an effort at mutual learning—where all sides contribute to developing meaning from science.

Vic Falls cross-team discussions helped participants progress from viewing stakeholder engagement as a "message delivery activity" (in which documented findings are given *to* stakeholders) to thinking about iterative processes of "meaning making" *with* stakeholders. The great challenge for AgMIP is to produce meaning from numbers beyond this scientific community.

Although working with non-research stakeholders to create meaning from science is second nature to a number of AgMIP scientists it was not designed as an integral activity to the project. Therefore a significant SU challenge is opening that door to AgMIP scientists and leadership—the mere fact that different users will need science interpreted differently is an emerging concept for many.

- **Prioritizing Target Stakeholders**

  An exercise in prioritization encouraged RRTs and Leadership to arrange those stakeholders who had participated in the first phase of AgMIP according to their levels of interest and influence. Participants admitted that although the task appeared at first to be simple, it became far more complicated and sometimes contentious, demanding discussion and even consensus building among team members with differing perspectives. Results show that the quadrant for high interest and high influence include government agricultural ministries (policy planners and Extension program developers), development organizations, donors, and NGOs (See pg. 12). Teams will attempt to reach district, provincial, regional, national, and global levels of decision makers.

  Teams continue to struggle with the issue of farmers, who many RRTs still view as priority audiences for AgMIP. Following much discussion, however, SLs acknowledge that considering the DIFID goal of influencing policy for development, and in light of the limited amount of time available for engagement, it may be more important to reach farmers' associations and production organizations than targeting individual farmers. RRTs need to plan interactions wisely for Phase II, especially as teams work to develop tools for the IE and identify potential users of this technology. The target user of the IE is a technical audience with analytical and interpretive skillsets. *This very simple exercise in stakeholder prioritization should have been done at project design by each RRT and leadership, and then re-iterated every six months or so as evidenced by the continued mention of farmers as users of AgMIP outputs that were never meant for them. Deeper interrogation of this question by different AgMIP actors would have given insights into how best to structure messaging activities—as an on-going process in AgMIP.*

- **Designing Effective Engagement Processes**

  Through a brainstorming activity in plenary, participants listed the reasons to engage stakeholders in AgMIP. (See pg. 17). Later, during technical sessions, SLs debriefed the significance of this exercise and concluded that having clarity on the specific objectives associated with engagement is important because they determine the type and number of stakeholders invited, as well as where meetings should be held. Furthermore, by differentiating among different stakeholder groups (policy advisors vs. farmers) engagement strategies can be diversified and appropriately tailored to different

audiences. SLs noted that successful meetings are impacted greatly by professional process design and facilitation. Simply inviting a group of stakeholders around a table and hoping for valuable input will not lead to meaningful feedback or collaborative learning.

- **Determining how to Document & Incorporate Stakeholder Feedback**
  Merely delivering AgMIP messages into a void through brochures, pamphlets and policy briefs does not constitute "stakeholder engagement" for AgMIP. Although such communication products are important and are expected for each RRT, greater effort must be spent on targeting outputs toward specific users and documenting stakeholders' responses to AgMIP research. For instance, SLs will record the questions asked at meetings, the types of suggestions stakeholders offer, how input affects message framing, and how modelers rethink their science as a result of stakeholder contributions. As important as it is to collect evidence of the uptake of AgMIP results, it is equally valuable to determine the barriers to uptake. SLs will therefore describe if and when AgMIP results are not adequate for incorporation into policy planning or decision making. They will also assess how intermediary AgMIP data is transformed by stakeholders for their own uses. A more detailed discussion of SL documentation for AgMIP is available on pg. 21.

Interacting with Stakeholders to Advance IE

Thanks to the gracious efforts of the CLIPS team, SLs had the opportunity to interact with a range of stakeholders from Zimbabwe, who joined the small SL technical session from Thursday afternoon until Friday lunchtime. The invited guests consisted of those who had previously attended CLIPs stakeholder engagements and two who were new to the project—one representing the ministry responsible for climate change planning and one representing the private sector (See pg. 14). There were multiple objectives of including stakeholders in the meeting but the primary interest was to continue discussions with them about processes and content related to the Impact Explorer.

Facilitated discussions were used to elicit thoughts and ideas related to potential users, uses, preferences and processes for development of the Impact Explorer. A critical point of understanding emerged from these sessions when clarity was reached on the ultimate user of the IE -- ***"The one who holds the mouse"*** --- became a reference phrase for those expected to actually use this emerging technology. Successful matching of AgMIP results with the needs of different audiences will require teams to think strategically about the strongest links between the information supply and demand sides. The more deeply AgMIP can understand stakeholders' "stake" in the research findings, the more easily entry points can be determined for further communication and tool development. SLs will be working closely with IE team and "user panels," consisting of motivated stakeholders from the regions (so-called "ambassadors of IE") will be invited to provide feedback on the IE.

Cross-team Exchanges & Learning

> ***"Explaining to each other helps us realize our own process"*** – SL comment on the activity in which Africa teams interacted with S. Asia teams about key messages from Phase I and target stakeholders for Phase II.

"When we interacted with the other group, it helped clarify the hierarchy of the messages and possible techniques for raising interest among different stakeholders." SL comment during a technical session debrief of the above-mentioned Day 1 activity.

Opportunities to share, listen, reflect and learn about how AgMIP RRTs have been engaging stakeholders are rare. Written responses to surveys and SL reports are one dimensional and shallow with few insights about how to improve engagement. Given the approach to meeting planning and organization—most joint time is spent in classroom setting with few opportunities for learning by reflecting, the SU tried to establish a different kind of agenda that focuses on experience (rather than expert) based learning. The SU values opportunities for this kind of learning and will continue to invest in these.

WHICH ASPECTS NEED FURTHER DISCUSSION & ACTION?

- **RAPS:** Teams may require more cross-disciplinary (and cross-RRT) discussions in order to outline how the Phase II process of developing RAPS will be similar to and different from Phase I, particularly for stakeholder engagement. Modelers should anticipate spending time preparing for these stakeholders engagement events and brainstorming with SLs about the specific entry points for stakeholder input within the modeling process, as well as the types of questions that are likely to illicit the kind of information that is of highest relevance to the research. A deeper understanding about the kinds of inputs and discussions /evaluations that modelers anticipate from stakeholders will assist SLs as they consider the most effective way to design stakeholder-scientist interactive spaces. In an effort to reach clarity on these details, the SU could schedule a skype meeting/webinar among SLs and AgMIP economists for comparative discussions on what worked and what did not for RAP development in Phase I -- and how these lessons might be incorporated into next steps.

- **Adaptation Packages:** Similar to the development of RAPs, stakeholders can contribute to AgMIP adaptation packages. This can happen in several different ways, such as by providing inputs for the AgMIP models as well as by assessing AgMIP findings or even by offering insights on the research/modeling process itself. Teams (and especially SLs) will need clarity about the extent to which stakeholders will contribute directly to the development of the adaptation packages in Phase II and under which circumstances modelers will rely on information gathered during Phase I. These differences must be well documented for each team so that the SU can keep track of when & how stakeholders influenced the research process.

- **Scalability and Representativeness:** ***"How representative is this data of the region if we only have district analyses?"*** Questions, such as this one, emerged among AgMIP SLs and modelers within RRTs and were raised by invited Zimbabwean stakeholders and related to how well the AgMIP findings can be scaled out to include broader areas, considering the size of the pilot sites. An approach that was offered is the use of agroecological zones, but this does not represent the economic elements and extrapolation is questionable. RRTs and Leadership need to work on ways to grapple with these issues so as to support SLs in communicating effectively about this issue.

- **Within-team cross-disciplinary communication:** SLs note that they need to work with the PIs to design specific processes for engaging with the team of modelers, especially in contexts where multiple countries are included and people are not located in the same physical space. Teams may need assistance and technical mechanisms to structure regular virtual meetings in order to keep members up to date on progress. The CLIP team's presentation and subsequent discussions revealed how important it was for their entire team to engage in discussions about the meaning(s) of the science in preparation for eventual engagement of stakeholders. The cross-disciplinary discussions help give modelers more insight into the complexities of rural livelihoods and how and when their science outputs might be relevant. It also helps scientists create more nuanced messages that better integrate the key AgMIP components.

- **IE timeline for development.** Messages from Phase I will continue to be refined *with* stakeholders. SLs will work closely with the IE team. SLs will work closely with modelers to manage the process for completing Phase I while simultaneously beginning to engage around Phase II. A user panel will help refine IE development and can facilitate ownership among potential users by early invitation to the process of tool building. Monthly SL meetings will keep this process on track and enable teams to share lessons and challenges.

- **SL documentation of process and outcomes:** SLs will share pre-and-post survey instruments that can be used to garner stakeholder feedback during scientist-stakeholder interactions. Furthermore, templates for on-going documentation of message refinement and team learning will be collaboratively developed and used over the course of the project. A site-based cross-team exchange visit will allow for learning among SLs into the future and for strengthening monitoring and evaluation tool development and implementation.

- **Feedback:** AgMIP Leadership seems quite clear on issues around RAPs, Adaptation Packages, Scalability and Representativeness. The problem is that in some cases they are the only ones with clarity—or that the issues change slightly as scale and level of detail change. Having read the Handbook Chapter on RAPs very carefully, a few issues have come to the fore for the SU. The nature of engagement within RAP development was to build better models and the mode of engagement was extracting critical information from those with expertise. There was little mention of whether or not these experts were intended users of subsequent AgMIP outputs, and if so, how those long-term relationships are being managed. This is one example of the kinds of issues that will require whole-team AgMIP learning that is *situated within RRTs* and facilitated by AgMIP Leadership.

PRE-WORKSHOP PREPARATION

Message sent to SLs & RRTs via email prior to the meeting

- Members of RRTs will have brainstormed with SLs prior to the meeting
- SLs will have completed a report that summarizes Phase I engagement & messages
- Come ready to discuss the items listed below

    - **Reflection on Phase I: Messages & Lessons Learned**
      What happened? What worked, what did not? Implications for Phase II?
        - The planning process - interactions among modelers within RRTs
        - Selection of stakeholders
        - Meeting design and outcomes
        - Phase I outcomes – distillation of findings & translation
        - Incorporating stakeholder feedback -- visually represent the engagement process from Phase I

    - **Planning Phase II**
        - Priority target audiences & messages
        - Building feedback and iteration into the engagement process
        - AgMIP Impact Explorer

VIC FALLS SU WORKSHOP OBJECTIVES

1. Facilitate Stakeholder Liaison (SL) group reflection on: interactions with RRTs, findings from Phase I (which stakeholders were engaged & how, what was learned) and implications for planning Phase II
2. Enhance capacity (via peer assist and coaching) in:
    a. AgMIP message interpretation and translation (visualization)
    b. Meeting design & implementation
    c. Indicators of success for on-going monitoring & evaluation
3. Co-develop (with RRT members) a pathway for Phase II stakeholder engagement and Impact Explorer development
4. Determine needs for future SL trainings/exchange visits and identify mechanisms for sustaining CoP and learning together in Phase II

ANTICIPATED OUTPUTS

- Consolidated & Documented Lessons Learned from Phase I
- Stakeholder engagement plans per RRT for Phase II (beginning with messaging)
- IE development plan
- Identified capacity needs for SLs/RRTs

SU PARTICIPANTS

Two of the SLs were unable to attend the Vic Falls meeting (Hlami for SAAMIP and Laxman for S. India) and one RRT arrived late due to travel challenges (IGB with Meena). The other RRTs were represented by Farah (Pakistan), Jonathan (E. Africa), Sabine (CLIPS) and a new member, John (W. Africa). Geetha (PI of S. India) and Lieven (PI of E. Africa) participated in several SL sessions.

SESSIONS & OUTCOMES

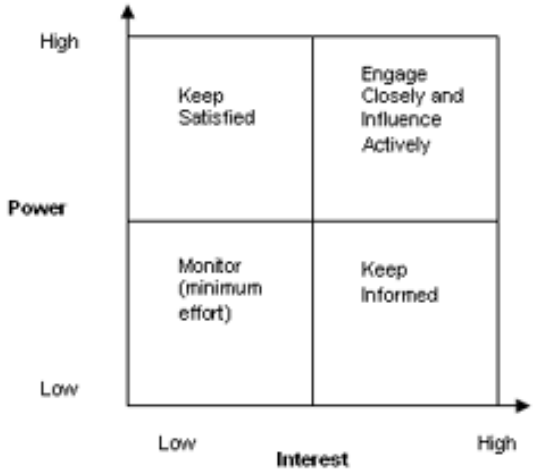
DAY I: AGMIP PHASE I MESSAGES AND TARGET AUDIENCES FOR PHASE II (Wednesday)

AGENDA & PROCESS

1:30 – 2:00 SU Introductory presentation
2:00 – 2:45 RRTs work in teams
Prepare 3 flipcharts that summarize your discussions about:

1. **Translation**
   - What are the Phase 1 key messages? (Report back)
   - *How did you develop them? (Reflect on together)*
   - *How will they be translated? (Reflect on together)*

2. **Stakeholder Mapping**
   - Identify your RRT stakeholders from Phase I on an influence/interest grid (by name & function). Prioritize 3 key audiences for Phase II (Report back)
   - *Match messages with key audiences for Phase II (Reflect on together)*



3. **Convening**
   - Visually represent engagement in Phase II (with anticipated timelines/deadlines)
   - *Reflect on together*
     - *How will Phase II be similar & different from Phase I based on lessons learned*
     - *How will you document stakeholder input?*
     - *How /when can you integrate stakeholder input into Phase II modeling?*

2:45 – 3:30 – World Café – RRT comparative sharing

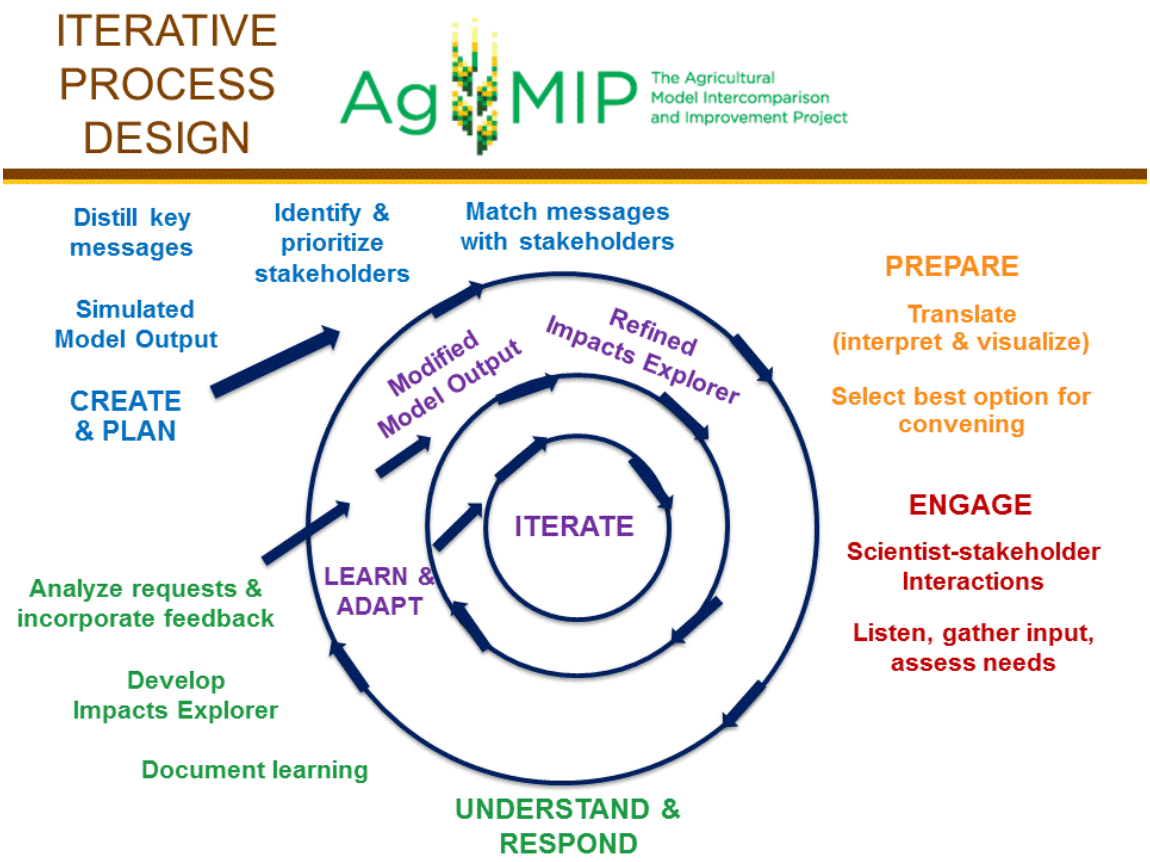
- Present flipcharts to one another. Listen & ask questions.
- Reflect on key similarities & differences
- Identify shared concerns & opportunities
  Prepare brief summary to report back in plenary at 4pm

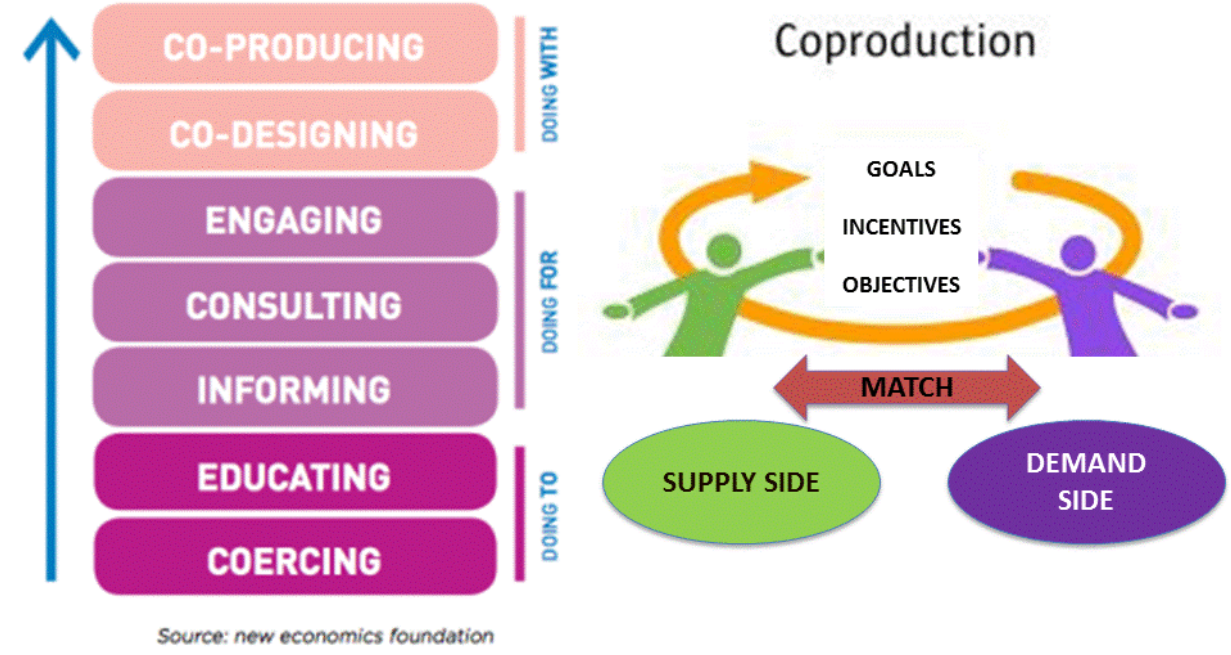
CLIPS with Pakistan in Giraffe
E Africa with S. India in Elephant
SAAMIP with W. Africa in Leopard
Leadership spread across RRTs during World Cafe

3:30 – 4:00 Break
4:00 – 4:45 Report back and Discussion
4:45 – 5:30 Impacts Explorer presentation

RESULTS

Key slides from SU presentation illustrating the importance of iteration for stakeholder engagement in AgMIP and aspects related to co-production processes.





RRT	KEY MESSAGES FROM AgMIP PHASE I
Pakistan	• There are adverse effects of climate change on agriculture. • There would be increase of 2.8^{o}C in day and 2.2^{o}C in night (mid-century). • Mean yield reduction up to 17% for rice and 14% for wheat.
S. India	• The climate is changing: temperatures are increasing, but so is rainfall. • Maize yields stand to benefit from increased rainfall, despite rising temperature. • Employing adaptation options, such as changing to sowing date or applying irrigation at critical stages can help increase the benefit from increased rainfall
IGB	• Team not present for this activity due to travel issues but messages are being consolidated through SL Phase I report
E. Africa	• Climate change to impoverish smallholder maize farmers in Uganda and Tanzania • For Kenya and Ethiopia, the highland study areas growing eth maize from will benefit from climate change • Both rainfall and temperature are increasing in the four study locations (areas) • The trend and projections of economic variable have greater impacts on livelihoods (compared to the negative effects of climate change) • Strategic crop adaptation measures offset the negative impacts of climate change
W. Africa	• Cereal production is negatively affected by CC • Adaptation is expected to yield highest benefits • That is using drought/heat tolerant crops • Key Stakeholders to support research to develop the varieties that are climate resilient
SAAMIP	• Maize will be negatively affected; Sugarcane will be positively affected • Commercial farmers were interested in the policy (RAPS) • Small-scale farmers were interested in adaptations
CLIPS	• **Climate:** Climate in Nkayi will be variable and drier in the future, with higher temperatures across the year, but uncertainty on rainfall. Rainy season is likely to start later. • **Crops:** For crop production climate effects alone are not the end of the world: on average staple food crop yields decline by 5%, in some years by 20%. High spatial and temporal variability and harvest outfalls due to drought are endemic. Production levels are so low that losses in production seem not that big in volume . • Livestock: Households with livestock production are less vulnerable to climate change than those who rely on crop production only. Livestock itself is less affected by climate change, but anthropogenic effects on rangelands might have a stronger bearing on livestock than climate change. Selling livestock farmers can also buy food when crop harvests fail, they are also in a better position to reinvest in agriculture, improving the overall wellbeing of their farm. However only 40% of the households own cattle. Improved feed technologies and access to markets rewarding higher offtake are key to sustaining vital livestock production, • **Vulnerability:** With high poverty levels, and frequent food insecurity, production outfalls due to climate change, even though they might be small, will expose more households to greater vulnerability. Dominance of maize production is one cause, as the crop is susceptible to climate. Other crops, like sorghum, millet, groundnuts, they have become less popular, even though more climate resilient, potential source of food and nutrition security, and income. Interventions that improve food security and income options might reduce rural poverty levels and extremely poor, but poverty still will remain high. • **Diversification and intensification:** Technologies are at hand for increasing production and farm net returns, offsetting impacts of climate change, e.g. by using low rates of inorganic and organic fertilizer, inclusion of drought and disease tolerant fodder and legume crops, revitalizing traditional food crops (small grains and legumes) and market oriented livestock production. Successful farming is towards better integrated and market oriented crop livestock systems. • **Tailoring technology and market options**: Farm types can be discerned based on resource endowments and inclination of farming systems. Incremental changes, such as business as usual interventions, will probably help reducing or offsetting effects of climate change on food security, but will not be sufficient to improve the livelihoods of the poor and lift them out of poverty. Farmers with livestock can benefit more from more drastic technologies, but also face higher risk of losses under climate or other hazards.

The exercise in consolidating messages from Phase I reveals that the CLIPS team benefited greatly from "maturing" their messages through iterative discussions with peer researchers and Zimbabwe stakeholders. After distilling lessons from phase I, CLIPS team members noted: "***Thank God there is Phase II!"***

RRT	HIGH POWER, HIGH INTEREST TARGET STAKEHOLDER GROUPS FOR PHASE II ***Engage closely and influence actively***
Pakistan	• Policy Makers • Researchers • Private Sector • Farmer Associates (Farmers will be involved by recording and using appraisal techniques, before developing the adaptation packages)
S. India	• Joint director of Ag (state level) -- Should be informed about regional-level climate change --- Hard to gauge personal interest • Director of Extension and Education --- Direct link to farmers and to understand viable adaptation strategies. -- Will be interested in adaptations that "work" • Secretary of Environment and Forestry (state level – they implement state action plans on CC) --- Interested in CC adaptation and land conservation (better management practices) • NGO's (they have an increasing role and influence in the region)
IGB	• Not present for this activity
E. Africa	• Donors (USAID, DFID, Gates Foundation) • Climate Change Coordination Units of the national governments • County Governments of Kenya (because of devolution under new constitution) • Parliamentary committee on agriculture and climate change • Media (both print & electronic) • Agroadvisroy services (includes agricultural extension officers at local level, non-governmental organisations working at community level, and private sector at local level).
W. Africa	• MOA** • NDPC** • DISTRICT ASSEMBLIES** • PARLIAMENT
SAAMIP	• Botswana - Inst. Policy; Commodities Trusts; Botswana (BT) Technical Research Institute; NGO- Botswana (BT); Commercial Farmers • Grain SA; SARC-Climate (South Africa Research Institute); Ag Business; Smallholders Farmers Association; Extension Services • KZN (University of KwaZulu-Natal) –Schultze (contact person); UCT (University of Cape Town) - CSEG - department
CLIPS	Greater spatial representation: Broader relevance • National - provincial - district levels (Ministry of Environment, Dpt of climate change, Met Dpt, Gvt Provincial extension): Grounding + decision making • NGOs: Feedback, scaling out • Private sector: business opportunities in climate smart technologies Telecommunications, ranch, livestock services (More clarity is needed on the engagement with private sector. We might revise if we monitor or use other forms of informing them). • NARS

The grid prioritization activity demonstrated that all teams identify high interest, high power stakeholders as policy, government, donor and NGO types. The media and private industry also emerged in some teams, but more thought and clarity is needed regarding the specifics of how to engage effectively with these groups.

"The grid activity was helpful because I had never thought about the differences in power and this is useful to develop engagement strategies" – PI, RRT.

During an SL debrief of this activity (pg. 13), it was noted that for policy making, long-term relationships with policy makers are essential and the grid activity could benefit from an additional axis that allowed teams to indicate the history of their relationship with those stakeholders in each quadrant.

SL TECHNICAL SESSIONS (Thursday & Friday)

SLs LOOKING BACK (Thursday morning)

AGENDA & PROCESS

- Debrief – (discuss in pairs, share in plenary) - What were some of the take home messages of the Wednesday activity on stakeholder engagement (grid of influence & messages)?
- Update – Report on Lessons learned from Phase I & development of SL report
    - How did it go?
    - Lessons learned
    - Documentation
- Prepare for stakeholder session in afternoon

RESULTS

Highlights from Discussion on Stakeholder Prioritization

- **Prior Relationships** – We need to account for RRTs history with stakeholders – Could add a +, - or 0 on the grid activity to signify the degree to which RRT has worked with stakeholder before (in addition to power and interest) -- Recognize that this grid is a snapshot and that these systems are dynamic – individuals and institutions are constantly changing
- **Overlap/Linkages with other projects** - ***"AgMIP is one more option available in a portfolio of information sources"*** – John, E.Africa in reference to the need to link AgMIP modeling with other similar efforts, such as CCAFS. Professionals multitask and target audiences that are linked to AgMIP or other projects – these are all key for relationship building – institutions have simultaneous/ parallel projects and can learn from the other strategies which might overlap and contribute. But need to pay attention to attribution. Figure out how to leverage and strengthen AgMIP contribution.
- **Documentation** – Real need for monitoring of interactions with stakeholders over time –share tools for keeping track – for instance examples from CCAFS
- **Strategy diversification** – Real need to differentiate among different stakeholder groups (policy advisors vs. farmers) so that messages can be tailored engagement processes (design and plan interactions differently)

Highlights from Discussion on Message Development

- **Message tailoring**
    - ***"You cannot pass over a message about best management practices to a high-level negotiator who attends the IPCC and UNFCCC meetings"*** - John, E. Africa.

- ***"It is clear that we need to pick a message from an AgMIP finding for a particular stakeholder. What are you picking for a farmer? What are you picking for a policy maker? We have learned that saying to a farmer – go and apply 2 bags of fertilizer per acre of maize - is not a message. You need to say, take this milk tin and …."*** – Jonathan, W. Africa.

- Accumulate/compile messages and then distill them
- Refine or repackage them – you might have the same messages for different audiences but they need to be presented differently
- Discuss the implications of the messages – if so, then so what….?
- Transform messages by iterative processes

  "At some point you have to hand over your messages to stakeholders and ask them how they would communicate those issues to their audiences – and work on developing solutions together" – Sabine, CLIPS

  "Communication is not only about developing policy briefs. It is listening and thinking together – resolving these issues together" – PI, East Africa.
- Recognize the need to augment AgMIP information for greater generalizability

********** **(For more information See IE Report)**

<u>IE DEVELOPMENT WITH ZIMBABWE STAKEHOLDERS</u> (Thursday afternoon & Friday morning)

<u>Invited Stakeholders from Zimbabwe (plus FANRPAN)</u>

Tshilidzi Madzivhandila	Policy and Research, FANRPAN	
Mupenyu Mberi	Holistic Rangeland Mgt & Livestock Production,	Debshan Ranch
Beniah Nyakanda	Agricultural Specialist - EcoFarmer Program -	Telecommunication Services,
Dumisani M Nyoni	Head of Provincial Agricultural Extension	
Leonard Unganai	Agricultural Policies, Development, Upscaling CC Adaptation	UNDP / GEF
Tirivanhu Muhwati	Climate Change Response Department	

Besides a few select closing comments from stakeholders and a debrief of the session by SLs, the agenda and results for this IE session are detailed in a separate report.

<u>Closing Comments from invited Stakeholders</u>

"The proof of the pudding is in the eating. I am waiting to see how all this AgMIP research ca improve our lives"

"Researchers have raised expectations. We are now looking for more. We hope you have the energy to generate data for other sites"

"How quickly can you adjust and respond because we need answers now?"

"There is a need to build confidence in the data and the tool. Being involved in the process helps."

"I was impressed that people from across the globe can come around a point of discussion that has potential implications at the local level of a farmer and a policy maker."

"I see the relevance of science for farming. We usually see science as separate but this meeting reinforced the connection to me."

<u>SL DEBRIEF OF IE STAKEHOLDER INTERACTION</u> (Friday afternoon)

AGENDA & PROCESS

- Debrief individually and then in pairs 3 positives and 3 negatives (process and outcomes) related to interactions with Zimbabwe stakeholders. Plenary discussion among all SLs
- Team messaging
    - SLs present an update on RRTs messages
    - How were (are) messages being developed with teams or with stakeholders?
    - What is the documentation strategy?
- Discuss SL planning within RRTs

RESULTS

Discussion Highlights on IE Stakeholder Interaction content & process – What worked? What didn't?

Positive Aspects

- Stakeholders asking what's next and invite us to a national climate change strategy table & annual dialog
- Opportunity to listen to stakeholders
- Clear picture of the "Internet Exploder"
- "***Who holds the mouse"***--- the difference between direct and indirect users (who are able to identify potential new stakeholders, eg. private sector)
- Sessions were strategic and got a lot of info in a short time
- Methods demonstrated how to create safe spaces for participants to share experiences– eg. began with warm-up activity of asking what people ate for breakfast as children . This short ice-breaker allowed participants to relate on a human level before entering the presentation/formal space
- Interactions reinforced the need to respect for established relationships – hosting team takes risks by inviting stakeholders to this event
- Meaningful interaction requires adequate time
- Established rapport and strategy thinking
- Diverse backgrounds and representations
- Exchanges were cross cultural (value of SLs in the discussion)
- We are learning to work as an SUteam (Sander, WL, Amy, Joske, Hugo)

Negative Aspects – i.e. could be improved

- We had a rough start to the process – Highlights the need for an opening activity for easy landings
- Inappropriate powerpoint presentations – too much detail
- Could have asked more about invited guest knowledge of AgMIP and expectations for their participation in that meeting Experience highlights the importance of preparation and planning team being on the same page. Sometimes small issues can derail meetings (eg. in this case lunch separated the members of the coordination team, which led to a level of discombobulation and the application of the introductory method differently from what had been planned)
- We tend to look forward and have difficulty self-reflecting and looking back – It is a challenge to learn from failure to improve – SLs role to help teams with this process to improve Phase II
- SLs should approach stakeholders one on one before bringing them together in a meeting – Is mixing stakeholder types a good idea? Need to think carefully about when to bring them together.
- No farmer and lack of smallholder perspective

Further Discussion

- There is a need to frame engagement appropriately – the goal is not to convince stakeholders about the validity of AgMIP results, but to learn together --- Admit imperfections and understand assumptions behind the models – Explore different options that can lead to feedback to adapt and improve the modeling.
- Constructing/refining messages together *within teams and with stakeholders* is important
- Frame the engagement to involve scientists to relate directly to stakeholders (eg. Lieven in team with Oxfam stakeholder – who critiqued the CLIPS graph and his observations, would not have been considered if only SL had been present – Needed scientist's perspective to make this breakthrough).
- We need strategies for framing messages and developing engagement strategies for different groups
- Key issues still struggling with
    - What is the role of farmers in AgMIP – How do we include them or link them to AgMIP output?
    - A major challenge will be to manage multiple AgMIP sites within the RRT – availability of time/effort

<u>EXPLORING STAKEHOLDER ENGAGEMENT IN AGMIP</u> (Saturday afternoon)

<u>Activity 1: Understanding Stakeholder Engagement</u>

When you hear the words "Stakeholder Engagement", what comes to mind?

AGENDA/PROCESS

AgMIP participants were asked in plenary to consider the question above and write down 3 words on a card. The facilitator then invited participants to share their understandings with the whole group.

RESULTS

(raw data)

collaboration, linkage, lock-and-key, information& knowledge sharing, co-learning x3, co-benefits, local problem solving, interaction x2, decision making, cross-fertilization, feedback x5, participation x5, attitudes, business, flexibility, work x2, relationship, communication x3, involvement, bring-on-board, honesty, clarity, consistency, meeting, care, concern, beneficiary, adaptive, again, inform, trust-building x2, discover, discuss, mutually-beneficial, dialog, common-understanding, common-interest, listening, understanding, investment, commitment, action, people, attraction, condoning, visualizing-future, handing-over, leadership, contact, expectations, context, humility, timing, promise, agreement, fighting, conflict-of-interest

Observations

Positive words used; principles/values-based feedback – emotionally laden rather than methods for verification or validation.

Activity 2: Defining Objectives for Stakeholder Engagement

AGENDA/PROCESS -- In plenary AgMIP participants asked to consider this question and to share their understandings with the whole group -- ***What are the reasons for engagement in AgMIP?***

REASONS TO ENGAGE STAKEHOLDERS IN AGMIP		
To understand needs	Understand conditions and perceptions of RAPS	To develop adaptation strategies
To produce a product	Internet Exploder	To increase awareness of AgMIP and climate change
To ameliorate current product	Explore adaptation opportunities	Propagate
Learn and educate	Share information and match ideas	Funding
Share	Contextualize research	Contextualize research
Build consensus	Ensure effective use of outputs	Ensure effective use of outputs
Get feedback	Data collection and data validation	Data collection and validation
It is a request from the donor	Bridge gaps	Buy-in for agreement
Needs assessment	Improve scientific output	Improve decision making
Reflection of applicability	Improve livelihoods and reduce poverty	Spread knowledge
To influence policy	Share information	To understand smallholder view of future world
To improve communication	Understand conditions and perceptions of RAPS	Explore adaptation opportunities
To explore research questions	“Internet Exploder”	Share information and match ideas
Improve scientific output	Improve livelihoods and reduce poverty	Bridge gaps
Share information	Convince	Simplify results
Increase confidence	Spread knowledge	Spread knowledge
Data collection and validation	Convince	

Activity 3: RRT Exercise to practice seeking feedback on messages

AGENDA/PROCESS

RRTs work in groups

- Objective: Imagine that as a team you are trying to get feedback on your messages from a specific stakeholder to know if they are effective and how to improve them
- Imagine two audiences of high influence-high power users:
    - Ministry of Agriculture/Climate change
    - Head of agricultural extension agency
- In your teams discuss their background
    - Who are they in your region? Role, responsibilities?
    - What is their background?
    - What is the message you want feedback on?
- Consider carefully
    - Which interactions would you design?
    - Which questions would you ask for feedback?
    - How would you capture the feedback?
    - How do each of the team members contribute?
    - Which concerns do you have?

RESULTS

Results from this activity demonstrate variation among teams in terms of how they propose seeking feedback from stakeholders. Some responses show significant detail and clarity of purpose, while others require more reflection, discussion and work. Several teams mention audio recording as a documentation method. However, as pointed out during the Vic Falls plenary discussion, this approach needs further thought as it can inhibit contributions from camera-shy stakeholders or alternatively, it can cause political stakeholders to strategically take advantage of the opportunity, dominate discussion and modify responses for effect. RRTs require more time working as a group to carefully design the kinds of questions that they could ask stakeholders in order to illicit the kind of feedback that they seek. Concerns that appear across teams include: the availability of time, language challenges, and the representativeness of AgMIP results.

What is the stakeholder background? **(who are they in your region; roles / responsibilities)**
• W. Africa Stakeholder A - Ministry of Agriculture/Head of CCA platform --- Agronomist Stakeholder B - Agronomist (CLIPS); Head of Extension – Not known • E. Africa Directors of Ag at national/regional/county level: identifying problems and implementing activities Permanent Secretary/principal secretary: directly informs minister on policy making + lobbying with accounting /budgeting • SAAMIP Stakeholder A - Ministry of Agriculture/Climate change Botswana: Chief Metrological services manager -- Climate person, Highly educated and knowledgeable; South Africa Small scale: Provincial Department of Agriculture, Risk management – Educated; South Africa Commercial: GrainSA -- Highly educated and knowledgeable

Stakeholder B - Head of agricultural extension agency
Botswana: Head of extension Ministry of Agriculture
South Africa Small scale: Provincial Department of Agriculture extension service
South Africa Commercial: GrainSA

- S. India

Stakeholder A - State Agricultural Production Commissioner -- Designing policies for the agrl. Sector & Implementation of state action plan on climate - Indian Administrative Service (min graduate degree)
Stakeholder B - Head of agricultural extension agency - Take messages to farming community; Transfer of technology to farmers - Post-Graduate in Agriculture

- Pakistan

Head of agricultural extension agency -- DG Extension, Govt. of Punjab -- Technology transfer, dissemination of knowledge, implementation of agricultural Laws; Well qualified agricultural professional (PhD)

- IGB not present for activity. CLIPS results not procured

What is the message you want feedback on?

- W. Africa
  to support research to develop the varieties that are climate resilient
- E. Africa
  CC had differential impacts depending on location; Numbers/figures/ maps with differential impacts on productivity/livelihoods; CC impacts are not always negative
- SAAMIP
  Botswana: Sensitivity of agricultural system to climate
  South Africa Small scale: Info on RAPS
  South Africa Commercial: Info on RAPS
- S. India
  Adaptation strategies will improve yield and income of the farmers in the region. “For example, in maize-based systems, the application of 100 kg/ha N in 3 splits will boost yields. Also, protective irrigation at critical stages of maize growth will reduce the climate impact.”
- Pakistan
  The farmers are using imbalance fertilizer.
  Planting density is low.

Which interactions would you design?

- Dialogue (W. Africa)
- Face-to-face meeting / focus group discussion (E. Africa)
- One on One meetings (SAAMIP)
- (S. India) Stakeholder A -- Face-to-face interaction; Technical briefs
  Stakeholder B -- Focus group meeting with extension and agrl. Officers; Technical briefs in local languages
- Face to face interaction b/w team and DG-Extension (Pakistan)

Which questions would you ask for feedback?

- Knowledge on cc issues; Policies in place (W. Africa)
- What do you think of this message/is the message useful/who else could this info be useful to and in which format (E. Africa)
- (SAAMIP)

A -- In terms of RAPS
B -- In terms of adaptation

- (S. India)

Stakeholder A
Can this information feed into any of your policy implementations?
Is our approach to understanding climate change risks in agriculture reasonable?
Is our approach to adaptation feasible?

Can we upscale/repeat this study to other regions?
Stakeholder B
How much fertilizer are they applying, and is there any way they can increase their access/availability/stocks??
Can you plan a farmer demonstration to increase awareness?
Can you demonstrate our results to farmers?
- (Pakistan)

How effective is this message?
How it could be improved? Any suggestions?

How would you capture the feedback?

- Audio and video recording with permission (W. Africa)
- Comprehensive note taking (E. Africa)
- Recorded written and follow up and thank you letter (SAAMIP)
- (S. India)

Stakeholder A: Audio-recording the proceedings; Develop clear minutes of meeting and obtain his approval
Stakeholder B: Video-recording the meetings and Develop clear minutes of meeting; Preparing a report that will provide documentation for us

- Recording, taking notes (Pakistan)

How do each of the team members contribute?

- Assist in developing the message (W. Africa)
- Generating messaging product (before meeting); PI leads with representation from disciplinary teams (E. Africa)
- According to the stakeholder and the team members strengths and weaknesses (SAAMIP)
- (S. India)

Stakeholder A -- Experts will weigh in on their topics and for clarification and interaction; PI will present
Stakeholder B --- The whole team will go! They will explain methodology and results, and will interact in the meetings

- Stakeholder started the discussion and facilitated by the crop scientist (Pakistan)

Which concerns do you have?

- Language, financing (W. Africa)
- Not given (enough) audience, Near term vs long term messages, Representativeness, What next?? (E. Africa)
- Time, speaking the same language, time frame availability, scale of the research (SAAMIP)
- (S. India)

Stakeholder A
Will there be enough time to interact properly?
Present results using a pilot location – how can we represent the impacts to the whole region?
Individual's (personal) interest in the problem
Stakeholder B
That fertilizers stocks cannot be made available
Is the adaptation package as a whole implementable
If the rains fails (weather risk), it will add to the farmer's loss

- Availability of time (Pakistan)

SL NEXT STEPS (Monday afternoon)

AGENDA & PROCESS

- Debrief the engagement/feedback from stakeholder activity – What was learned with teams?
- Discuss Priority stakeholder groups in Phase II and timelines
- How can we strengthen documentation/evaluation for capturing feedback (about users/for team)

RESULTS

Highlights from discussion on engagement strategies

> ***"Your objective (for engagement) determines the number of participants and who will be invited and where it will be held. I always plan some sort of facilitation, think about the design. It has to be well thought through. So that those two hours are valuable and I get what I want out of it."*** – John, E.Africa
>
> ***"Prioritization is a strategy – who I will go to at the beginning, who in the middle, who in the end."*** – Farah, Pakistan
>
> ***"What if stakeholders ask for something we cannot answer?"*** -- All AgMIP scientists should consider how they will manage this last question.

Teams are bound to be challenged by stakeholders and are encouraged to prepare for how they might respond to potential questions before meeting with stakeholders. Considering appropriate visualizations of data is an essential part of such preparation.

Highlights from discussion on SL documentation

SLs to will need to work closely with teams to clarify the modeling process (See photo) and to understand entry-points for key stakeholder contributions. There are no protocols for stakeholder engagement. However, at a minimum, SLs are expected to:

1. Understand what kind of input from stakeholders you need to elicit and collect
2. Design an appropriate process for interaction – define who needs to be there, decide why, then where it will be and the activities, and whether a facilitator and monitor/recorder are needed
3. Document how the process design affected the result and the learning that takes place. What did your research team do with the output of the interaction? Was it useful to

- stakeholders
- for modelers & research
- for the understanding of SLs on best ways to engage stakeholders
  If yes, why? If not, why not?

4. Note new opportunities that emerge (e.g. invited to join certain processes, etc.)

SLs will guide RRTs in AgMIP message refinement and on how to document stakeholder feedback for modeling efforts. Furthermore, they will document how stakeholders view the credibility, relevance, and utility of AgMIP outputs. Documentation is not videoing stakeholders at meetings. Rather, it entails detailed descriptions of various aspects associated with stakeholder engagement, how this process affects scientist-stakeholder discussions, and how stakeholders uptake AgMIP results, and how AgMIP modelers incorporate stakeholder feedback.

SLs are encouraged to document the following:

1. specific input from stakeholders (questions, suggestions, concerns)
2. how & when they collected get that information (meeting, small break out group, plenary discussion, face-to-face interview etc.)
3. how the interactive process was designed
   a. What were the objectives
   b. Who facilitated
   c. Who attended
   d. What types of activities were developed
   e. Was there a facilitator / monitor/recorder?
4. Reflect on how the process/design affect the discussion/output/results obtained
5. What did the research team do with the results/process/outcomes/output of meeting. e.g., Was it useful to modeling or research? Why or why not?
6. What happened after that meeting? What did research team do? What did stakeholders do with that information you gave them? What new opportunities emerged for you as SL? What new understanding do you have after doing this? (Was it useful to stakeholders? Was it useful to research? Was it useful to understanding engagement and useful to other SLs?)

A more-detailed template for documentation will be developed within the SU to guide SLs and teams.

Requirements for the Impacts Explorer

Results from the Victoria Falls workshop, June 2015

Internal Report

Joske Houtkamp, Hugo de Groot, Sander Janssen, Alterra Wageningen UR

18/08/2015

Summary

This document reports on the results of the requirements activities conducted with stakeholders from Zimbabwe and stakeholder liaisons on June 25 and 26, 2015, as part of the Stakeholder Unit sessions at the regional meeting held in Victoria Falls. Regarding the requirements for the Impacts Explorer, the main conclusions (especially for Zimbabwe) are:

Users of the Impacts Explorer
The most important user group are so-called technocrats: professionals with a relevant academic background, working for government;

1. either focused on preparing policy plans or
2. advising farmers (organisations).

Also experts in farmers'organisations are expected to benefit from the IE; however individual farmers and researchers are not regarded as primary users.

Activities the Impacts Explorer should support with data and functionality
Probable activities using the IE are:

- (focus on policy): collect information on adaptation strategies and options, in the context of preparing policy plans. For instance: describe current situation, find relevant information, determine risks, compare options.
- (focus on advising farmers): collect relevant information on options and current climate trends for raising awareness and pathways for change; the objective is presentation to other audiences.

The functionality therefore must support

- easy access to available data and information by a clear organisation of the content and
- by representing the messages and information using both visuals and text designed for users without expert knowledge;
- search for (related) information;
- comparison of outcomes;
- and options for downloading and printing.

The requirements will be further specified in the requirements activities planned for the second half of 2015.

Data in the Impacts Explorer
The Impacts Explorer will focus on presenting and visualizing data produced by AgMIP phase 1. Model simulations are the core of AgMIP activities. Model simulation results are available in three domains:

- Crops
- Economics
- Climate

For crops and economics the results are harmonized; the results from the from the different teams are centrally stored in the same structure. For crops this is the ACMO data; on economics there are harmonized summary tables available. Regarding the climate data the most important characteristics and ways to visualize them are being investigated by the climate team members.

Besides the simulation model results the Impacts Explorer will open up metadata on the study areas, data on RAPs and adaptation packages and –if feasible – additional data which are important to explain the key messages. The next paragraph explains more about key

messages. The concept of key messages plays an important role in the design of the Impacts Explorer.

Key messages presented by the Impacts Explorer
There is a gap between the data and the attractive and simple visualizations required by stakeholders in the IE. Many visualizations are scientific and in some cases phase 1 results are not adequate for the development of visualizations.

Teams are able to draft key messages themselves, but for the intended audience more detailed descriptions of the key messages need to be developed. The following elements need to be included in the IE, as draft template for the key messages: 1. What do these graphs tell us? 2. Why is this important? 3. How did we obtain these results? 4. Can the results be generalized? Are these results usable for other locations? Are these results valid at other locations? What are the characteristics of the results? 5. Additional information: data sources used (references), methods, etc.

1. Background

In the first phase of the AgMIP project, a start was made with the design of the Impacts Explorer: an interactive application to make project outcomes accessible and usable not only for researchers, but especially for stakeholders involved in planning and decision making. A prototype was developed demonstrating the use of maps in a user friendly interface to create a common vision of the IE for the AgMIP researchers.

A first activity to identify user needs was undertaken in the Arusha Workshop (Tanzania, 2014). Stakeholders accompanying the RRTs expressed their ideas about the content and functionality of an online tool presenting AgMIP results; and identified individuals they expected would be users of such a tool, in particular professionals working at governmental or farmers organisations.

For the development of the IE in AgMIP Phase 2 a user centered approach is applied to ensure that the tool meets the target user needs and that project outcomes will reach a wide audience. This document reports on the results of the requirements activities conducted with stakeholders from Zimbabwe, SL's (stakeholder liaisons) on June 25 and 26 (2015), as part of the SU sessions at the regional meeting held in Victoria Falls.

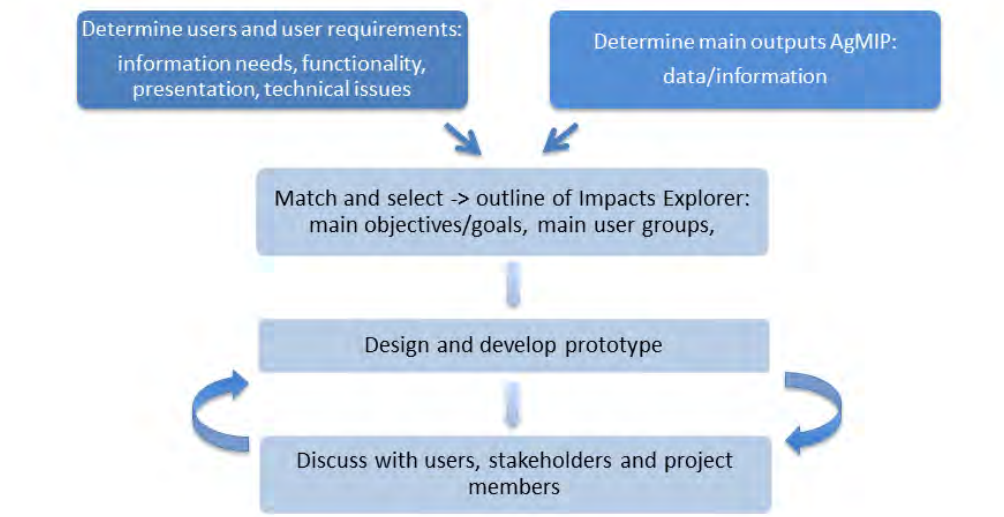
2. Requirements Analysis for the Impacts Explorer

The information, data and guidance collected, assimilated and shared through the Impacts Explorer are intended to address knowledge gaps, and enhance the awareness of the need for adaptation, both in the context of enabling action. To support these functions of the IE, in the development process many decisions will be made on e.g. the functionality, data and information presentation, and technical aspects (software and platform). The decisions must be based on results from carefully conducted analysis activities involving representatives from all desired user groups and countries.

Therefore, determining user requirements is an important activity in the design of the IE. User-centered methods ensure that the design and development of the Impacts Explorer is based upon an explicit understanding of users, tasks and environments through three principles:

- Users are involved throughout design and development;
- The design is driven and refined by user-centered evaluation;
- Iterative design process.

Following these principles, the requirements analysis is conducted with future users and stakeholders in iterative cycles to adjust the design and prototypes during development. Techniques are selected that proceed from explorative and broad to more specific; on the one hand because the design of the IE is also dependent on the AgMIP research output and objectives that are still evolving; and secondly because the physical and organisational context in which the IE will be used vary between the countries involved in AgMIP and these conditions are not yet assessed. First a PACT-analysis is conducted to scope the system; afterwards more focused activities are undertaken to determine user requirements regarding data and functionality.



For the design activities of the Impacts Explorer during the AgMIP regional workshop in Victoria Falls two activities with stakeholders and AgMip project members were prepared:

1. a PACT-analysis to scope the system, and
2. individual interviews to determine data requirements.

Below, first the principles of these methods are explained, after which the results of the workshop and conclusions are presented.

3. Strategy

3.1 Step 1: PACT-analysis

PACT (People, Activities, Contexts, Technologies) is a framework for discussing the design situation (Benyon, D. (2010). *Designing interactive systems: a comprehensive guide to HCI and interaction design*). The framework concerns the people who will use or be affected by the application, the activities that the system will support (functionality); the context that the system will be used in (and whether this will affect the design); the technologies that can be used and are available to support the activities. An overview of issues is presented in Table 1.

The issues are discussed in focus groups or with a small number of stakeholders or users. The outcomes are presented in a mind map or a list of conclusions and sometimes further

questions. The outcomes are discussed in the design team and lead to a first set of requirements.

People

- Who are stakeholders of the Impacts Explorer (who will benefit from the information), and who are the *main* stakeholders? Government, private sector, research, NGO's, etc. At which level do they operate?
- Who are the *actual users* of the Impacts Explorer? Where are they employed, what is their educational level, computer experience, domain expertise?

Identify and prioritize

- most desired stakeholders (target stakeholders(audience?))
- most desired users (target users)
- most likely stakeholders (audience?)
- most likely users.

Consider users':

- level of knowledge (agriculture, policy, climate)
- level of expertise (e.g. understanding modelling)
- experience with similar tools (modelling, but also computer experience, GIS, etc)
- familiarity with English.

Activities

Describe the main activities carried out with the Impacts Explorer. These determine:

- What functionality is necessary;
- What data are essential;
- What other applications and tools may be used in combination with the Impacts Explorer.

Questions to be considered:

- For what activities and specific tasks would the users work with the IE?
- Elaborate examples, e.g. "prepare policy brief on required adaptations in ..."; "prepare decison on …"? How are the data used, viewed etc?

This is a first step to **user scenarios**/user stories.

Consider:

- topics: ... (e.g. crops, climate info, farm practices, etc)
- time frame
- level: ..(e.g. national/regional etc);
- type: (e.g. information search, analysis, generate output) .

It is often helpful to ask participants how they carry out these activities at the moment, and how the Impacts Explorer may support them more adequately.

Context

Activities take place in a context that may affect the application design. Several types of context are distinguishable, such as

• the organisational context (may determine who has access to the application, how often the application is used, reliability of the data and application, etc); • the social and cultural context (e.g., should the Impacts Explore be available in local languages?); • and the physical circumstances under which the activity takes place (used in the office or in the field, power failures, etc.).
Questions to be discussed: • What is the policy making/ decision making context of the IE? • What role can the IE play in the decision making process on national and regional level? How is the decision making context organized in the countries involved in AgMIP? • Who are key figures in this process? • What are the differences/similarities between the regions involved? • What other factors may influence the use of the Impacts Explorer in a policy making/decision making context? (trust, reliability of the data.
Technologies
In the design phase choices are made regarding the software and platform used for the IE. Issues that must be discussed for each region • What is the local availability of computers with reliable internet connection? Are there technical limitations to the use of an Impact Explorer? (assuming that it will be an interactive web application, providing access to large datasets through maps and graphs) • Do the organisations and users have access to sufficiently fast Internet services? • How reliable is the Internet connection? • Is there a strong demand for AgMIP-related information available through mobile platforms? • Should (a part of) the application be available on a mobile device? • If yes, which platforms? • Issues with operating systems, browsers? • Who will provide technical support? • Social media use (or not)? • Data download: Excel, other formats? • Printing options important? • Do the organisations and users have access to sufficiently fast Internet services? • Should (a part of) the application be available on a mobile device?

Table 1: Questions and issues for the PACT-analysis of the Impacts Explorer

3.2 Step 2 : Interviews to determine data and information requirements

The Impacts Explorer will support users in exploring the quantitative, spatio-temporal data produced by the RRTs, including the qualitative results leading to key messages, and contextual information required for interpretation. To understand the user needs regarding data and information individual interviews were held. After showing the key messages in the Impacts Explorer prototype, stakeholders were invited to answer the following 4 questions:

- How would you use this information?
- What are you missing?
- How do you get it currently?
- How would you like to get it?

3.3 Step 3: Personas and scenarios

In the third step, Impacts Explorer requirements are further specified with the help of personas and scenarios. The purpose of personas is to create reliable and realistic representations of key users. They help to focus decisions surrounding application

components by adding a layer of real-world consideration to the conversation. They also offer a quick and inexpensive way to test and prioritize those features throughout the development process.
In the Arusha workshop in 2014, some personas were developed with the help of stakeholders. These will be combined with the results of the Victoria Falls workshop and refined in the second half of 2015 with stakeholders and intended users.
Scenarios are narrative descriptions of the use of an application for a specific task, in day to day activities of a user. Using scenarios in the design and evaluation help to ensure that the application is effective, efficient, easy to use and has good utility.

4. Results PACT analysis and interviews Victoria Falls workshop

4.1 Participants

Present in the workshop were

- CLIPS stakeholders:
  - Tshilidzi Madzivhandila (Policy and Research, Economics, FANRPAN)
  - Mupenyu Mberi (Holistic Rangeland Management)
  - Beniah Nyakanda (Ecofarming, Econet)
  - Dumisani Nyoni (Provincial Agriculture, Min. of Agriculture)
  - Dr Leonard Ungunai (Policy and Adaptation , UNDP/GEF)
  - Mr Washington Zhakata (Climate Change Response, Climate Change Response Department)

- Stakeholder liaisons (or their replacements):
  - Sabine Homann (CLIPS)
  - Jonathan Anaglo (CIWARA)
  - John Recha (East Africa)
  - Hlamalani Judith Ngwenya (SAAMIP)
  - Farah Riaz (Pakistan)
  - Mohar Singh Meena (IGB)
  - Vellingira Geethalakshmi (Southern India)

- Stakeholder unit: Wendy-Lin Bartels, Hugo de Groot, Joske Houtkamp, Sander Janssen, Amy Sullivan.

4.2 Results Session 1 , June 25: PACT-analysis (People-Activities-Context-Technology)

After an introduction on AgMIP and the Impacts Explorer, stakeholders and SL's were divided into groups and discussed the questions belonging to the PACT-analysis with one of the SU members. Main outcomes of these discussion are presented below.

4.2.1 People

Who will be the users of the Impacts Explorer? (= people holding the mouse)
Top to bottom: most often mentioned – least mentioned.

- "Technocrats", academically trained, at national level (policy making) departments, policy analysts; including extension agents (specialists), agricultural extension workers (academic background);
- Commercial farmers; someone with expertise in farmers' organisation/association, emerging communal farmer (Zim);
- Smallholder farmers use information through other farmers;

- Development workers, practicioners at NGO's (academic background);
- Students (academia);
- Private sector: for instance local agent;
- Media;
- "Opinion leader";
- Required: some expertise in analysis and interpretation of information;
- Important: trust in system through other users.

Conclusions for Zimbabwe

The results indicate two main user categories:
Primary user:

Technocrat: relevant academic background and working for government;

1) either focused on preparing policy plans or
2) advising farmers (organisations).

Secondary users:

1) Development worker, practicioner at NGO's, having a relevant academic background;
2) Commercial farmer;
3) Someone with expertise in farmers' organisation/association.

Important for recognition of the Impacts Explorer: opinion leaders (who may fall into different categories).

4.2.2 Activities

For what tasks or activities will individuals use the Impacts Explorer? What are their goals? How will they use the output?

- Prepare policy plans, decisions;
- Advising on investments (governm.);
- Influence the way a community handles change;
- Expert system selecting options from a series offered;
- Choices in management practices;
- Scenario analysis;
- Predictive studies;
- Cross border learning;
- Discussion about time frame of offered information: also (some) long term information is useful for short term policy.

Conclusions for Zimbabwe

Probable activities using the IE are, for primary user 1 (focus on policy):

- Collect information on adaptation strategies and options, in the context of preparing policy plans. For instance: describe current situation, find relevant information, determine risks, compare options. For in depth analysis they will ask a consultant.

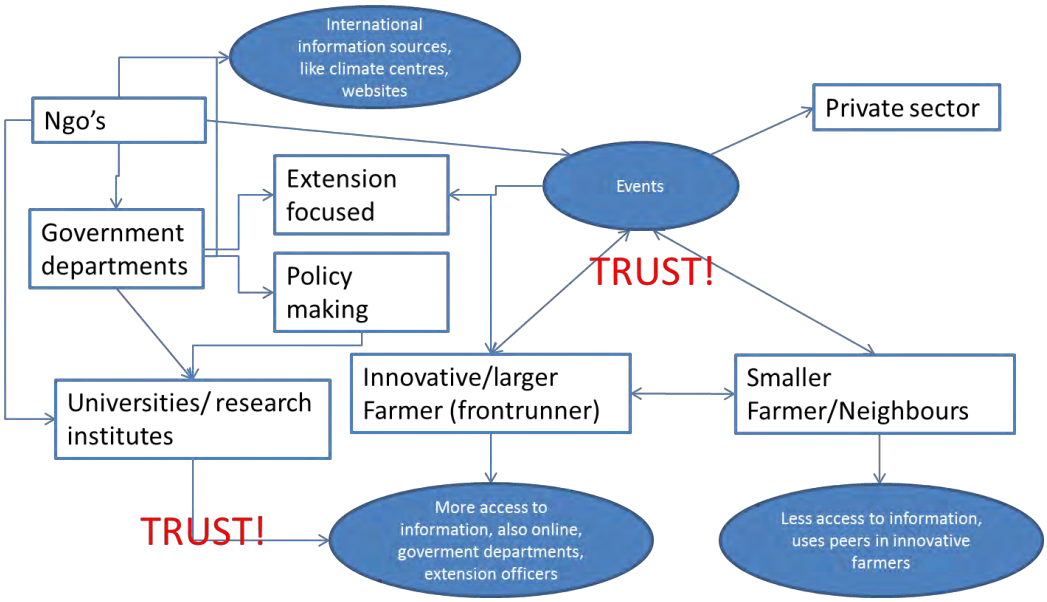
Primary user 2 (focus on advising farmers):

- Collect relevant information on options and current climate trends for raising awareness and pathways for change; objective is presentation to other audiences.

4.2.3 Context

What is the context (organisational, cultural, etc.) in which the IE will be used? Will the context affect its design, content, functionality?
(As a remark, here also insights from other regions are presented as participants from other regions thought about the differences and similarities to their region in the sessions.)

The participants talked about the relationships of the different stakeholders in the debate, and together designed a quite complex and intricate web of relationships between stakeholders with many connections between them, and some reference to information use.

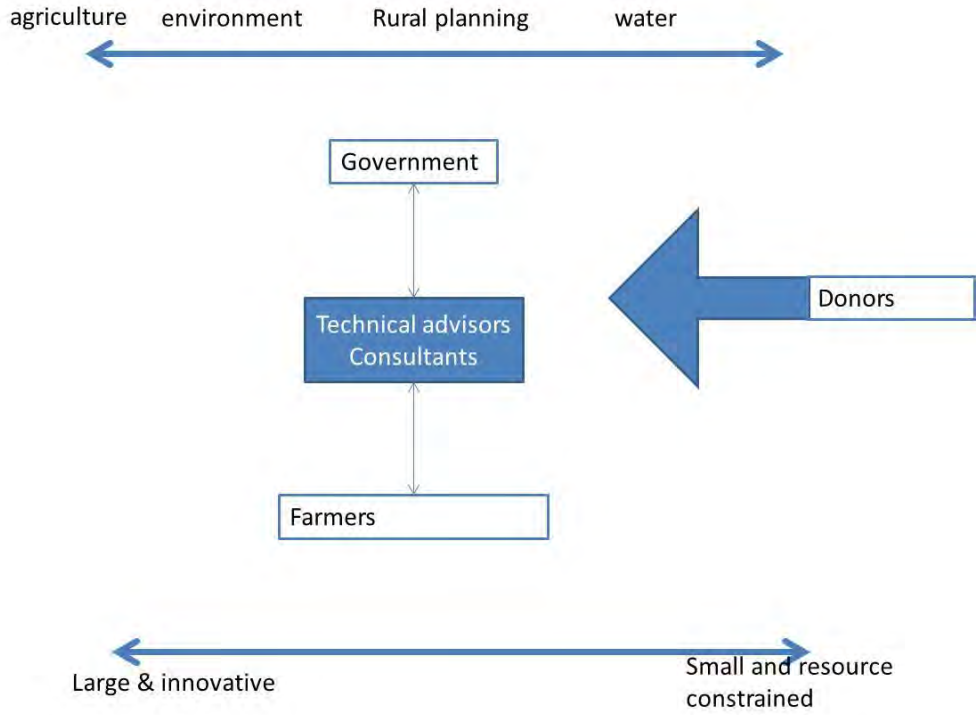


The figure gives a highly stylized overview of some of the actors and relationships as they emerged from the Zimbabwe context. The following observations are applicable:

1. The context is dynamic, in that more active collaborations and contacts occurred over the past 5 years, as climate change became a clearer and prominent issue and as commercialization of farming is occurring with a joint interest of farmers, extensions and government. This commercialization of farming should occur in a climate-smart way.
2. Each of the actors mentioned in the figure consists of several parts that are not all represented in the figure and have their own dynamics internally. Ultimately a complex web emerges of relationships and links, which could be further investigated and sketched. For example, the government consists of regional departments and the National government. Also the government has more executive offices, such as a Met-office, which makes data available.
3. Each of the actors has different information sources and differing access to information. As shown in the figure, the trust in one-another is crucial, and private sector is seen as somehow self-interested, and not received the same level of trust as other actors.
4. Government also works together with governments from other countries, to share experiences, knowledge and develop joint agenda's.
5. There was no single institute or organization in the context identified that already delivers information on impacts and adaptation to climate change. Also, multiple sources of information were considered valuable to compare and validate messages across sources. The quality of the information needs to be evaluated and available to the user.

6. A farmer receives information from many different sources, and also has many interests, think of: market place, input prices and availability, technical advice, weather, insurance, banking. He has to combine information from all these sources and make trade offs between them, e.g. what is the risk of a drought in the next year and how to manage this with the financial products like insurance or a bank loan?

The figure below gives a more abstract conceptualization of the context.



In this figure three 'standard' layers are conceptualized of farmers, government and a technical layer acting between them, in which consultants, extensionists, ngo's are active, and providing advice, and the whole 3 layers are influenced by donors. It is proposed that these three layers will be active in some form or other in all locations. However, the actual players in the regions might differ. This became clearest when discussing differences between countries in SSA and SA, where it was noted that large differences exist. Some have strong centralized governments like Ethiopia and weak regional governments, while others (for example Kenia) have very strong regional governments and a weaker central government. This has an impact on who one should primarily target with an Impact Explorer. Similarly Zimbabwe is different from the countries that surrounds it, but there is some contact between these countries, also on a political level. Finally, there is always a diversity of farmers and policy departments, as also shown in the figure above, while the same applies to private sector and ngo's.

Conclusions for Zimbabwe:

1. The developments of commercialization of farming and increased concern with a changing climate through some extreme events lead to a strong network of the different stakeholders, and an interest in receiving information on the impacts of climate change.
2. Other information sources yet in Zimbabwe on impacts of climate change, with adaptation packages were not identified during the session.
3. There is an intricate network of stakeholders which develops over time, depending on trends on the inside and outside. Each stakeholder group is in itself highly

heterogeneous, but there is usually a technical layer providing advice and support in some form.
4. Trust and quality of the information are important criteria for the use of information.
5. Other regions will differ in the importance of different stakeholders in the regions.

4.2.4 Technology

What technology will be used for the IE? What obstacles/opportunities can be identified?

- Internet in Harare and Bulawayo is reliable and reasonably fast;
- Power cuts are the biggest problem; 3 times a week, for 5 hrs or more;
- National offices have good computers;
- In the regions hardware and Internet access are less reliable;
- Smallholder farmers can best be reached with regular (simple) cell phones; Econet provides SMS based services for regular cell phones;
- 80% of country is covered by telephone companies; and about 80% of farmers do have a simple cell phone. Bigger farmers can reach their neighboorhood.
- Younger generation get used to technology;
- Ministry of climate change uses every available medium to deliver message: Internet, billboards, tv, etc.

Note: The IGB team uses social media (Twitter, Linkedin, Facebook) to spread message.

Conclusions for Zimbabwe:

For primary users internet access is of sufficient quality. The IE itself will probably not be designed for use in field. Therefore extensive download options are required to allow for instance extension workers to download visuals and key messages for presentation to a wider audience.

4.3 Results Session 2, June 26: Data requirements

Participants: CLIPS stakeholders. Sls present.
After showing the stakeholder the key messages of the CLIPS team in the Impacts Explorer prototype, we asked them the following 4 questions:

- How would you use this information?
- What are you missing?
- How do you get it currently?
- How would you like to get it?

The results of the interviews are presented in the Appendix.

A summary of the results:

Use of information

The stakeholders expect they would use similar information for:

- prediction, planning;
- seasonal forecasts;
- learn from the adaptation packages for their own situation;
- vulnerability assessments;

- adaptation plans;
- policy briefs;
- as a source of data sets.

Now missing
The answers given relate both to the content of the messages as well as the presentation:

- Evidence from real world (so not only modelling);
- Impacts of adaptation measures;
- Shorter term predictions;
- Overlay: combine information and see how it possibly interacts;
- Background information on study area (size, nr of households);
- The policy message: for who is it? Tailor key messages to specific audiences;
- Scenario's should be explained; take response into account (early adopting farmers vs. regular implementation time);
- Key learnings: which adaptation works?

Current information sources
A number of sources is mentioned, supporting the remark that much information is available but not in one place and not always free:

- Agritex;
- MET services : seasonal forecast;
- ICRISAT, National Research Service;
- IPCC;
- World Bank portal;
- Universities;
- Self-collected; own research;
- Internet, social media.

Delivery/presentation
Several ideas were proposed for the presentation of the results:

- Supply recommendations and evidence ;
- Specific for a locality;
- Explanation of how a case may scale out;
- Understandable for non experts, but more in depth for experts;
- Providing access to underlying data.

4.4 Conclusions

Users of the Impacts Explorer
The most important user group are so-called technocrats: professionals with a relevant academic background, working for government;

1) either focused on preparing policy plans or
2) advising farmers (organisations).

Also experts in farmers'organisations are expected to benefit from the IE; however individual farmers and researchers are not regarded as primary users.

Activities the Impacts Explorer should support with data and functionality
Probable activities using the IE are:

- (focus on policy): collect information on adaptation strategies and options, in the context of preparing policy plans. For instance: describe current situation, find

relevant information, determine risks, compare options. For in depth analysis they will ask a consultant.
- (focus on advising farmers): collect relevant information on options and current climate trends for raising awareness and pathways for change; the objective is presentation to other audiences.

The Impacts Explorer will offer a one-stop repository of information, data and knowledge to support professionals preparing for and adapting to the consequences of climate change.To exploit this service, the application must be designed to provide access to and understanding of the available information through an efficient and easy-to-use interface.

The application must support easy access to available data and information by a clear organisation of the content and use of both visuals and text, designed for users without expert knowledge; search for (related) information; comparison of outcomes; and options for downloading and printing.
The key messages are expected to:
- supply recommendations and evidence ;
- be specific for a locality;
- explain how a case may scale out;
- be understandable for non experts, but offer more in depth information for experts;
- be supported by background data; and by evidence to enhance credibility;
- provide access to underlying data.

The requirements will be specified in the next requirements activities.

Data in the Impacts Explorer
One of the main goals of the Impacts Explorer is to provide access to the AgMIP phase 1 results which are produced by the regional teams. We distinguish these parts:
- Model simulation results
    - Climate
    - Crops
    - Economics
- RAPs and adaptation packages
- Metadata on the study areas used by every regional team.

The model simulation results produced by the regional teams are handed over to the crops, economics and climate team. For crops and economics the results are harmonized; the results from the different teams are centrally stored in the same structure. For crops this is the ACMO data; on economics there are harmonized summary tables available.
The harmonized results on crops and economics will be provided to the Impacts Explorer team. These harmonized results are the basis for the visualization and presentation in the Impacts Explorer. Regarding the climate data the most important characteristics and ways to visualize them are being investigated by the climate team members. The climate team will provide summarized data to be presented in the Impacts Explorer. The focus of the Impacts Explorer will be on model outputs; for model inputs the user will be guided to existing AgMIP websites.

The RAPs and adaptation packages are descriptions which will be provided in text files, preferably as Word or PDF-files.

Metadata on the study areas will also be delivered as text files. A geospatial presentation of the study areas can be valuable as well.

Based on all the phase 1 results the regional teams generate key messages to stakeholders. The concept of key messages plays an important role in the design of the Impacts Explorer. The focus on data for the Impacts Explorer will be on data which explain and underpin the key messages. There might be additional data which are important in explaining the key messages. If possible they will be integrated with the Impacts Explorer as well. It might not be feasible to include lots of the additional non-Agmip data; in those cases external links to these data may be sufficient.

Key messages presented by the Impacts Explorer
Teams are able to draft key messages in several sessions, but more detailed descriptions or templates for the key messages need to be developed. The following elements need to be included in the IE, as draft template for the key messages:1. What do these graphs tell us? 2. Why is this important? 3. How did we obtain these results? 4. Can the results be generalized? Are these results usable for other locations? Are these results valid at other locations? What are the characteristics of the results? 5. Additional information: data sources used (references), methods & Study site: general description.

Presentation of Key Messages
There is a gap between the data and the attractive and simple visualizations required by stakeholders in the IE. Many visualizations are scientific and in cases phase 1 results are not adequate for the development of visualizations.

From the workshop the team gained a good impression of target stakeholders and users in Zimbabwe, and a first overview of tasks and activities for which the IE will be used, and expectations of the users regarding data presentation and functionality. Also the stakeholders' discussion led to understanding of the context in which the IE will be used that is important for the successful introduction and use of the IE.

Next steps in this process must be aimed at finding similarities and differences with other regions involved and further specifying users to develop user scenarios.

5 Next steps and Timeline

Next steps in the design and development of the Impacts Explorer follow the principles of user centered design and will lead to a first prototype in January 2016. The results of the PACT-analysis and data requirements interviews with the Zimbabwe stakeholders will be discussed with other AgMIP teams and used to determine a first set of requirements for the IE. To complete this phase, a PACT-analysis and data requirements interviews will be conducted in all other regions as well. This leads to understanding of differences and similarities between the expected use and users and enhance the involvement of the regional teams with the design of the IE. This process will be supported by the IE team and will be concluded in October/November.

In parallel, personas and user scenarios will be developed to further guide development and evaluation during the design, development and evaluation process. The personas will be initiated by the IE team and presented to the RRTs for comments and refinement.

In cooperation with Shari Lynn Lifson an activity list and time line will be developed for collecting, enhancing and evaluating the content (text and visuals) representing the key messages in a common format (template).

An advisory group or user panel is launched in autumn 2015 to evaluate the key messages and prototypes and help develop a plan for successful introduction and implementation of the Impacts Explorer; representing interested users and stakeholder groups, and experts using or developing similar applications.

The first prototype will be delivered in January 2016. The design and development activities are divided in four components, all conducted in collaboration with SU and teams.

Activity	
User requirements (Joske)	
	End of August: Instructions for doing PACT analysis in regions with teams through SL's (Joske)
	September/October: Teams do PACT analysis (full or partial)
	November/December: Joske and teams evaluate results of PACT analysis with a focus on requirements for IE prototype 2. Personas and scenarios.
	General pages of IE: Joske proposes main topics, and contact Shari for link to general AgMIP website
Key messages in IE (Joske in close collaboration with Amy and Wendy-Lin)	
	End of August: First version of template for key-messages (Joske); provided to Amy and Wendy-Lin
	September SU planning meeting: working through the template with teams and collecting/evaluating some results
	End of October: first complete draft delivered by teams
	November-December: Shari and Joske provide feedback, editing

	and further development (Visuals based on work of Shari and teams in phase 1)
	January: first prototype filled with key messages
Interactive tool: data and visualizations (Hugo and Arjan)	
	End of August: Alex, John/Roberto, Cheryl deliver phase 1 data to Hugo
	From October monthly skypes between Hugo and data providers
	January: first prototype of interactive tool
Advisory group/User Panel (Joske, Sander)	
	September: Joske and Sander develop terms of reference and scope (September)
	Advisory group/User Panel is formed, with invitations (October/November)

Table 2. Timeline towards 1st prototype

July 17th, 2015

AgMIP Victoria Falls Workshop
Climate Team Report

A. Breakout team participants

- Burhan Ahmad, Pakistan Meteorological Department
- Mary Kilavi, Kenya Meteorological Department (East Africa Team)
- Mohammed Ly, AGRHYMET, Niger (CIWARA)
- Sonali McDermid, New York University, NYU (S. India Team and Climate co-Lead)
- Alex Ruane, NASA Goddard Institute for Space Studies, USA (Climate co-Lead)
- Additional participants engaged on climate issues:
    - Alyson Brizius, University of Chicago, USA (FACE-IT)
    - Nataraja Subash, Indian Council for Agricultural Research (Indo-Gangetic Basin Team)
    - Guillermo Baigorria, University of Nebraska-Lincoln, USA (IGB Team)
- Olivier Crespo, University of Cape Town, South Africa (CLIP and SAAMIP) also interacted with the team extensively ahead of the workshop despite note being able to attend in person

B. Climate Team Objectives

The Climate Team breakout sessions were conducted to:

- Familiarize participants with AgMIP Climate Team protocols and the role of climate information and analyses in the broader regional integrated assessment.
- Assess and control quality of historical climate datasets that form the basis of climate information for crop and livestock modeling in the region, and then set into .AgMIP data format to enable the use of AgMIP climate scenarios generation tools.
- Create estimates of various farm site climates for each economic survey site grouping.
- Analyze the ensemble of GCM projections for each region's growing season in order to select 5 GCM subset featuring representative (relatively) warm/dry, warm/wet, cool/dry, cool/wet, and ensemble median models.
- Check that these selected GCMs have reasonable representation of the main climate features for a region and note that each GCM represents a specific fraction of the wider GCM ensemble.
- Produce future climate scenarios that recognize changes in mean and intraseasonal variability as projected by the GCMs.
- Engage with crop modeling team in sensibility analysis built upon a realistic response of agricultural systems to changes in mean temperature, rainfall, and carbon dioxide concentrations, as well as the interannual variability in the historical period (1980-2010).

C. Summary of Activities

The Climate Team conducted a series of webinars in anticipation of the Victoria Falls Workshop and thus were able to hit the ground running during our time together at the workshop. The webinars focused on updating the protocols for Phase 2 with an emphasis on what has changed

since Phase 1 in the climate team and in the overall project design (e.g., the additional core question). We also emphasized the need for increased analysis and perspective from the climate team to ensure sensible results and useful metrics of climate change.

Climate Team breakouts at the workshop began with two technical sessions designed to introduce the AgMIP approach and tools for historical period quality assessment and quality control of meteorological station datasets, estimation of nearby farm site climate series, selecting a subset of GCMs for full integrated assessment, and generation of mean-and-variability-change future climate scenarios. Participants then spent the rest of the workshop mechanistically working their way through their own climate information for regional integrated assessment, generally getting through at least one complete set of climate data for a site in order to demonstrate the process to eventually be repeated for any other sites that might be needed or added by their team. As the mechanical process was generally in good shape by day 4, Climate Team participants focused on analyzing climate metrics that could explain historical yield variability using current period simulations taken from Phase 1. Drs. Ruane and McDermid also worked with the crop modeling breakout group to conduct carbon, temperature, water, and nitrogen (CTWN) sensitivity tests that were designed to elucidate model differences and potential issues in the calibration of crop model simulations. Considerable effort was also devoted to selecting the 5 GCM subset for regional integrated assessment and to ensure that the models were reasonably represented of regional climate. In the course of this work we determined that it was important to have one GCM selected for the whole year in order to ensure consistency for economic model applications (that is, the cotton and wheat growing seasons in Pakistan should utilize the same GCM). To do this it is important to recognize that rainfall changes in the irrigated season should not matter as much as those in the rainfed season when determining the GCM subset.

The Climate Team also collaborated with the crop and economics teams to determine the need for RCP4.5 climate scenarios as an element of the more optimistic Representative Agricultural Pathway (RAP) to be developed for future period simulations. This will also more accurately represent uncertainties in greenhouse gas emissions pathways in the coming decades. The analysis approach does not require the same GCMs to be used for RCP8.5 and RCP4.5, so teams will select a representative subset of GCMs for each ensemble.

D. Summary of Analyses conducted at the workshop

D.1: Historical climate filling

Figure 1 contrasts three datasets for Tmax in Trichy, India, as an example of the gap-filling and quality controlling that was done to obtain a representative baseline climate series. The observations were missing all of 1980, and contained erroneous (mis-recorded) values, as shown by the extended green lines that appear to be "off the charts". These erroneous values were first corrected by the teams using expert judgement on what the actual values should have been, and are consistent with the Tmax logged for the days prior and after the erroneous values. Once these values were fixed, the monthly averages in the observed series were used to bias-corrected the AgMERRA series, in order to bring the AgMERRA series more closely in-line with the observed monthly averages over the time period. In general, the bias fell within 3% of the observed monthly averages, indicating the utility and generally good representation of AgMERRA in this locality. The bias-corrected AgMERRA values were then used to fill in the missing values (in this case, all of 1980) in the observed timeseries, and the observed (corrected) values were preserved. In cases where the teams have much of their 1980-2010 data, but are missing some values and/or individual years, this method provides a means to complete their climate series in a representative way, preserving the major features of the observations.

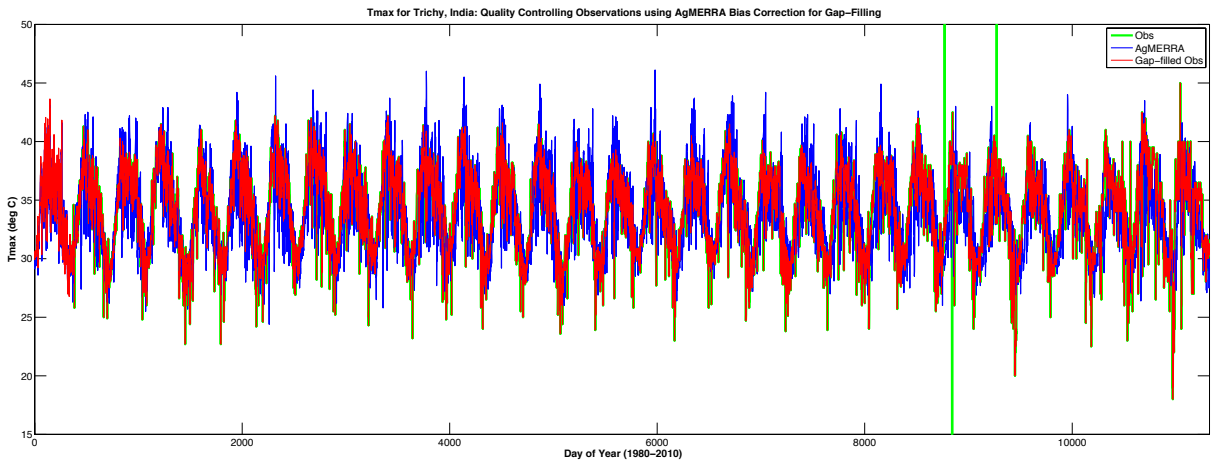


Figure 1: Daily Tmax plotted for the raw observations (green); the corresponding AgMERRA daily series (blue); and the adjusted observations that have been gap-filled with a bias-corrected version of the AgMERRA data for Trichy, Tamil Nadu, India.

D.2: GCM subset selection

Figure 2 shows examples of the model selection scatter plots produced by three RRTs (described in the figure caption). These plots demonstrate the "quadrant" method that has been applied in Phase 2, grouping the models' T and P changes relative to the median of all modeled changes. Teams generally will select the model closest to the median point (shown as colored dots) in each quadrant and the center box. Additional teams have since created this plot, and utilizing the quadrant method shown, have made their selection of five GCMs (at minimum) that represent the spread of model results, and will utilize these GCMs in the crop and economic portions of the assessment. Table 1 details the models chosen thus far for the teams that have contributed their selections. We expect to have each team's model selections, for each season of interest, recorded in this table for future reference.

Additionally, the climate participants, in discussion with the crops and economics teams, reached a decision to utilize the entirety of the growing seasons modeled in their respective farming systems. For example, if a farming system included both June-Sept and Sept-Dec crop, then the five GCMs would be selected based upon the temperature and rainfall spread for June-Dec combined. The future scenarios from five GCMs would then be passed to the crop modelers, and the relative yield changes from these five GCMs would be provided to the economists. The reasoning for doing this revolved around the complexities and difficulties introduced in the economics assessment by changing to a different five GCMs if they were chosen separately by season. One set of five GCMs must be consistent for the entire farming system, inclusive of the multiple seasons modeled. However, in some cases, such as South India, it was agreed that separate climate-crop assessments would be undertaken for a unique set of GCMs for each growing season, in addition to a consistent set of five GCMs across seasons that would facilitate the economics assessment. Some differences were observed between the GCM selection taken for the distinct seasons and then for the combined seasons that would make such a comparative assessment worthwhile.

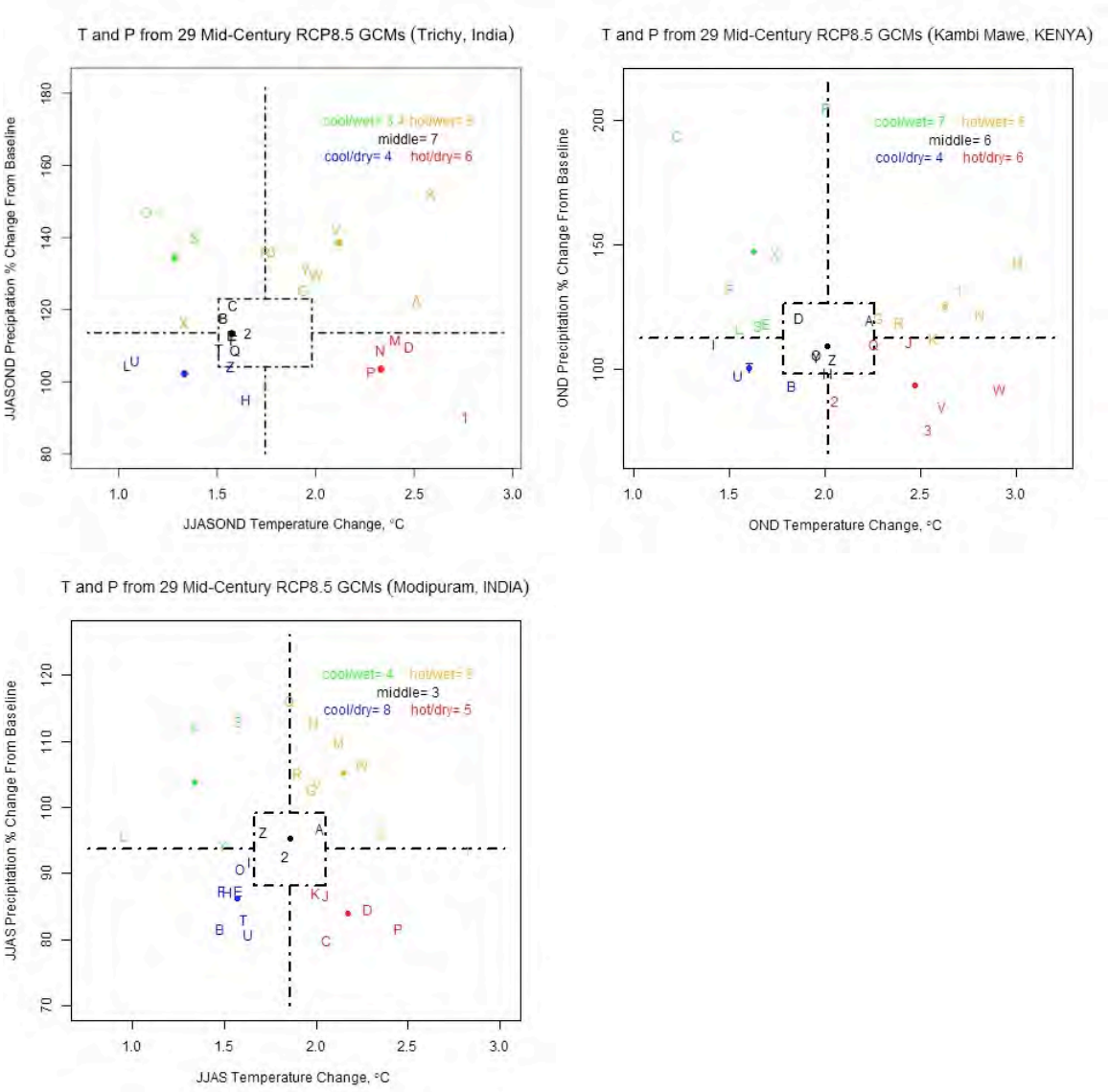


Figure 2: GCM Temperature and Rainfall change scatter plots for a) Trichy, India (South India team); b) Kami Ya Mawe, Kenya (East Africa team); and c) Modipuram, India (IGB team). Colored dots indicate the median point of each quadrant and center box (which is defined as one standard deviation across for delta T and delta P).

Table 1: Preliminary selection of GCM subset for teams participating at Victoria Falls workshop. These selections are still being finalized (e.g., to ensure that the same GCM can be used for all elements of an economic system) and the selections of SAAMIP and CLIP are being collected remotely from Olivier Crespo. The introduction of RCP4.5 outputs to represent a more optimistic RAP was added during the workshop, so many of the teams will need to select the subset of GCMs to represent this ensemble of projections.

Team						
CIWARA	*Site: Tamale*	All Crops				
		Season	JJAS			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry

	RCP85	IPSL-CM5B-LR	CanESM2	GISS-E2-R	HadGEM2-ES	MIROC5
	RCP45	IPSL-CM5B-LR	HadGEM2-AO	CESM1-BGC	CMCC-CMS	BNU-ESM
	Site: Koutiala	All Crops				
		Season	JJAS			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	MIROC5	ACCESS1-0	GFDL-CM3	MPI-ESM-MR	CCSM4
	RCP45	CCSM4	ACCESS1-0	MRI-CGCM3	CMCC-CMS	CESM1-BGC
	Site: Nioro	All Crops				
		Season	JJAS			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	MIROC5	IPSL-CM5A-LR	GFDL-CM3	MPI-ESM-MR	inmcm4
	RCP45	CCSM4	IPSL-CM5A-LR	MRI-CGCM3	CMCC-CMS	CESM1-BGC
	Site: Navrongo	All Crops				
		Season	JJAS			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	TBD	TBD	TBD	TBD	TBD
	RCP45	CCSM4	CMCC-CM	MRI-CGCM3	bcc-csm1-1	CMCC-CMS
Pakistan						
	Site: Rahim Yar Khan	Crops	cotton/wheat			
		Season	JJASONDJFMA			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	TBD	TBD	TBD	TBD	TBD
	RCP45	TBD	TBD	TBD	TBD	TBD
	Site: Bahawalpur	Crops	cotton/wheat			

		Season	JJASONDJFMA			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	GFDL-CM3	CSIRO-Mk3-6-0	MIROC5	CCSM4	CMCC-CMS
	RCP45	TBD	TBD	TBD	TBD	TBD
	Site: Multan	Crops	cotton/wheat			
		Season	JJASONDJFMA			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	TBD	TBD	TBD	TBD	TBD
	RCP45	TBD	TBD	TBD	TBD	TBD
	Site: Bahawalnagar	Crops	cotton/wheat			
		Season	JJASONDJFMA			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	TBD	TBD	TBD	TBD	TBD
	RCP45	TBD	TBD	TBD	TBD	TBD
	Site: Lodhran	Crops	cotton/wheat			
		Season	JJASONDJFMA			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	TBD	TBD	TBD	TBD	TBD
	RCP45	TBD	TBD	TBD	TBD	TBD
South India						
	Site: Trichy	Crops	maize			
		Season	JJAS			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	MRI-CGCM3	CMCC-CM	CCSM4	FGOALS-g2	MIROC-ESM
	RCP45	TBD	TBD	TBD	TBD	TBD
	Site: Trichy	Crops	rice			

		Season	SOND			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	BNU-ESM	ACCESS1-0	GGFDL-ESM2M	CESM1-BGC	MIROC-ESM
	RCP45	TBD	TBD	TBD	TBD	TBD
	Site: Trichy	Crops	maize and rice			
		Season	JJASOND			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	MRI-CGCM3	CMCC-CM	CESM1-BGC	FGOALS-g2	MIROC-ESM
	RCP45	TBD	TBD	TBD	TBD	TBD
East Africa						
	Site: Kambi Ya Mawe	Crops				
		Season	OND			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	CNRM-CM5	GFDL-CM3	MIROC5*	NorESM1-M	CMCC-CM
	RCP45	TBD	TBD	TBD	TBD	TBD
	*To be verified by Mary Kilavi					
IGB						
	Site: Modipuram	Crops	Rice			
		Season	JJAS			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	CNRM-CM5	CMCC-CMS	IPSL-CM5B-LR	CCSM4	CanESM2
	RCP45	TBD	TBD	TBD	TBD	TBD
	Site: Modipuram	Crops	Wheat			

		Season	DJFMA			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	MPI-ESM-MR	CanESM2	MIROC5	CNRM-CM5	CMCC-CMS
	RCP45	TBD	TBD	TBD	TBD	TBD
	Site: Modipuram	Crops	Rice and Wheat			
		Season	JJASONDJFMA			
		Cool/Wet	Hot/Wet	Middle	Cool/Dry	Hot/Dry
	RCP85	CNRM-CM5	CMCC-CMS	IPSL-CM5B-LR	GFDL-ESM2	HadGEM2-CC
	RCP45	TBD	TBD	TBD	TBD	TBD

D.3: CTWN Analyses

The crop modeling team used DOME tools (co-created with the Climate Team) to provide CTWN analyses for six locations (Dakshina Murthy – Indian Maize; Patricia Masikati – Nkayi Maize; Bright Freduah – Navrongo Maize; Bright Freduah – Nioro Maize; Nataraja Subash – Indian Wheat; Dilys McCarthy – Nioro Maize). Analysis of the linear and C3MP suite of sensitivity tests revealed substantial differences between the crop model responses to CTWN factors across sites and models. Below are some examples of the many figures created and analyzed for each simulation. It is the strong recommendation of the AgMIP Climate Team co-Leaders that CTWN analyses are continued and emphasized in Phase 2 of AgMIP work in Sub-Saharan Africa and South Asia.

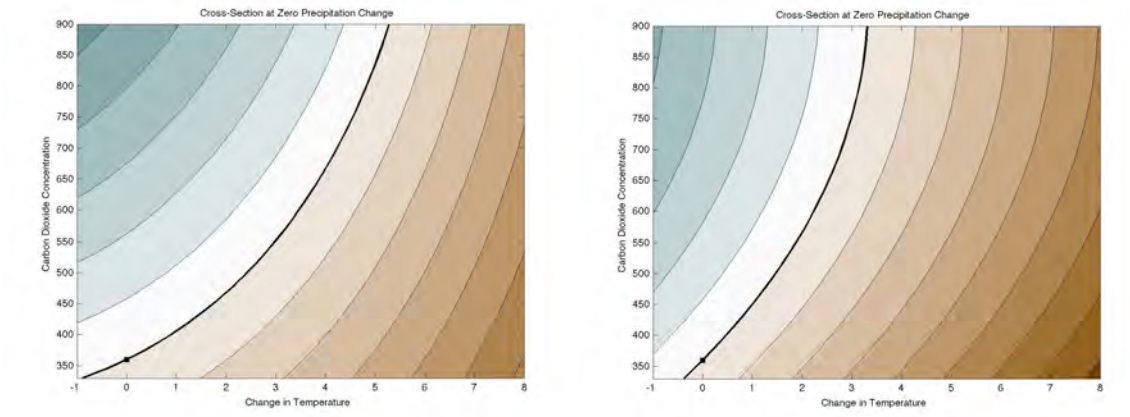


Figure 3: Response of (left) DSSAT and (right) APSIM to carbon dioxide concentration and mean temperature changes for Dr. Subash's irrigated wheat site in India. APSIM has a stronger response to temperature while DSSAT response more strongly to [CO_2].

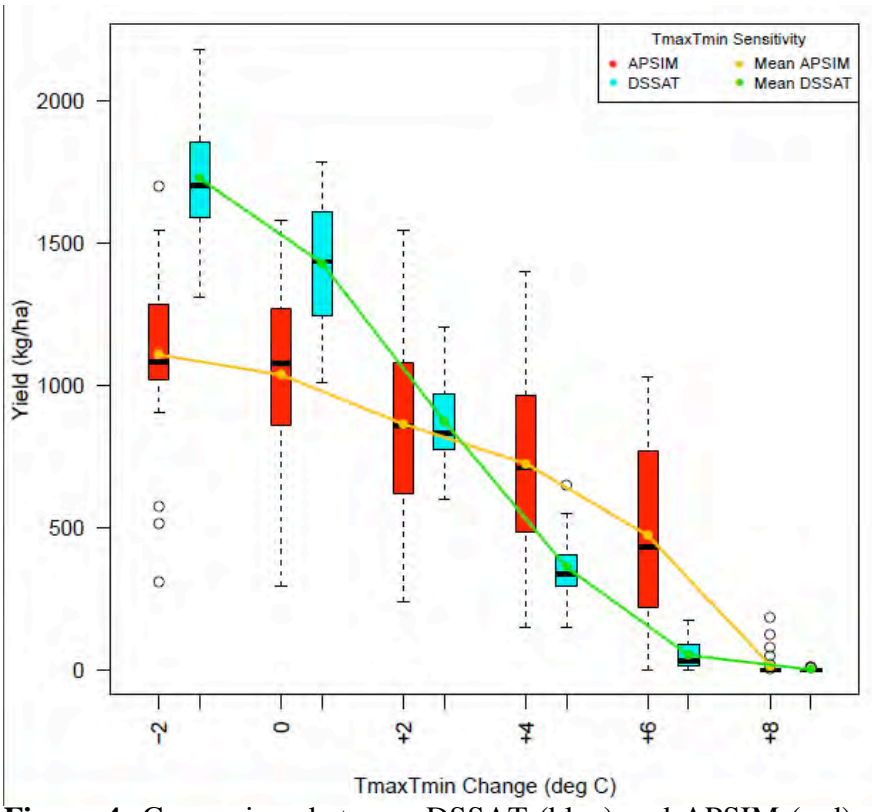


Figure 4: Comparison between DSSAT (blue) and APSIM (red) maize yield response to mean changes in temperature (from Bright Freduah's Nioro maize simulations). Box-and-whisker plots show 30 years of yield for each sensitivity test. DSSAT has a rapid decline in yields with warming temperatures which then flattens out as yield approaches zero, while APSIM has a modest decline in yields until the +8°C simulation where yields are nearly entirely eliminated. These types of differences need to be understood, as do the mean biases evident at the no temperature change case.

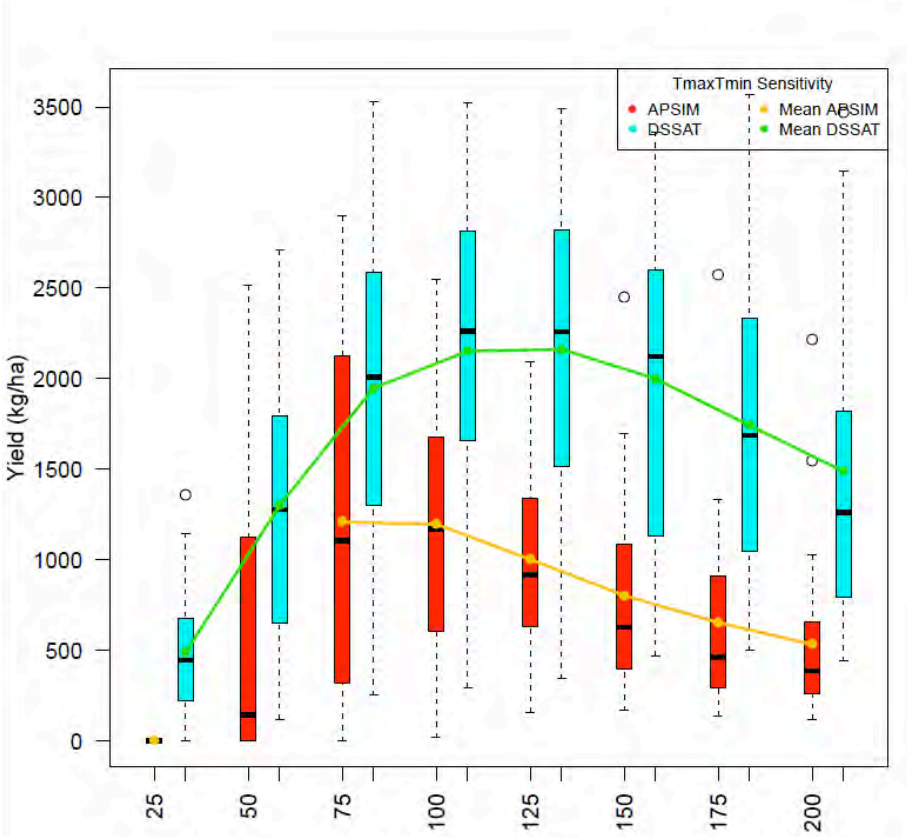


Figure 5: Comparison between DSSAT (blue) and APSIM (red) maize yield response to mean changes in rainfall (from Patricia Masikati's Nkayi maize simulations). Box-and-whisker plots show 30 years of yield for each sensitivity test. DSSAT has a slight increase in yields for the first 25% increase in rainfall before yields begin to drop off (likely due to leaching). APSIM yields decline as rainfall is either higher or lower than the current period (100% on x-axis). In general the pattern of response is similar despite some variation in mean yields. APSIM shows a stronger response of interannual yield variability to mean rainfall, with the drier conditions leading to much larger yield variability and the wetter conditions having reduced interannual variability.

E. Summary of Climate Status for Each RRT

IGB: Dr. Subash and Guillermo Baigorria have indicated that they have downloaded all of the updated scripts and processed climate data and scenarios for some of their sites. Additional sites are expected to be processed soon using the same methods. As the IGB team missed out on the climate team breakouts it is important that we increase interactions on analysis of these data.

South India: Dr. McDermid has processed climate information for new sites and has utilized the climate tools for full scenario generation.

Pakistan: Burhan Ahmad processed historical climate information for the cotton-wheat system site, flagged suspect data, and filled in identified gaps. He also utilized the AgMIP climate tools to create farm climate datasets and future scenarios using mean-and-variability scripts on a subset of GCMs selected to represent the spread of 29 GCMs without an over-reliance on models with poor monsoons.

SAAMIP: Dr. Crespo has utilized the AgMIP climate scripts to select GCMs for the SAAMIP sites and has produced farmclimate estimated datasets and future scenarios.

CLIP: Dr. Crespo has utilized the AgMIP climate scripts to select GCMs for the CLIP sites and has produced farmclimate estimated datasets and future scenarios.

East Africa: Mary Kilavi attended the workshop and learned about the tools and approaches for phase 2 but was not able to stay the whole week. She has been in touch with Dr. McDermid and Dr. Ruane and will continue to work on the scripts. We have full confidence that Mary will shortly be through the production of climate information for the East African sites (although there may be a slight delay in identifying the new Phase 2 sites and the corresponding climate information needed). It is important that the East Africa team ensure that the same processes are conducted for sites outside of Kenya, with either Mary taking the lead or assisting others in the use of AgMIP Climate tools.

CIWARA: Mohammed Ly, attending on behalf of Seydou Traore, was able to compile historical climate datasets, produce farmclimate estimated site datasets, and generate future climate mean-and-variability-change scenarios using a subset of representative GCMs. This was conducted for the Tamale, Ghana, site at the workshop, and we have full confidence in Mr. Ly's ability to follow the same methods at other CIWARA sites.

AgMIP Phase 2 Fundamentals Workshop
June 24 - 30, 2015
Crop Modeling and IT Breakouts Report

Participants:

Gerrit Hoogenboom – AgMIP Crop Modeling/ DSSAT
John Dimes – APSIM
Cheryl Porter – AgMIP IT / Crop Modeling
Alison Brizius – FACE-IT
Davide Cammarano – AgMIP Crop Modeling

Syed Aftab Wajid – Pakistan
Nataraja Subash – IGB
Geethalakshmi – Southern India
Dakshina Murthy – Southern India
Dilys S. MacCarthy – CIWARA
Sibiry Traore – CIWARA
Bright Freduah – CIWARA
Sridhar Gummadi – East Africa
Thembeka Mpusaing – SAAMIP
Patricia Masikati – CLIP
Jairos Ruinda - CLIP

Thursday, June 25 / Friday, June 26: Crop Modeling and IT protocols

Each person gave a brief description of their role in AgMIP, how many members of the team would work on crop modeling, and an overview of their proposed phase 2 crop modeling workplan. The initial reaction from leaders was that the plans were too ambitious. However, after team workplans were revised and completed by the following Monday, the workloads appeared to be reasonable.

Gerrit Hoogenboom presented Phase 2 AgMIP protocols, covering the following topics:

- Review processes for entering new data
    - Sources of cultivar data, calibration of cultivar traits from sentinel site experiments
    - Identifying sources of weather data, soils, management for new farm survey yield data
- Advice on filling in missing information (soil organic carbon pools, initial soil water, initial soil NO3 and NH4, rooting profile, residue, prior root, manure application dates, plant population, fertilizing dates)
- Discuss calibration to historical yield simulations (hints of what to do if yield distribution is too high, too low, tails too strong at low or high end)
- Reviewing the six basic crop model runs (CM1 to CM6) needed to address the core questions and provide four change ratios for the TOA analyses
- Simulating future technology (RAPs) – trying to mimic future yield trends
- Simulating climate adaptations – those requiring extraordinary investment

Topics of particular interest for discussion were:

- The differences between modeling RAPs and adaptation packages. This issue was covered in detail in plenary sessions as well, that helped the teams to understand how the crop models could be parameterized for the future scenarios.
- Correctly parameterizing soils for APSIM and DSSAT. This requires further discussion and we have proposed a follow-up webinar.

The presentation and discussion of crop modeling protocols required most of Thursday, so we modified the schedule to allow an additional half-day on Friday for presenting and learning the latest data translation tools. Cheryl Porter presented the current state of AgMIP data translation tools, with a focus on organization of data and files.

- IT tools for entering farm survey yields
- IT tools for entering missing assumption (DOME)
- QUADUI tools for converting to model-ready files
- Running the crop models, error checking, logs
- Evaluating distributions of historical yields (CM0)
- Seasonal Strategy tools for running 30-year simulations

The teams had the option to either use their own data or use a sample of the Nioro, Senegal data from the CIWARA team's phase 1 data. The participants were able to successfully use the data translation tools to create crop model simulations for historical and current climate, current production conditions (CM0 and CM1). The new batch DOME feature was used to generate simulations for multiple GCMs. Most teams were able to successfully complete these simulations. Additional time to work on these was provided in the Monday afternoon FACE-IT workshop.

Friday, June 26– CTWN & C3MP sensitivity analyses

The crop modeling and data translation protocols required an additional half-day, so the CTWN and C3MP protocols were shortened to a half-day on Friday afternoon. Alex presented the CTWN protocols and Cheryl presented the data translation tools for generating the simulations using a single farm site. We looked at one site in detail (Farm 20 of the Nioro, Senegal data from the CIWARA team), including methodology for selecting the farm for detailed analysis. This site revealed some very different responses to climate variables between DSSAT and APSIM. For example, DSSAT showed no sensitivity to N fertilizer, due to other factors which limited growth. APSIM showed higher sensitivity to water stress. Sample graphs from this analysis are appended to this report. Some of the regional teams produced CTWN and C3MP results during the workshop, including CIWARA, IGB, and Southern India.

As a result of the CTWN sensitivity analysis outputs for the Nioro-Farm20 site, the importance of soil inputs was emphasized. John Dimes prepared a soil input presentation that he shared to the group on Monday.

Monday, June 29 – Phase 1 Data review

In preparation for the workshop, the IT team performed a thorough review of Phase 1 data in support of the book chapters that each team authored. Cheryl Porter visited with each team during their Regional Team breakouts to discuss data deficiencies, phase 2 data protocols, and the AgMIP open data policy. The data for CIWARA, SAAMIP, IGB, and Pakistan are complete. We still require additional data from East Africa and Southern India, which were defined in detail in emails to each PI and crop modeler. These data deficiencies were reviewed with the team crop modelers and we have reassurances that the data will be provided before the end of July.

All teams have agreed to allow their data to be made available on the AgMIP Data Interchange with no restrictions, with the exception of the Pakistan team. The historical weather data for the Pakistan study are private. The future climate scenarios for Pakistan may be stored and publicly accessed. However, the Pakistan team has requested that no data be made public for another 4-12 months until additional journal articles are completed and published. Data may be released to the AgMIP Impacts Explorer team immediately, with the condition that it is still private.

Monday, June 29 – FACE-IT workshop

Alison Brizius was present all week to work with individuals on using the FACE-IT workflow system for AgMIP Regional Integrated Assessments. On Monday, we had a workshop where participants worked with FACE-IT using their data. Cheryl and Alison were available to answer questions and beginning at 4pm local time, we had support from University of Florida and University of Chicago FACE-IT developers. Most of the participants had previously worked with FACE-IT and used the time to gain confidence and learn about the new applications. For the benefit of those who had not previously used FACE-IT, presentations and demonstrations started with signing up for an account, uploading data, building a simple workflow, and analyzing outputs. The feedback from the participants was very positive. Before the end of the workshop, we had one of the participants teaching use of FACE-IT to another participant that had missed the Monday session.

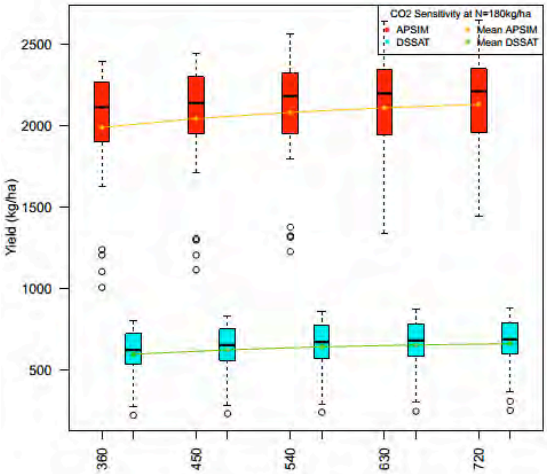
Side meetings:

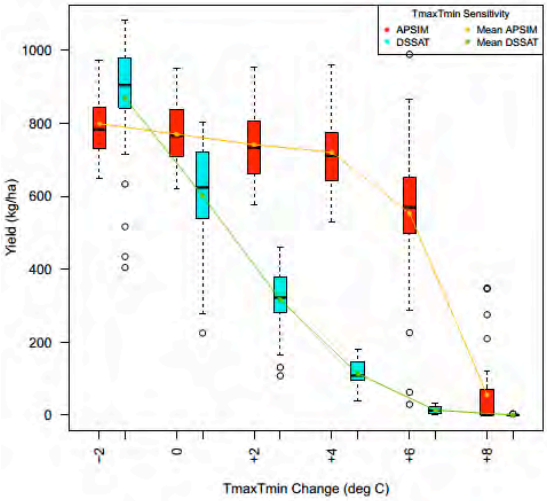
1) Livestock / IT. Cheryl Porter met with Katrien Descheemaeker and Mink Zijlstra to discuss harmonization of livestock model inputs and outputs. Some immediate needs were identified:
   a) To automate the conversion of ACMO data to a format useable by the LIVSIM R routines.
   b) To define livestock model outputs in a format analogous to ACMO (ALMO?)
   c) Longer term livestock modeling needs are to define a standard vocabulary and to develop data translation tools.
2) AgMIP Impacts Explorer data provisioning meeting with John Antle, Roberto Valdivia, Alex Ruane, Cheryl Porter, Sander Janssen, and Hugo de Groot. AIE will be designed to provide phase 1 data, but also expand capability for phase 2 data as these become available. All Phase 1 data for climate, crop and economic analyses will be provided to Hugo by the end of August. Phase 2 economics data will be provided in a database with the relevant metadata, input summaries and output summaries. Crop model formats for phase 2 will not change.

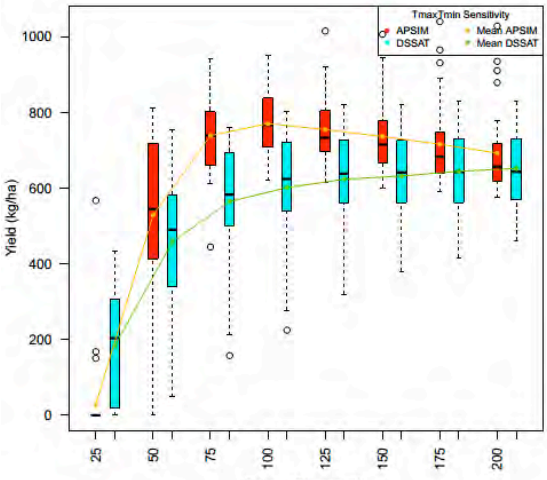
Follow-up activities:
The following activities were identified as necessary in the short-term to facilitate phase 2 crop modeling activities.

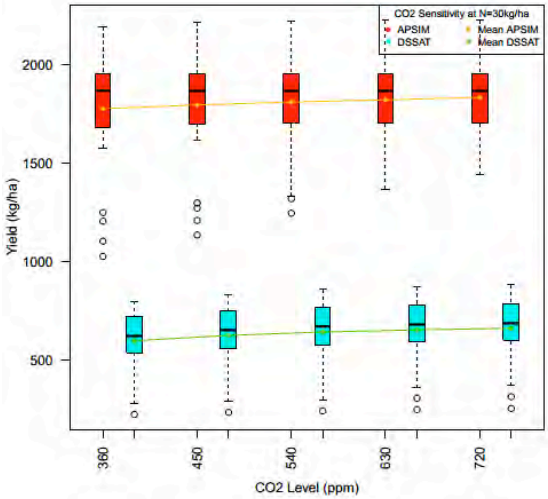
1. Send out CTWN protocols to crop modeling participants (Ken's doc) by email – CHP
2. Establish a protocol for quality control, especially of the CM0 analyses which form the basis for all other analyses. (GH, KJB, PT)
3. Organize two crop modeling webinars (KJB, PT, GH, JDimes, CHP):
    a. Crop model inputs (mid-July). This webinar would go into detail on how to parameterize some of the more difficult parameters, which are often not measured, including soil organic carbon pools, soil water holding capacity, soil evaporation parameters, initial residue amounts and characteristics, etc.
    b. Report from teams on detailed model results and comparison (late July or August). This webinar (or webinars) would allow the crop modelers from the teams to present some preliminary results from historical and CTWN analyses and seek guidance on model output interpretation and model input improvement.
4. Get phase 1 data (climate, crop, econ) to AgMIP Impacts Explorer team by end of August (CV, CHP)
5. APSIM – get CO2 xml files to the teams (John Dimes)
6. Need instruction manual on entering soil C initial conditions for DSSAT and APSIM using ICASA variables and DOME functions (CHP, JDimes, JHargreaves, KJB)
7. Add more analysis and QC/QA to protocols for crop modeling (KJB, PT)

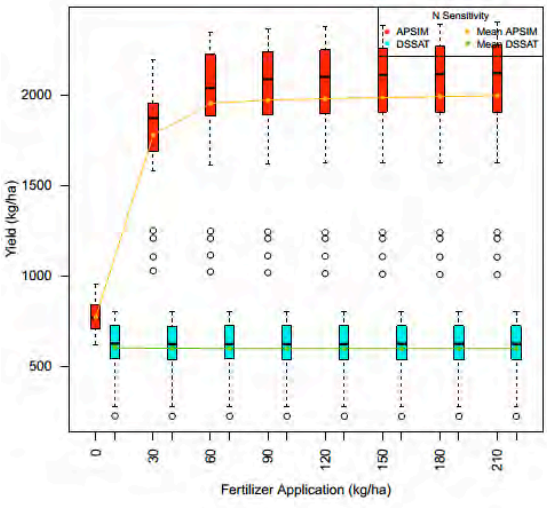
Nioro – Farm 20 – CTWN plots











AgMIP Fundamentals Workshop

Economics Technical Report

July 2 2015

John Antle and Roberto Valdivia

Purpose

The Regional Economics Team at Oregon State University (J. Antle, R. Valdivia, C. Dixon) designed a capacity building program for economists participating in Phase 2. This program began in April 2015 with a short course on the TOA-MD model, and culminated with technical sessions at the workshop in Victoria Falls.

TOA-MD Short Course

In Phase II, the new economists must learn how to use the TOA-MD model to implement the AgMIP Regional Integrated Assessment (RIA) protocols. In order to support the RRTs and new economists, the regional economics team designed a short/intensive TOA-MD course targeted to those new economists. The format of the course followed the same structure of the regular TOA-MD course offered by the OSU Tradeoff Analysis Project. Economists from Phase I that wanted to review the model and methods were also welcome to participate.

Short-Course Structure

Part 1: TOA-MD Basic Learning Module (BLM)

- Register, download and install the TOA-MD model (tradeoffs.oregonstate.edu)
- Attend the 1st TOA-MD BLM Webinar
- Work through the BLM and send the exercises to the TOA-MD Team

Part 2: Climate Change Learning Module (CCLM)

- Those who have successfully completed the BLM will receive the CCLM
- Attend the 2nd Climate Change Learning Module Webinar
- Work through the CCLM and send the exercises to the TOA-MD Team

Workshop: Participation in the Fundamentals Workshop in Zimbabwe was coordinated with each RRT team PI and the AgMIP coordination team, subject to funding availability.

Course schedule

April 23: Economists should have registered, downloaded and installed the TOA-MD model.

April 23: *1st Webinar – BLM*
May 15: Participants submit all BLM Exercises to TOA-MD Team (tradeoffs.team@oregonstate.edu)

May 15-21: TOA-MD team and participants review BLM exercises
May 22: Participants start working on CCLM
June 10: *2nd Webinar CCLM*
June 15: Participants submit CCLM exercises to TOA-MD Team
June 15-19: Review of CCLM exercises and preparation for AgMIP RRT Workshop
June 22-30: AgMIP RRT Workshop, Econ Technical Breakout to review and discuss exercises and methods

Workshop Technical Breakout

Activities:

- Review of each team's study areas and data
- Review of "best practices" for data preparation and analysis, including new data template for calculation of TOA-MD parameters
- Completion of the climate change learning module (step-by-step analysis of Core Questions)
- Review of methods for RAPs and adaptations

Accomplishments and Challenges

All of the new economists that participated in the workshop completed the step-by-step climate change learning module exercise, and indicated that their understanding of and capability to implement the TOA-MD analysis was substantially improved.

All of the lead economists who were team members in Phase 1 indicated they are prepared to implement Phase 2 protocols. However, several of the new economists are students who lack data analysis and modeling experience, and cannot be expected to implement an analysis without substantial support from more senior team members.

Economists also indicated that a major challenge is running the model manually, and manually transferring data from TOA-MD output files to a summary file or database. The OSU team plans to provide a program that will run the TOA-MD model in batch model, and that will transfer data from the TOA-MD output files into a database for analysis and use in the Impacts Explorer.

Timeline and Tasks for Regional Econ Team

Each RRT has its own timeline that includes economist tasks. For the OSU team, the following tasks were identified:

- Ongoing: provide technical support to team economists as needed
- July 2015: document the two RAPs to be used for phase 2

- Aug 2015: price and productivity trend data from global models sent to RRT economists
- Aug 2015: devAdapt template sent to RRT economists to document adaptations
- Aug 2015: send sample TOA-MD output database to IE Team
- Sept 2015: programs to run TOA-MD in batch, and to transfer data from TOA-MD output files into a database for analysis and use in the Impacts Explorer
- Oct 2015: JA to meet and support SAAMIP team in South Africa
- Nov 2015: checkin with team economists (may be webinar)
- Dec 2015-Feb 2016: Review team outputs, provide feedback before Feb/Mar workshop
- March – October 2016: Assist review of final modeling outputs; assist in development of messages, publications.

Participants

	Team	Name	Last name	Institution	Profession	Email	Country
1	CIWARA	Ly	Ahmadou	IPAR	Research Asst. Socio-economics	lydou221@gmail.com	Senegal
2	CIWARA	Joseph	Clottey	University of Ghana	Grad student Ag Econ	josephclottey24@gmail.com	Ghana
3	CIWARA	Justina	Onumah	University of Ghana	Grad student Ag Econ	naadoq@gmail.com	Ghana
4	CLIPS	Ana Lidia	Gangulo	IIAM	Economist	anagungulo@gmail.com	Malawi
5	CLIPS	Ian	Tumeo	Matopos Research Institute	Economist	ian.tumeo@gmail.com	Zimbabwe
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9	IGB	Dinesh	Tapa	Nepal	Economist	darlami.dinesh@gmail.com	Nepal
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14	Pakistan	Sadia	Akhtar Awan	UAF	Research Assitant Economist	awansaawan632@gmail.com	Pakistan
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16	East Africa	Ibrahim	Kadigi	SUA	Economist	kideannito@gmail.com	Tanzania
17	East Africa	Anthony	Oyoo	ICRISAT	Economist	A.Oyoo@cgiar.org	Kenya
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19	East Africa	Caroline	Mwongera	CIAT-CCAFS	Economist	c.mwongera@cgiar.org	Kenya
20	SAAMIP	Wiltrud	Durand	ARC		pdurand@mweb.za	South Africa

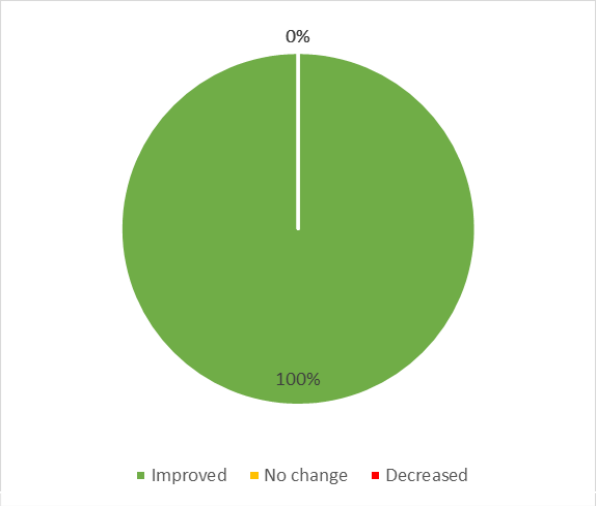
Entry and Exit Questionnaires

To help assess the effectiveness of the workshop, the AgMIP Leadership created entry and exit questionnaires that were distributed to all the participants.

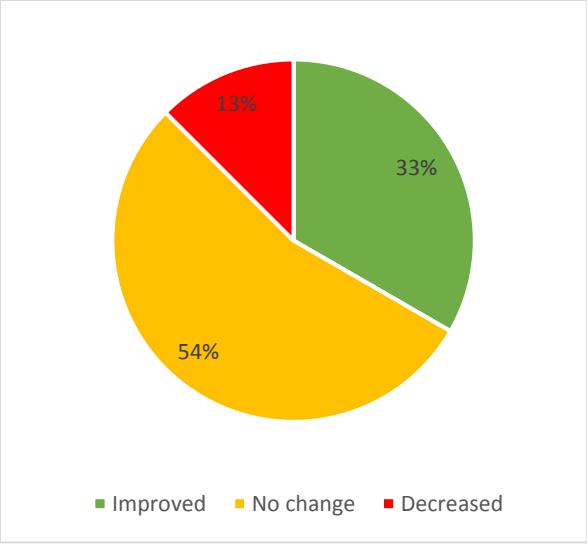
Participants were asked about their general understanding of several topics encompassing AgMIP's various disciplines at the start of the workshop and then again at the end. There were four possible answers: Quite A Lot, Somewhat, Not At All, and Does Not Apply. There were 62 total respondents but only 35 completed both the entry and exit questionnaires.

The results below show the change in responses from entry to exit and are divided into 3 categories: Improved (e.g., respondent marked 'Somewhat' at entry and 'Quite A Lot' at exit), Decrease (e.g., respondent marked 'Somewhat' at entry and 'Not At All' at exit), and No Change (i.e., respondent gave the same response both times). The results below include only responses from the 35 participants that answered both questionnaires. 'Does Not Apply' responses were not taken into account. If the respondent answered 'Quite A Lot' both times, this was not included in the No Change category.

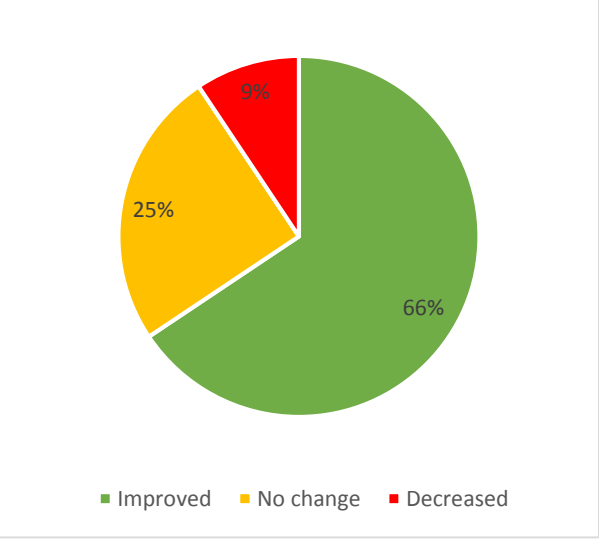
The participants were first asked three general questions:



How well do you now understand the research objectives of your regional research team?

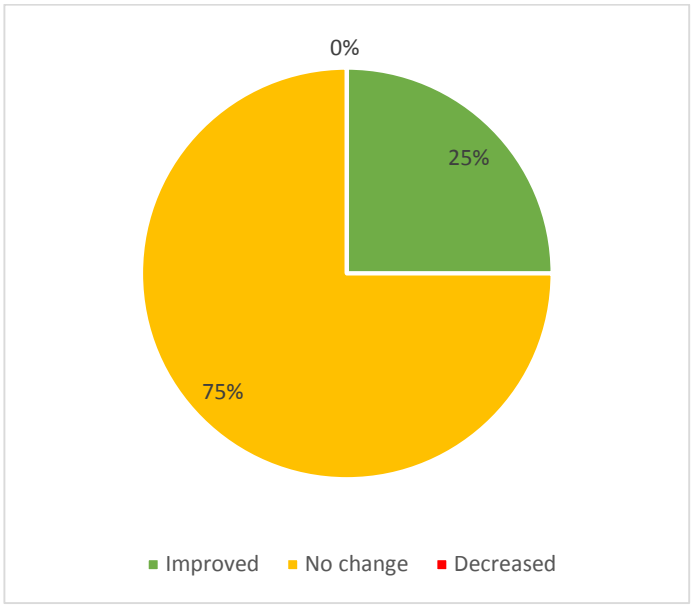


How familiar are you with plans for stakeholder engagement in Phase II for your team?

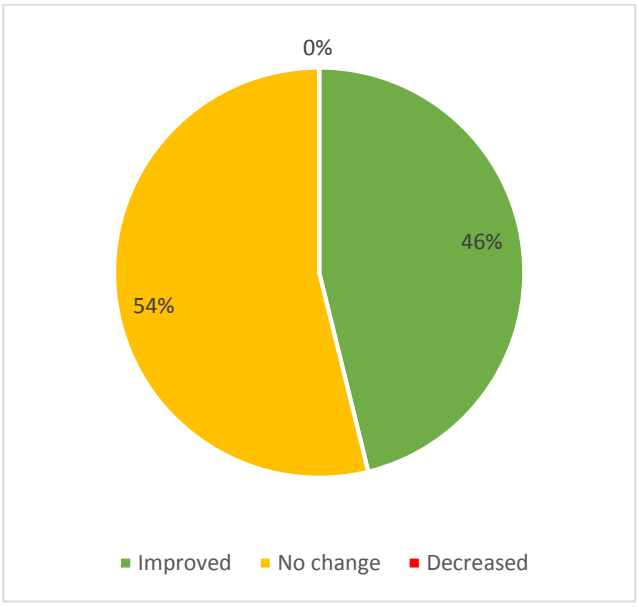


How well do you understand the intent of the AgMIP Impacts Explorer?

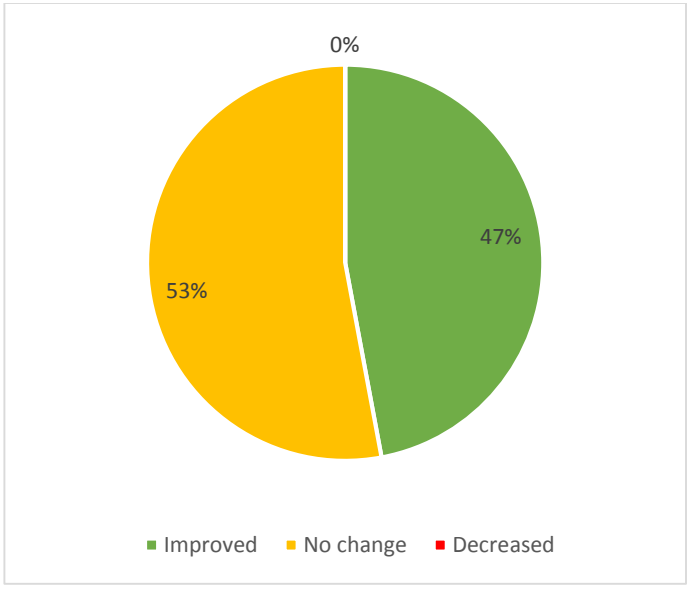
The participants were then asked how comfortable they felt using AgMIP tools for the following:



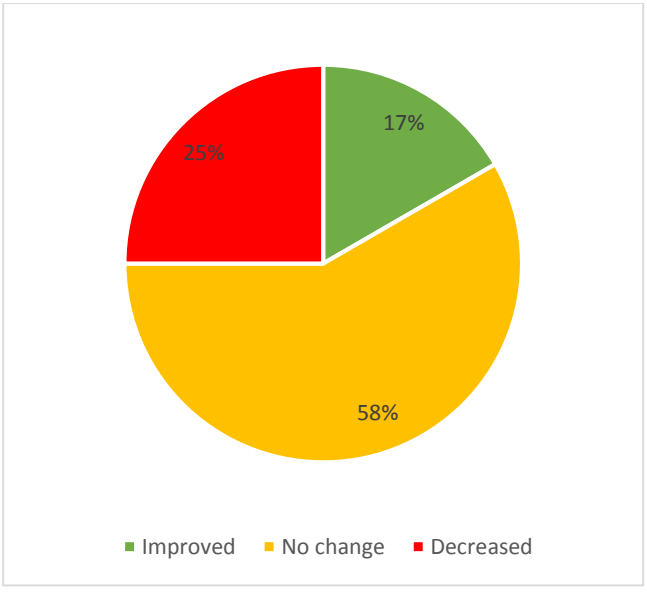
TOA-MD basic learning module



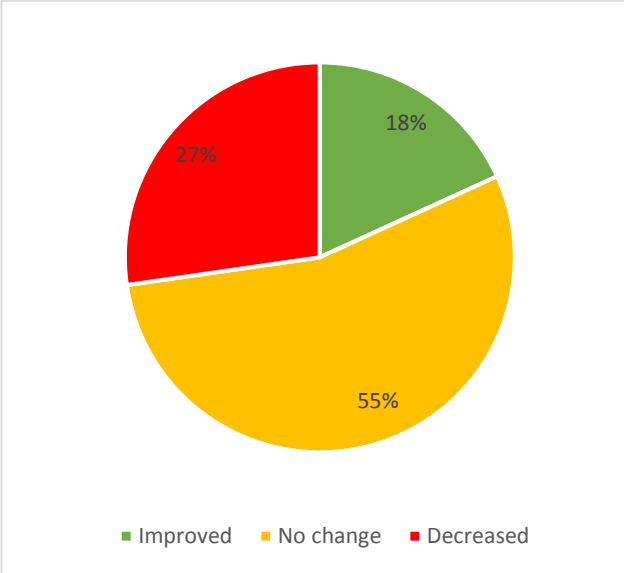
TOA-MD climate change learning module



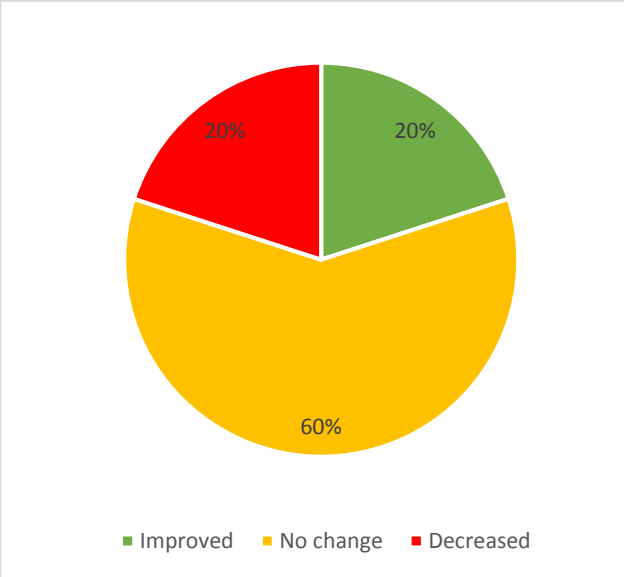
Representative Agricultural Pathways (RAPs)



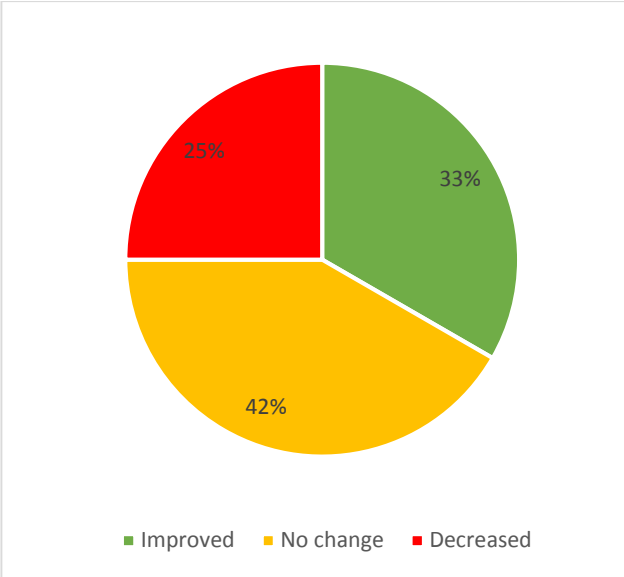
Historical Climate Quality Assurance/Quality Control



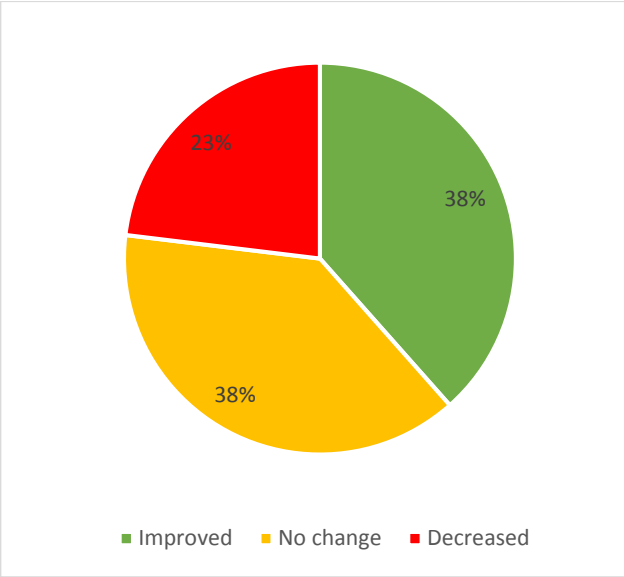
Climate Scenario Generation



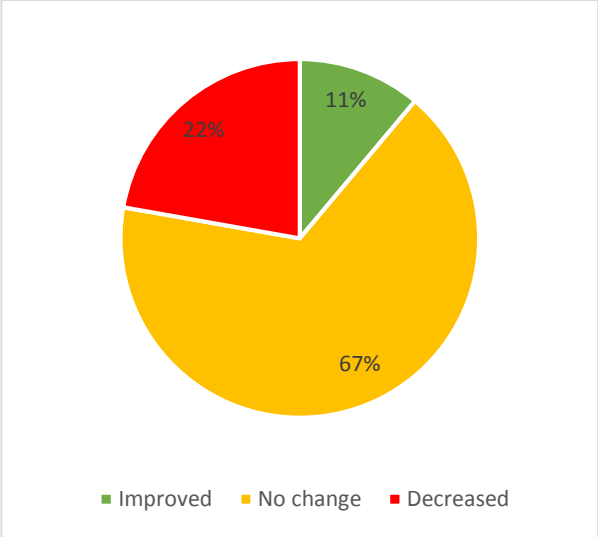
Global Climate Model (GCM) data subsetting



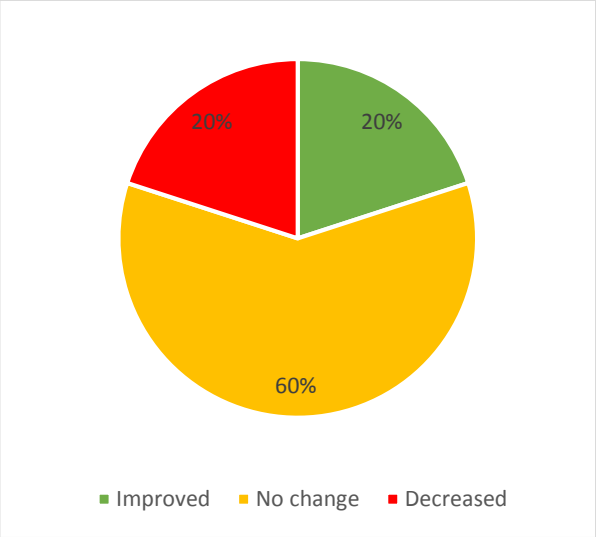
C3MP sensitivity tests & analyses



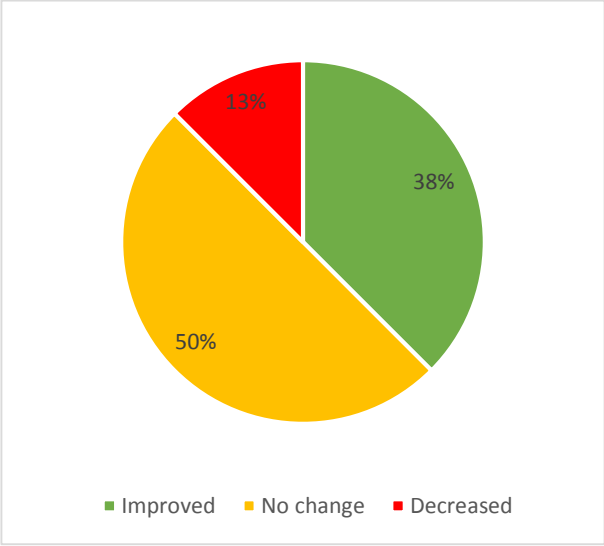
CTWN Sensitivity Tests & Analyses



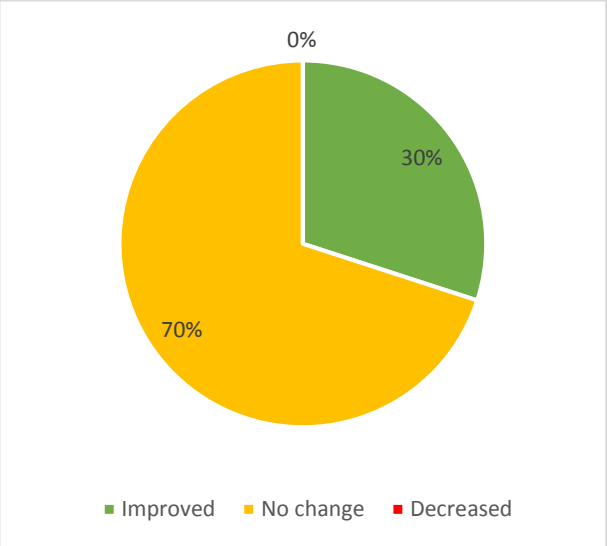
Template for entering farm yield survey data



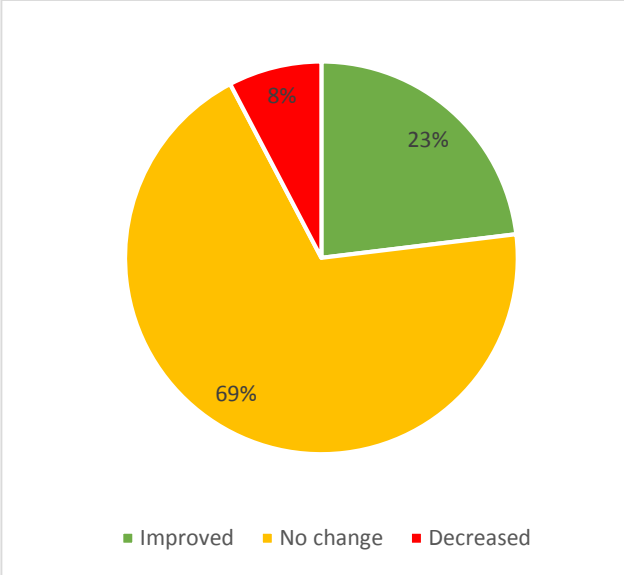
Field_Overlay DOME for missing info – farm surveys



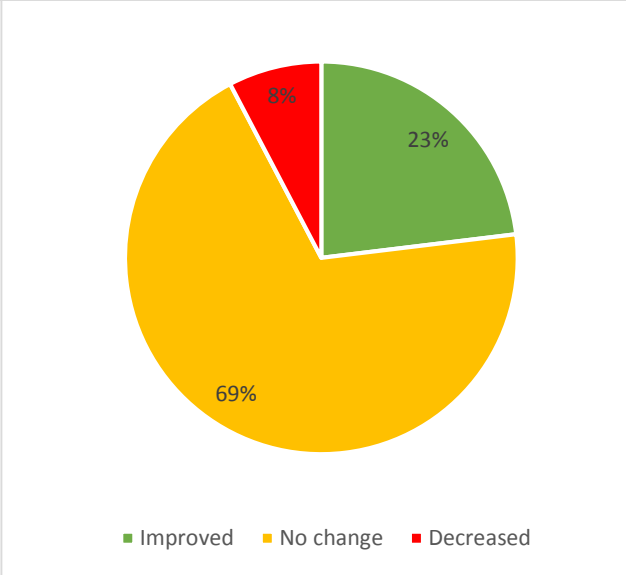
Seasonal_Strategy DOME for multi-year simulations



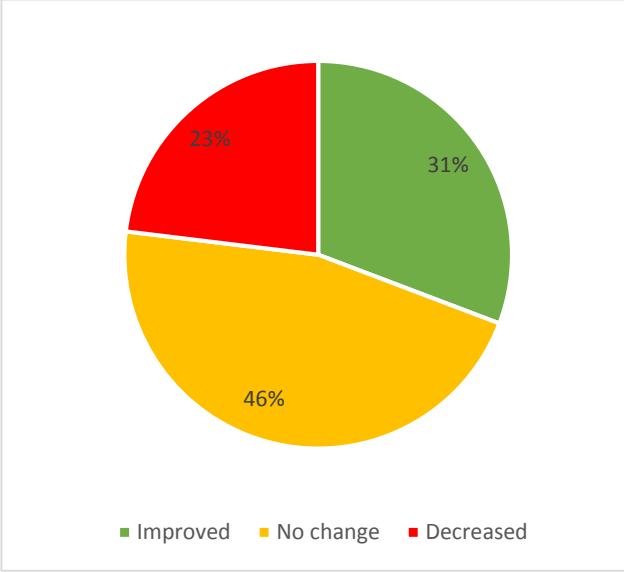
QUADUI Tools converting to model-ready files



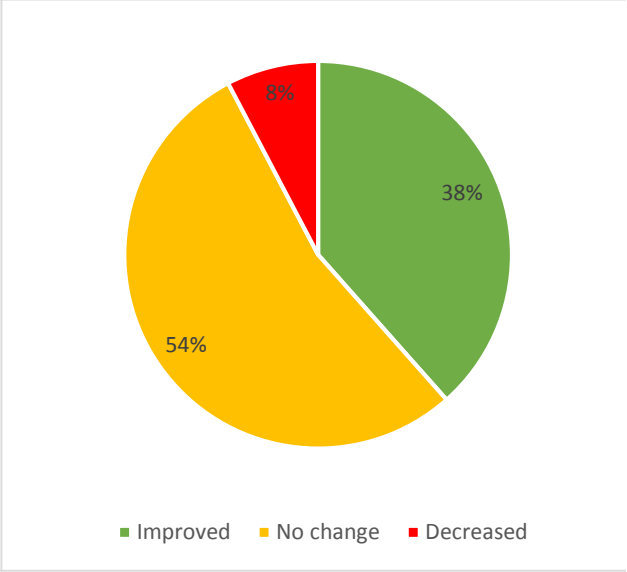
R-Script & MATLAB tools for graphical analyses



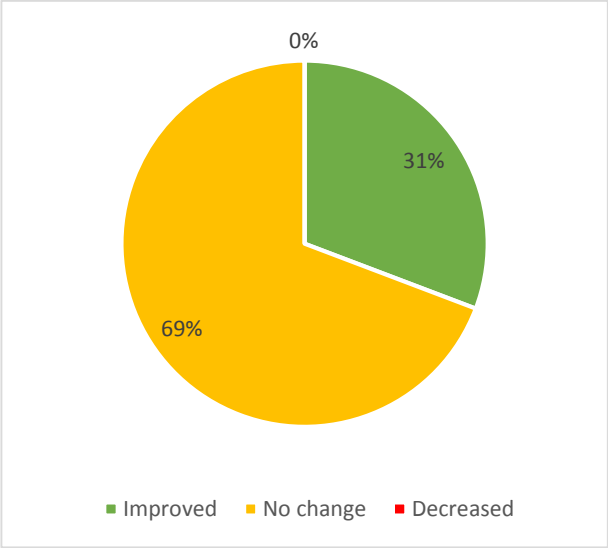
ACMOUI for combining output date with metadata



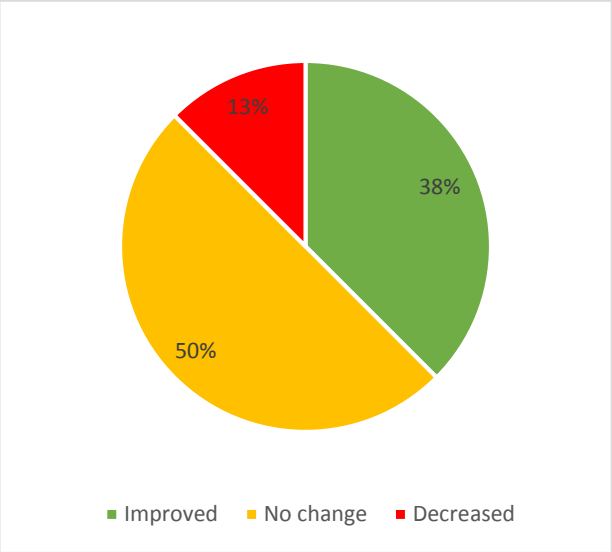
Input templates for livestock model input data



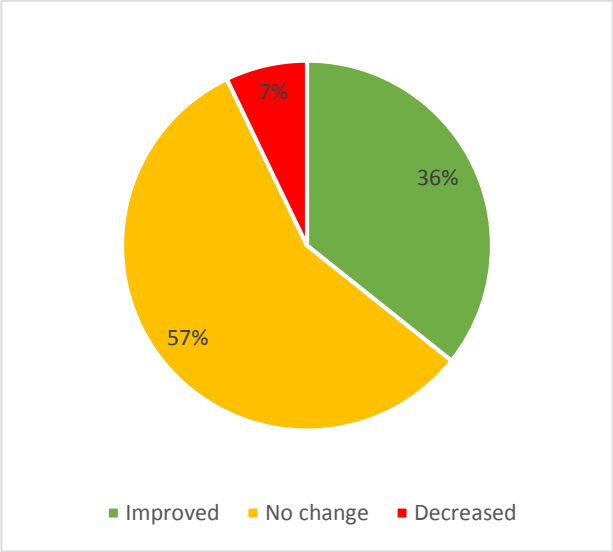
R-script for running the LivSim model



R-script for consulting and plotting LivSim output data



FACE-IT for crop modeling workflow



FACE-IT for climate tools

Participant List

Name	Role	Institution
Regional Research Teams		
South Asia Region		
Indo-Gangetic Basin Team		
Nataraja Subash, PI	Leader, Crop and Climate Modeling	ICAR-IIFSR
Harbir Singh, Co-PI	Economic Modeling	ICAR-IIFSR
Mohar Singh Meena	Stakeholder Engagement	ICAR-ZPD
Gokul Paduel	Economic Modeling	CIMMYT
Sohan Vir Singh	Livestock Modeling	ICAR-NDRI
Pakistan Team		
Ashfaq Ahmad Chatta, PI	Leader, Crop Modeling	University of Agriculture, Faisalabad
Muhammad Ashfaq, Co-PI	Economic Modeling	University of Agriculture, Faisalabad
Ahmad Burhan	Climate Modeling	Pakistan Meteorological Department
Tayyaba Hina	Economic Modeling	University of Agriculture, Faisalabad
Farah Riaz	Stakeholder Engagement	University of Agriculture, Faisalabad
Syed Aftab Wajid	Crop Modeling	University of Agriculture, Faisalabad
South India Team		
Vellingiri Geethalakshmi, PI	Leader, Climate Modeling	Tamil Nadu Agricultural University
Ponnusamy Paramasivam, Co-PI	Economic Modeling	Tamil Nadu Agricultural University
Dakshina Murthy	Stakeholder Engagement, Crop Modeling	ICRISAT
S. Nedumaran	Economic Modeling	ICRISAT
Sub Saharan African Region		
East Africa Team		
Lieven Claessens, PI	Leader, Economic and Crop Modeling	ICRISAT, Kenya
Sridhar Gummadi, Co-PI	Crop and Climate Modeling	ICRISAT, Ethiopia
Jackline Bonabana	Economic Modeling	Makerere University
Ibrahim Kadigi	Economic Modeling	Sokoine University of Agriculture
Mary Kilavi	Climate Modeling	Kenya Meterological Services
David Maleko	Livestock Modeling	Sokoine University of Agriculture
Caroline Mwongera	Economic Modeling	CIAT, Kenya
Anthony Oyoo	Economic Modeling	ICRISAT, Kenya
John Recha	Stakeholder Engagement	CCAFS EA/ILRI
Kelvin Shikuku	Economic Modeling	CIAT, Kenya
Southeast Africa Team - CLIP		
Sabine Homann, PI	Leader, Economic Modeling	ICRISAT, Bulawayo
Patricia Masikati, Co-PI	Crop Modeling	ICRAF
Ana Lidia Gangulo	Economic Modeling	IIAM
Jairos Ruinda	Crop Modeling	University of Zimbabwe
Naomi Jones	Economic Modeling	LUANAR
Cordeliah Ndwalaza	Coordination	ICRISAT, Bulawayo
Trinity Senda	Stakeholder Engagement	Matopos Research Institute
Gevious Sisito	Economic Modeling	LUANAR

Ian Tumeo	Economic Modeling	Matopos Research Institute
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Wiltrud Durand, PI	Leader, Crop and Economic Modeling	Agricultural Research Council
Hlami Ngwenya, co-PI	Stakeholder Engagement	Facilitation of Systemic Change Consulting
Joseph Baloyi	Livestock Modeling	University of Venda
Thembeka Mpusaing	Crop Modeling	Botswana College of Agriculture
Weldemichael Tesfhuney	Crop Modeling	University of the Free State
West Africa Team - CIWARA		
Dilys S. MacCarthy, PI	Leader, Crop Modeling	University of Ghana
Pierre C. Sibiry Traore, Co-PI	Crop Modeling	ICRISAT
Jonathan Anaglo	Stakeholder Engagement	University of Ghana
Joseph Korley Clottey	Economic Modeling	University of Ghana
Bright S. Freduah	Crop Modeling	University of Ghana
Ibrahima Hathie	Economic Modeling	Initiative Prospective Agricole et Rurale
Mouhamed Ly	Climate Modeling	Agrhymet
Andree Mentho Nenkam	Crop Modeling	ICRISAT
Eric Timpong-Jones	Livestock Modeling	University of Ghana
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Principal Investigators		
Cynthia Rosenzweig	AgMIP Leadership and Direction	NASA GISS
John Antle	AgMIP Leadership and Direction	Oregon State University
Host Institution Leader		
Kizito Mazvimavi	Agricultural Economist	ICRISAT, Bulawayo
Expertise Leaders		
Wendy-Lin Bartels	Stakeholder Engagement	University of Florida
Sander Janssen	IT, Data, Impacts Explorer	Wageningen University
Sonali McDermid	Climate Modeling	New York University
Cheryl Porter	IT, Data, Harmonizaiton Tools	University of Florida
Alexander Ruane	Climate Modeling	NASA GISS
Roberto Valdivia	Regional Economic Modeling, TOA	Oregon State University
Advisors		
Alison Brizius	FACE-IT	University of Chicago
Hugo de Groot	Impacts Explorer	Wageningen University
John Dimes	Crop Modeling (APSIM)	Consultant
Joske Houtkamp	Impacts Explorer	Wageningen University
Mink Zijlstra	Livestock Modeling	Wageningen University
Resource Persons		
Guillermo Baigorria	IGB, Crop Modeling	University of Nebraska-Lincoln
Davide Cammarano	SAAMIIP, Crop Modeling	The James Hutton Institute
Katrien Descheemaeker	CLIP, Livestock Modeling	Wageningen University
Caleb Dickson	E Africa, TOA Modeling	Oregon State University
Gerrit Hoogenboom	Pakistan, Crop Modeling	Washington State University

Sonali McDermid	S India, Climate Modeling	New York University
Amy Sullivan	Stakeholder Engagement	Bridgewater Consulting
Ramilan Thiangajarah	W Africa, Livestock Modeling	ICRISAT
Coordination		
Alexander Ruane	Science Coordination	NASA GISS
Carolyn Mutter	International Coordination	Columbia University
Shari Lifson	Communications	Columbia University
Stakeholders		
Tshilidzi Madzivhandila	Policy and Research, Economics	FANRPAN
Mupenyu Mberi	Holistic Rangeland Management	Debshan Ranch
Beniah Nyakanda	EcoFarming	Econet
Dumisani M Nyoni	Provincial Agriculture	Min of Agriculture
Leonard Unganai	Policy and Adaptation	UNDP / GEF
Washington Zhakata	Climate Change Response	Climate Change Response Department
AgMIP Steering Council		
Alessandro Moscuzza	Program Manager	UK DFID

Links to Presentations

Day1:

Rosenzweig
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