RESEARCH PROGRAM ON
Climate Change,
Agriculture and
Food Security

ILRI

2013 technical report

1. Activity Reporting

Activity 591-2013 (Milestone 1.2.1 2013 (2).)

Title: Model application to assess the impacts of climate change in rangeland systems, including changes in biomass availability, plant functional groups, and carbon and nitrogen fluxes.

Status: **Partially complete.** We finalized a working version of the model, have assembled and vetted the climate data necessary to carry out the runs.

Gender component:

Deliverables:

- Peer-reviewed publication on Grange model.

We have a report describing the final version of the model, which contains most of the text and many of the figures that will form the basis for the publication, but have not yet prepared/submitted the final manuscript.

- Particiation in grassMIP.

We have participated in grassMIP. The project has not yet produced reports or papers.

- Training of regional experts (and students) in Grange

We completed regional training of Sudanese scientists in the use of GRange. We have prepared training materials. We are slated to give additional trainings in Kenya (February) and Belgium (May).

- Release of Grange model and traiing modules

We have completed GRange model development, released version 1.0 of the model, and prepared training materials.

Partners:

CSU; CSIRO

Locations:

Global

Activity 592-2013 (Milestone 1.1.2 2013 (1).)

Title: Review of livestock - related migitation and adaptation strategies at regional level including assessments of their application domains and potential impacts on productivity and GHG emissions.

Status: **Incomplete.** A framework for out-scaling and priority setting has been developed and a report produced as result of this.

Gender component:

Deliverables:

- Framework for out-scaling and priority setting.

see attached report.

- Review of indicators for effectiveness and risk,

This will be delivered in 2014. Partners involved in the Animal Change (the bilateral project) delayed their feedback.

- Identification of "best-bet" options and their out-scaling potential.

This will be delivered in 2014. Partners involved in the Animal Change (the bilateral project) delayed their feedback.

Partners:

IIASA; FAO; JRC; CIRAD; EMBRAPA; University of Pretoria; SAC

Locations:

Activity 593-2013 (Milestone 1.3.1 2014 (2).)

Title: Explore institutional arrangements to support adaptation at local level.

Status: **Incomplete.** Activities are ongoing. At the first site (Makueni County, Kenya), they are 40% complete. Activities at two other sites will begin in 2014.

Gender component:

We will include attention to the different roles of men, women, elders and youth.

Deliverables:

- Report on first year of work to refine methodology to understand governance arrangements

report is on the CCAFS intranet.

- Preliminary report on indicators of adapative capacity that can be used for impact assessment in three different benchmark sites.

This took the form of a report on indicators for adaption (submitted already to CCAFS Theme 4.2) in food systems. Not testing of indicators was possible in 2013 but we will work on this in 2014 for both Theme 4.2 and under this activity.

Partners:

Locations:

Activity 594-2013 (Milestone 2.1.1 2013.)

Title: IBLI product assessed and efforts to catalyze sales continue. IBLI surveys (assessment and herd collaring) continue in Borena, Ethiopia.

Status: **Partially complete.** The program is ongoing and mostof the required activities/outputs for 2013 have been completed. The second annual panel survey of 525 households was completed in March/April as well as the bi-annual intensive herd migration survey for a sub-sample that is conducted in February and September. The migration survey is targeted to the 20 households in 4 Woreda's whose herds (3 cattle per household) have been collared by GPS. The insurance program upon which this research is built (though the research agenda is

broader than just assessing IBLI uptake, welfare impact and herd behavioral change as well as environmental management) is ongoing with both scheduled sales windows taking place in 2013. While contract sales continue to be unimpressive, assessments conducted with partners have led to a redoubling of efforts as well as the introduction of new partners (Mercy Corps and CIFA) and additional funds and capacity support targeted to insurance companies. Draft papers on IBLI uptake, and the gender dimensions of IBLI are underway but not yet submitted to Journals.

Gender component:

A Cornell University graduate student, Liz Baegent is leading a paper on the gender dimensions of IBLI uptake and engagement co-authored by team members. An initial draft is underway and Liz is spending three months in early 2014 supporting survey implementation in Yabello that will include a specialized additional module to dig deeper into some of the related gender issues.

Deliverables:

- 2nd round of comprehensive 525 household annual survey.

Data collection is complete. Finalizing codebook and data cleaning.

- 5th and 6th rounds of detailed herd migration data tracking 20 households.

Data collection is complete. Finalizing codebook and data cleaning.

- IBLI Process Manual (Guide for partners interested in IBLI implementation).

At draft stage but still needs considerable revision.

- Software automating complete process of calculating and communicating index.

This is underway. Had trouble sourcing the right team to help with the development. That process is now complete with contract in place. Should be complete in 2014.

Partners:

Cornell University; I4; OIC; MUSALAC; CIFA

Locations:

East Africa (EA)

Activity 595-2013 (Milestone 2.1.2 2013.)

Title: Household level modelling of risk management strategies in diverse farming systems in the CCAFS regions, including the development of improved models and up and outscaling approaches.

Status: **Partially complete.** Detailed generic analyses of risk and resilience characteristics of crop and livestock components in smallholder farming systems have been performed. Part of the results were presented in Wageningen in a discussion meeting around household modeling. The powerpoint presentation is included in the deliverables. These results are currently being used to develop a draft of a paper to be submitted to Climate Risk and Management in the first half of 2014. Draft paper is ready of a risk and adaptation analysis in Borana, and the role of institutions in supporting adaptation options of farmers. A short report has been written on risk modeling using stochastic LP models, also included in the deliverables.

Deliverables:

- Scientific publication submitted to peer reviewed journal on the risk model

Draft of paper is currently being developed. Obtained results are now presented as a powerpoint presentation. Short report describing the stochastic LP with which risk analysis of cash crops in Kenya have been performed is included as well.

- Report describing model applications to Borana (Ethiopia) and Wote (Kenya)

Draft of paper is currently being developed. Obtained results are now presented as a powerpoint presentation

- Report describing the influence of institutions on adaptive capacity for individuals and communities in Borana, Ethiopia.

Draft paper by lead author Stanley Karanja ready, currently being finalised, Will be submitted first half next year.

Partners:

Columbia University

Locations:

Latin America (LAM),East Africa (EA)

Activity 596-2013 (Milestone 3.2.1 2013 (1).)

Title: Studies on incentives for mitigation in rangeland systems and potential for carbon sequestration in rangelands.

Status: **Partially complete.** This project is largely funded by BMZ, and progress is ongoing. The start of field work was originally delayed but is now completed and students and PIs are writing up the results. A no-cost extension has been approved.

Gender component:

Deliverables:

- Write workshop.

Two workshops were held.

- Remotely sensed data, climate, households surveys, soils and vegetation.

the complication of the data is ongoing, but preliminary results are described in the attached report.

- The program will have a number of PhD, Post Doc and MSc students.

Students are all recruited and working hard.

- Research and policy briefs.

these will now be delivered in 2014.

- 3 reports.

see attached report.

Partners:

Hawassa University; ICRAF; University of Hohenheim; DISTL; INERA

Locations:

East Africa (EA)

Activity 597-2013 (Milestone 3.3.1 2013.)

Title: Studies on mitigation strategies in livestock systems.

Status: **Partially complete.** Analysis of 249 dairy farming households in the North Rift, Kenya demonstrates the potential to reduce emission intensity by increasing the milk yield of cows in the region. Enteric fermentation has been estimated for all heads of cattle in the dataset, and emissions from land and fossil fuel use at a household level. Further a summary report of the dataset has been drafted.Remaining activities include:- Finalise analysis of household level emissions with new, regionally applicable feed data (lab results due in by the end of February)- Report on recommendations for mitigating GHGs, including options for increasing milk yield. This report must also identify potential emission leakages and negative consequences (eg. importing beef or deforestation).- Input into a methodology for a Payment for Environmental Services (PES) mechanism

Gender component:

Gender will be used as a variable influencing technological adoption.

Deliverables:

Partners:

FAO; MLD

Locations:

Latin America (LAM),East Africa (EA)

Activity 598-2013 (Milestone 3.3.2 2013.)

Title: Coordinate development of low cost protocol ('SAMPLES') for quantification of key farming systems of East and West Africa, and SE Asia, in collaboration with ICRAF, IRRI and other centres.

Status: **Complete.** The protocol has been successfully developed with partners. Journal articles have been submitted and published. The protocol handbook itself will be published in 2014

Gender component:

Deliverables:

- Protocol for targeting, GHG emission measurements, upscaling etc.

As part of the protocol, the following research papers have been published:

Arias-Navarro C, Díaz-Pinés E, Kiese R, Rosenstock TS, Rufino MC, Stern D, Neufeldt H, Verchot LV, Butterbach-Bahl K, 2013, Gas pooling: A sampling technique to overcome spatial heterogeneity of soil carbon dioxide and nitrous oxide fluxes. Soil Biology and Biogeochemistry 67, 20-23

Ogle SM, Buendia L, Butterbach-Bahl K, Breidt FJ, Hartman M, Yagi K, Nayamuth R, Spencer S, Wirth T, Smith P, 2013, Advancing national greenhouse gas inventories for agriculture in developing countries: improving activity data, emission factors and software technology. Environ. Res. Lett. 8, 015030 (8pp), doi:10.1088/1748-9326/8/1/015030

Rosenstock TS, Rufino MC, Butterbach-Bahl K, Wollenberg E, 2013, Toward a protocol for quantifying the greenhouse gas balance and identifying mitigation options in smallholder farming systems. Environ. Res. Lett. 8,

021003, doi:10.1088/1748-9326/8/2/021003
Rosenstock TS, Diaz-Pines E, Zuazo P, Jordan G, Predotova M, Mutuo P, Abwanda S, Thiong'o M, Buerkert A, Rufino MC, Kiese R, Neufeldt H, Butterbach-Bahl K, 2013, Accuracy and precision of photoacoustic spectroscopy not guaranteed. Global Change Biology 19, 3565-3567.

- Training of research fellows, technicians and scientist.

In close cooperation with ICRAF and CIFOR, ILRI has trained and is continuing to Train the following individuals in measuring techniques of GHG emissions from soils and livestock systems, targeting and socioeconomic assessments of mitigation Options:

Name	Degree	Enrolled at University	Funding	Nationality	Affiliation
Elizabeth Adobi Okwuosa	PhD	University of Nairobi,	ILRI – CIFOR,	Kenya,	
KARIIbrahim Wanyama	PhD	Freiburg University,	ILRI – IITA-DAAD,	Uganda,	IITA, ILRI
Alice Onyango Maseno	PhD	Maseno University	ILRI – ICRAF-DAAD	Kenya	Maseno University
Bernard Fungo	PhD,	University of Amsterdam,	ICRAF-ILRI-KIT,	Uganda,	ICRAF,
Frederick Wandera	Msc,	University of Eldoret,	KARI-ILRI,	Kenya,	KARI
Theodore Achieng	Msc,	Maseno University,	ICRAF – CIFOR,	Kenya,	Maseno University
Benedict Nangira	Msc	Maseno University,	ICRAF,	Kenya,	Maseno University
Emmanuel Mambo Odoury	Msc,	Maseno University	ICRAF,	Kenya,	Maseno University
Betty Gisore	Msc,	Kenyatta University,	ILRI,	Kenya,	Kenyatta University, ILRI
David Musuya	Msc,	Maseno University,	ICRAF,	Kenya,	Maseno University

- Discussion of strategies and first outcomes.

Klaus Butterbach-Bahl actively participated and contributed to the "Roundtable Discussions on Taking Forward Agricultural Priority Actions in the National Climate Change Action Plan of Kenya for the 2013-2017". This is an on-going activity, with Action plans starting to be realized from 2014 onwards.

- Identification of global GHG emission hotspots.

A Workshop (Global hotspot analysis for GHG emissions and mitigation potential from terrestrial ecosystems) with 18 international participants, working in the field of global GHG emissions from terrestrial Systems was

Held in Schagen, Netherlands, October 28-29, 2013. An outcome of the Workshop was that we agreed to prepare a number of publications for a Special issue and to run additional Analysis using published GIS and socio-economic data. However, this will require some additional funding in 2014 which is not secured yet.

Partners:

ICRAF; Maseno University; CIFOR

Locations:

East Africa (EA)

Activity 599-2013 (Milestone 3.3.2 2013.) Commissioned

Title: Capacity building on methods for quantification of GHG to national stakeholders (researchers and technicians), collection of information for characterizing GHG emissions, and farming system characterization (e.g. crop performance, soils, livelihoods). Establish on-farm experiments to measure GHG emissions, productivity, profitability and social acceptability through farmers interviews in three CCAFS sites.

Status: **Partially complete.** This project has a strong focus on capacity building and initiation of soil GHG emission measurements at selected CCAFS sites in Kenya (Nyando, Wote), Uganda (Rakai) and Tanzania (Lushoto). A central training with students from the mentioned countries was done from June 23-28. Moreover, all sites were visited, discussions with extension services were initialized, students came to Nairobi, and targeting work has started. For 2014 work on the ground is foreseen for Wote, Rakai and Nyando. For Lushoto, we are still struggling to have an active participation of our local contacts in planning and getting work started.

Gender component:

For all Training activities and work on the ground we actively manage that the share of women is at least 50%.

Deliverables:

- GHG equipment to enhance regional capacity for GHG measurements.

Within the project a mobile lab was build, which can be operated at all field sites. It has an own battery buffered power supply, a gas chromatograph allowing analysis of major GHG concentrations (CO2, CH4, N2O) in air samples, and all necessary equipment and instrumentation (soil moisture sensor, weather station) for realizing closed chamber measurements in the field. We also established laboratory incubation facilities, which do allow to incubating intact soil cores under standardized conditions. These facilities are in use for first measurements of soil GHG emissions at the site Nyando. Here we already parameterized soil GHG emissions for 36 plots across the landscape. Comparable approaches are in preparation for Rakai (Spring 2014) and Wotes (Spring 2014).

- 1 Training for researchers and technicians from NARES on GHG measurments.

During a 10-day workshop (17-26 June 2013) six students from three different east African countries were successfully trained how to design and implement experiments and analyze the data on measurements of GHG emissions from agriculture. The instructor to student ratio was close to 1:1 allowing for a high of personal attention for each of the students. This resulted in very specific and targeted learning specific to each students needs. In general, the curriculum aimed to provide the students with the knowledge to take initiatives in their studies and for furthering their careers. These skills included the ability to design both field and laboratory experiments (e.g. lab incubations) within the realm of GHG measurement and mitigation strategies, to collect

and analyze the appropriate samples as well as measuring other important explanatory variables such as temperature (air and soil), humidity, and other soil physicochemical properties. The training also included some basic laboratory techniques such as how to analyze the gas samples on a gas chromatograph, as well as some simple data manipulation and statistical methods for analysis.Most of the six students involved have since been active pursuing either an M.Sc. or a Ph.D. estimating GHG emissions and have therefore been using many of the methods learned at the workshop. The skills and confidence learned at the workshop have also allowed them to take initiatives within their study area and expand their own study in ways to further their careers at the same time as improving the state of knowledge of GHG emissions from smallholder African farms.

- GHG assessment for Lushoto, Wote, Rakai.

Prior to the measurements of GHG fluxes at the sites Lushoto, Wote and Rakai we did a targeting of sampling sites. This required the use of satellite information for deriving landuse maps and statistics of land uses. This work is close to completion for Rakai and Wote, while for Lushoto, due to missing active participation of our local counterpart, Paul Reuben (Sokoine University of Agriculture), this work is still pending. However, we are positive that work in Lushoto can be started in 2014. Following targeting, our students at Wote (Elizabeth Adobi Okwuosa, PhD, University of Nairobi; Frederick Wandera, Msc, University of Eldoret) and Rakai (Ibrahim Wanyama, PhD, IITA, Kampala, and University of Freiburg) are planning to take soil cores at selected plots, carry out parameterization experiments and on bases of results, assess GHG emission potentials for the sites. Laboratory experiments are planned to be backed by field measurements of GHG emissions using the mobile lab which has been acquired for the project. Field measurements in Rakai are foreseen for June/July 2014, while for Wote, field measurements will be done in August/ September 2014.

Partners:

IITA; NARO; SUA; KARI

Locations:

East Africa (EA)

Activity 600-2013 (Milestone 3.3.2 2013.) Commissioned

Title: Lead cross-CGIAR team on development of a low-cost protocol for all GHG quantification at whole farm and landscape scales, appropriate for developing countries.

Status: **Incomplete.** reporting included under activity 598.

Gender component:

Deliverables:

Partners:

Locations:

Global

Activity 601-2013 (Milestone 4.2.1 2013 (1).)

Title: Further analysis of how vulnerability to Rift Valley Fever (RVF) could change under different socio-economic scenarios and how to include this information in decision support.

Status: **Partially complete.** Project deliverables delayed and will not be uploaded until first week of February.

Gender component:

Deliverables:

- a framework for assessing vulnerability and risk to vector-borne disases in the context of climate change.

Peer-reviewed article in preparation. Report attached.

- Translation of socio-economic scenarios for the Eastern Africa into story-lines suitable for quantificition of future disease vulnerability

Report submitted and attached.

- Projections of key socio-economic determinants of RVF risk and vulnerability.

Partner (IIASA) working on compiling the data.

Partners:

University of Salzburg; IIASA

Locations:

Other,East Africa (EA)

Activity 602-2013 (Milestone 4.2.1 2013 (5).)

Title: Household modelling of adaptation and mitigation strategies in CCAFS benchmark sites.

Status: **Partially complete.** A large part of this year focused on cleaning and structuring the ImpactLite household level data in such a way that they can be made publicly available. This process was time-consuming, but has now been finalised. The data will be available on-line on the 31st of january 2014. The whole process has been documented, and a meta data report that describes in detail the data collected will be available. Two writeshops were held in which outlines were developed for the different CCAFS regions, resulting in two drafts of scientific papers. As a consequence of this delay in data availability, the foreseen modeling activities could not take place. However 5 papers have been written with a focus on household modeling and trade off analyses, which show concrete examples of how the CCAFS household level data can be used for useful household level analysis of adaptation and mitigation options.

Gender component:

Gender specific activities will be included in the model setup and analyses.

Deliverables:

- Report describing the analysis of household level data and the development of farm typologies which can be compared across the regions.

On the impactlite data the following deliverables are available:1. the data (they will be released in the site: data.ilri.org)2. a meta data report3. a data quality summary4. the surveys5. the 'IMPACTlite data dictionary'6.

the manual7. 2 outlines for impactlite based papers (one by Silvia Silvestri and one by Sabine Douxchamps)
- Simple household level model which can be used to analyse adaptation and mitigation options at household level.
Description of simple household model, applied for biofuel assessment in Kenya
- Report describing the application of the household level across the CCAFS benchmark sites in East and West Africa.
5 papers on household level modeling, two published, one in press, and two under review1) Rufino M.C., P.K. Thornton, S.K. Ng'ang'a, I. Mutie, P.G. Jones,M.T. van Wijk, M. Herrero. 2013. Transitions in agro-pastoralist systems of East Africa: Impacts on food security and poverty. Agriculture, Ecosystems and Environment 179: 215– 230.2) Klapwijk L, M.T. van Wijk, P. van Asten, P.K. Thornton, K.E. Giller. 2014. Trade-off Analysis in (Tropical) Agricultural Systems. COSUST 6, 110 – 115.3) Herrero, M, PK Thornton, A Bernues, I Baltenweck, J Vervoort, J van de Steeg, S Makokha, MT van Wijk, S Karanja, MC Rufino, SJ Staal. Global Environmental Change, accepted.4) M.T. van Wijk, M.C. Rufino, D. Enahoro, D. Parsons, S. Silvestri, R.O. Valdivia, M. Herrero. Farm household modelling and its role in designing climate-resilient agricultural systems. Global Food Security, submitted.5) M.T. van Wijk. From global economic modelling to household level analyses of food security and sustainability: how big is the gap and can we bridge it? Food Policy, submitted.

Partners:

Locations:

East Africa (EA),West Africa (WA)

Activity 603-2013 (Milestone 4.2.1 2013 (3).)

Title: Development of tools and data sets for assessing water-livestock climate change linkages and implications for sustainable livestock production alternatives.

Status: **Partially complete.** This activity has three deliverables, two of which are complete and one of which needs a bit of work before the data are complete.

Gender component:

Deliverables:

- New climate dataset for systematic assessments of local CC impacts as a function of global mean temperature increase.
it will be publicly available via the PanClim website, licensed under the Open Database License. Unfortunately, there are some issues with the external server where the date is actually hosted. The guys doing this have completely revised the interface to allow fancy stuff like selection of regions and time periods. It seems that somehow the files got messed up and currently only the meta-data are accessible. There was also supposed to be a separate interface from which only the PanClim data can be browsed and selected but since the update I can't access it anymore. It is this site that will be integrated into the PanClim website. The catalog and the metadata, these can be accessed here: http://catalog.glues.geo.tu-dresden.de:8080/terraCatalog/Start.do
- Peer reviewed paper describing methodology behind dataset.
The dataset has been documented in a peer-reviewed paper in Earth System Dynamics. I am first author of this

paper that was published in October 2013. The full reference for the paper is:Heinke, J.; Ostberg, S.; Schaphoff, S.; Frieler, K.; Müller, C.; Gerten, D.; Meinshausen, M.; Lucht, W. (2013): A new climate dataset for systematic assessments of climate change impacts as a function of global warming. - Geoscientific Model Development, 6, 1689-1703, doi:10.5194/gmd-6-1689-2013
- Peer reviewed paper demonstrating strength of new CC impact assessment approach.
One paper is complete and a second is in draft.

Partners:

PIK; SEI; CSIRO

Locations:

Global

Activity 604-2013 (Milestone 4.2.1 2013 (5).) Commissioned

Title: Vulnerability work: 1. Conduct a meta-analysis of local level vulnerability assessments to ascertain their empirical validity with respect to identifying causal pathways that are generalizable. 2. Assist CCAFS in developing a methodology for using M&E of adaptation interventions to foster adaptive management by working with 2-3 selected outcome pathways in two of the five CCAFS regions, details to be decided on once the regional killer outcomes are identified (by early May).

Status: **Partially complete.** The meta-analysis is largely complete; the papers and the results of the quality review will be shared on DropBox. A draft paper will be submitted end February.the M&E will happen this year in support of Flagship 4.

Gender component:

Deliverables:

- Report

Publication and all reviewed papers will be shared by end of February.

Partners:

Locations:

Global

Activity 605-2013 (Milestone 4.2.2 2013.) Commissioned

Title: Climate Change and Social learning (CCSL)1. Contribute to organisation, facilitation and documentation of CCAFS science meeting2. Backstopping of social learning activities within CCAFS and facilitate cross-CRP collaboration3. Support strategy implementation4. Support engagement and communication on CCSL products5. Manage and facilitate the CCSL Sandbox, ensure documentation (including Sandbox funds)

Status: **Partially complete.** The CCSL activities have been delivered for 80-90%. Only the case studies from ILRI

work and the incubation workshop have not been delivered, due to time constraints and (earlier in the year) reallocation of some of Ewen Le Borgne's time to some unanticipated/unplanned CCSL-related events such as the CCAFS (the IDS Knowledge Exchange on learning about climate change, the Agricultural Innovation Systems in Africa conference, the CCSL writeshop in June 2013 and the final team meeting in London). These extra activities partly cover up for the activities that were not completed.Generally, 2013 has been a year of growth and consolidation for 2013, developing a solid body of work that can now, in 2014, be shared more widely and applied (and documented again) to test out the framework, insights and ideas from first hand practice.

Gender component:

Gender is one of the key factors influencing the effectiveness of social learning and associated processes so will be part of all activities and analyses. Moreover, one of our intentions is to see how social learning can explicitly benefit women and other 'differentiated' groups. A working paper on social differentiation has been developed in 2013 as one of the key outputs for 2013 and its insights and lessons are integrated in the current CCSL framework and set of case studies.

Deliverables:

- Science meeting facilitation and documentation.

The CCAFS science meeting has been properly organised, facilitated and documented at: http://ccsl.wikispaces.com/CCAFS+Science+meeting+2013The results have been only partially successful, due to the relative infancy, at the time of the meeting, of a number of CCSL outputs and reflections. However the meeting has put social learning on the CCAFS map and has helped rally more interest in the sandbox as well as trigger very good conversations about the CCSL framework and set of case studies initiated later in the year.

- Contributions to strategy process.

Two major meetings have taken place which helped develop the CCSL strategy process for 2014 and beyond: the CCSL plan-and-writeshop (http://ccsl.wikispaces.com/Plan_and_Writeshop) in June 2013 and the core team meeting (http://ccsl.wikispaces.com/2013+CCSL+Core+Team+Meeting%2C+London%2C+UK) in December 2013.These meetings have helped take stock of existing outputs and reflections, take into account and act upon the critical feedback gathered during the CCAFS science meeting, and pave the way for the CCSL framework and toolkit developed in the second semester of 2013 (see: http://ccsl.wikispaces.com/CCSL+Framework+%26+Toolkit).The strategy is spelt out at http://ccsl.wikispaces.com/ccsl2 and favours the central use of the framework and toolkit, together with interactions on the CCSL sandbox, to implement social learning approaches and help CCAFS and other initiatives document their own social learning initiatives. The December 2013 meeting in particular has consolidated the strategy by opening up to other networks and getting the word out and about CCSL so that more people and organizations can use the body of work developed in 2012 and 2013.

- Sandbox progress report.

This report is coming up. In addition to it, a sandbox survey was undertaken in 2013 Q3 and the survey report is available on the CCSL wiki: http://ccsl.wikispaces.com/file/view/Sandbox_Survey_Analysis_Report_2Oct13.doc/482905922/Sandbox_Survey_Analysis_Report_2Oct13.doc

- CCSL case stories from ILRI.

As mentioned in the general status update, these case studies have not been delivered due to a) time constraints on behalf of Ewen Le Borgne (with more time allocated to supporting specific events) and b) the fact

that a number of key elements (the framework and toolkit) were not finalized yet, making the conceptual underpinning of the case study work.However, initial contact was made with the IBLI team in Ethiopia (to provide one of the case studies) and contacts with other projects identified (Africa RISING and Nile Basin Development Challenge) is secure.In 2014, these case studies are one of the main priorities for ILRI KMIS work in CCAFS/CCSL.

Partners:

IIED; IDS; Euforic Services

Locations:

Global

Activity 606-2013 (Milestone 4.2.1 2013 (5).) Commissioned

Title: Development of near real-time rainfall intensity observation system for Kenya.

Status: **Partially complete.** One paper is complete and attached. The second is almost finished and will be shared within the month.

Gender component:

Deliverables:

- An assessment report of the prospects of the development of near real-time rainfall intensity observation.
see attached publication. a second paper will soon be shared.

Partners:

Safaricom; Kenya RedCross

Locations:

East Africa (EA)

Activity 631-2013 (Milestone 4.2.1 2013 (3).)

Title: To build up the climate-change oriented aspects of the Livestock-Geo-Wiki.

Status: **Incomplete.** this activity was never funded due to the budget crisis in July and the confusion over what would be funded or not.

Gender component:

Deliverables:

Partners:

Locations:

Global

2. Succinct summary of activities and deliverables by Output level

Output: **1.1.2**

Summary:

A global applicable vulnerability framework has been developed in order to guide systematic assessment of vulnerability of communities. Measurable indicators have been explicitly identified. The vulnerability assessments have also been linked to a frame

Output: **1.2.1**

Summary:

The GRange model is a remarkable scientific advancement as it allows the modelling of climate change impacts on rangeland ecology, representing multiple complex processes such as soil nutrient and water dynamics, vegetation growth, fire, and wild and dome

Output: **1.3.1**

Summary:

A institutional and governance assessment methodology has been developed and tested in one benchmark site (Wote, Kenya). The development of this methodology has forced the research team to clarify the role of local institutions with respect to climate ch

Output: **2.1.1**

Summary:

The insurance program upon which this research is built (though the research agenda is broader than just assessing IBLI uptake, welfare impact and herd behavioral change as well as environmental management) is ongoing with both scheduled sales windows tak

Output: **2.1.2**

Summary:

A modelling framework has been developed to analyse the feedbacks that drive the resilience (or conversely the poverty traps), with a focus on the role of climate variability in these processes. A workshop on this and other approaches to risk management

Output: **3.2.1**

Summary:

The activity estimated the carbon sequestering potential of rangelands using existing long-term livestock and rangeland management experiments. Soil organic carbon was measured for the effect of grazing management

across different soil layers in the bi-co

Output: **3.3.1**

Summary:

This feasibility study on generating carbon credits through dairy productive gains aimed to demonstrate the potential for linking reductions in emission intensity in dairy production achieved through productivity gains to carbon credit mechanisms. A preli

Output: **3.3.2**

Summary:

The activity focused on capacity building and initiation of a soil GHG emission measurements across selected CCAFS sites. The activity coordinated the development of a low cost protocol for the quantification of GHG emissions associated with key farming s

Output: **4.2.1**

Summary:

A framework for identifying vulnerability due to disease risk in livestock systems has been developed. This was used to identify disease "hotspots". Also scenarios of future change have been developed, building upon the CCAFS East Africa scenarios but m

Output: **4.2.2**

Summary:

The CCSL sandbox is up and running and very visible. A toolkit has been compiled, along with a report on Social Learning in the CGIAR. Two international workshops were held in 2013. Please see the Case study for more information.

3. Publications

Publication #1

Type: Journal papers

CCAFS Themes: Theme 2, Theme 4.2

Citation: Rufino, M., PK Thornton, SK Ng'ang'a, I. Mutie, PG Jones, MT van Wijk and M Hererro. 2013. Transitions in agro-pastoralist systems of East Africa: impacts on food security and poverty. Agriculture, Ecosystems and Environment 179:215-230.

Publication #2

Type: Journal papers

CCAFS Themes: Theme 4.2

Citation: Klapwijk, MT van Wijk, TS Rosentock, PJA van Asten, PK Thornton and KE Giller. 2014. Analysis of trade-offs in agricultural systems: current status and way forward. Current Opinion in Environmental Sustainability6:110-115

Publication #3

Type: Journal papers

CCAFS Themes: Theme 3

Citation: Herrero, M., et al. 2013. The role of livestock in developing countries. Animal 7:s1: 3-18.

Publication #4

Type: Journal papers

CCAFS Themes: Theme 1

Citation: Bryan, E., C. Ringer, B. Okoba, C. Roncoli, S. Silvestri, and M. Herrero. 2013. Adapting to climate change in Kenya: household strategies and determinants. Journal of Environmental Management 114: 26-35.

Publication #5

Type: Journal papers

CCAFS Themes: Theme 4.2

Citation: Gerten, D et al. 2013 Asynchronous exposure to global warming: freshwater resources and terrestrial ecosystems. Environmental Research Letters 8:034032.

Publication #6

Type: Journal papers

CCAFS Themes: Theme 4.2

Citation: Heinke, J., et al. 2013. A new climate dataset for systematic assessments of climate change impacts as a function of global warming. Geosci. Model Dev. 6:1689-1703.

Publication #7

Type: Journal papers

CCAFS Themes: Theme 3

Citation: Rosenstock, T., etal. 2013. Accuracy and precision of photoacoustic spectroscopy not guaranteed. Global Change Biology 19: 3565-3567.

Publication #8

Type: Journal papers

CCAFS Themes: Theme 3

Citation: Rosenstock, T., MC Rufino, K Butterbach-bahl and E Wollenberg. 2013. Toward a protocol for quantifying the greenhouse gas balance and identifying mitigation options in smallholder farming systems. Environmental Research Letters 8: 021003.

Publication #9

Type: Journal papers

CCAFS Themes: Theme 3

Citation: Ogle, S.M, et al. 2013. Advancing national greenhouse gas inventories for agriculture in developing countries: improving activity data, emission factors and software technology. Environmental Research Letters 8: 015030.

Publication #10

Type: Journal papers

CCAFS Themes: Theme 3

Citation: Arias-Navarro, C. et al. 2013. Gas pooling: a sampling technique to overcome spatial heterogeneity of soil carbon dioxide and nitrous oxide fluxes. Soil Biology and Biochemistry 67:20-23.

Publication #11

Type: Book chapters

CCAFS Themes: Theme 4.2

Citation: Conant, RT. 2014. Managing soil carbon for multiple benefits: positive exemplars. Pages 1-24 in S. Banward, E. Milne and E. Nellemeyer, eds. Soil carbon- science, management and policy for multiple benefits. SCOPE 71.

Publication #12

Type: Book chapters

CCAFS Themes: Theme 4.2

Citation: Ojima, DS, JG Canadell, RT Conant, C Negra and P Tschakert. 2013. Carbon cycle sustainability and land sue. Pages 523-528 in D. Brown, CA Robinson, NHF French and BC Reed, editors. Land use and the Carbon Cycle: Science and Applications in Human and Environment Interactions. Cambridge University Press, Cambridge.

Publication #13

Type: Working papers

CCAFS Themes: Theme 4.2

Citation: Herrero, M, A Notenbaert, P Thornton, C Pfeifer, and S. Silvestri, A. Omolo and C. Quiros. 2014. A framework for targeting and scaling-out interventiosn in agricultural systems. CCAFS Working Paper No. 62.

4. Communications

Media campaigns:

See our outcome story regarding media coverage of the GHG emissions work.

Blogs:

The CCSL sandbox is very active http://ccsl.wikispaces.com/Sandbox

Websites:

All IBLI activities are documented at www.ilri.org/ibli

Social media campaigns:

The CCSL sandbox members above have an active yammer.

Newsletters:

N/A

Events:

IBLI: Series of workshops and trainings both in Addis and Yabello but largely in Yabello focused on training Village Insurance Promoters, Cooperatives and Development Agents of the local government.

Videos and other multimedia:

IBLI: Developed radio advertisements that run regularly during the sales windows

Other communications and outreach:

The special issue of PNAS on Livestock Systems received a ton of media coverage. here is a sample.Media coverage on global livestock systems in PNAS—06 January 2014 1. Economist "Feast and Famine" Blog (UK): Meat and greens2. Voice of America: Africa's Livestock Demand Better Feeding3. BBC Persian (UK): و گ اوها ای‌گ لخانه‌گ ازهای4. Climate News Network: Single stomachs help to cut the carbon

5. Case studies

Case Study #1

Title: A new climate dataset for systematic assessments of climate change impacts as a function of global warming

Author: Jens Heinke, Mats Lannerstad

Type: Breakthrough science

Project description:

The development of the climate dataset is based on the pattern scaling approach. Linear and logistic regression was applied to derive monthly scaling patterns at 0.5 arc-degree resolution for various climate variables (temperature, precipitation and cloud cover) for 19 different climate models. Scaling patterns summarize the local mean change of respective climate variable for a global mean temperature increase by 1 degree. The extracted patterns are shown to accurately capture the behavior of each climate model over a wide range of climate scenarios. The reduced-complexity carbon cycle climate model MAGICC6 was used to construct 8 temperature scenarios for 2100 covering a global mean temperature increase range from 1.5 to 5 degrees, with 0.5 degree steps. By using the scaling patterns for the different climate models and climate variables, local mean climate anomalies can be derived for each temperature trajectory. Combining these anomalies with observed climate data gives complete time series of climate scenarios that can be seamlessly combined with historic observations.

Introduction / objectives:

A new dataset of future climate scenarios has been developed that allows systematic assessments of climate change impacts as a function of global mean temperature increase. With such assessments, mitigation costs, impacts from unavoided climate change, and adaptation requirements can be assessed and presented in a way that is suited to inform climate policy makers. The limited number of currently available scenario runs from climate models (AOGCMs) strongly limits this type of assessments to a narrow range of temperature levels and/or a reduced set of climate models.

Project results:

A peer reviewed paper describing the methodology behind the dataset was published in Geoscientific Model Development in October 2013. By 31 January 2014 the paper has already been viewed more than 400 times, downloaded more than 200 times and cited three times. The dataset will be licensed under the Open Database License and made publicly available for download. The launch of the website is planned to February 2014 (link below). The dataset has already been used for assessments of permafrost thawing, global ecosystem change and water resources availability change. These three applications demonstrate the strength of the dataset to produce systematic climate impact assessments. One of the papers is the central topic of perspective paper by Chris Huntingford in ERL in which the importance of this novel approach for dealing with the complexity in

climate impact assessments has been highlighted. Thanks to the dataset design, with the same 8 temperature steps for all 19 climate models, the results of different studies can be directly compared. Thus, the output from any assessment, covering various sectors and using different impact measures will each add to the build-up of linked results that contribute to broadening the understanding for assessments of the value of mitigation effort and adaptation requirements.

Partners:

The dataset was developed in cooperation with Potsdam Institute for Climate Impact Research (PIK). The dataset has been applied in three impact assessments in collaboration with PIK scientists covering permafrost thawing, global ecosystem change, and wate

Links/sources for further information:

http://www.geosci-model-dev.net/6/1689/2013/http://panclim.org

Case Study #2

Title: Systematic Review of Vulnerability Assessments

Author: Sabrina Chesterman, Polly Ericksen

Type: Breakthrough science,Food security

Project description:

This study is the first (to our knowledge) attempt to use the methodology known as a "systematic" review (borrowed originally from epidemiology) to identify indicators of vulnerability among agricultural households. The review identified studies that use methods sufficient to tease out a causal relationship between vulnerability status and key determinants. A systematic review is the process of identifying, assessing, and interpreting available research evidence on a chosen topic and specific research question (Thomas & Harden 2008). A systematic review requires the identification of studies of sufficient quality to include in the overall analysis (Wells & Little 2009). A systematic review brings together the results of primary research, through the application of explicit methods that allow a central research question to be answered. We chose this rather than a meta-analysis, as we could use purposive sampling based on our own defined selection critera (Doyle 2003). The key questions the systematic review aims to answer were:1. What determinants of vulnerability are common across the studies?2. What relationships between determinants and vulnerability status the studies identify and how?3. Lastly we aimed to explore the possibility of developing a standard set of vulnerability indicators using national or global data sets based on these findings?

Introduction / objectives:

This study under Theme 4.2 sets out to explore whether local level vulnerability assessments carried out across the global tropics could provide rigorous evidence of a consensus regarding determinants and indicators that

can be used to measure and evaluate smallholder farmers' vulnerability to climate change.

Project results:

We searched a range of databases to select household level vulnerability assessments using these key search criteria:

- Rural livelihoods and households• Sub-national unit of analysis
- Poverty
- Food insecurity
- Agriculture
- Climate change
- Climate risk
- Climate variability (includes drought and floods)
- Multiple stressors including a climate-related riskFollowing abstract review, seventy-one papers underwent a full text review and data extraction process. This yielded 30 studies that were selected on the basis of having conclusions sufficiently supported by the methods employed and the evidence generated. The studies employed various frameworks to underpin their methodologies for assessing vulnerability. These included the Sustainable Livelihoods Framework, Vulnerability as Expected Poverty and Risk based frameworks, with the most approach across the studies being the IPCCs vulnerability framework (Vulnerability = f(exposure, sensitivity, adaptive capacity)). Common determinants of vulnerability identified by the studies which could be translated into indicators of local level vulnerability include:

- Climate variability
- Extreme rainfall events
- Household demographics (age, literacy levels, gender balance)
- Dependence on income derived from agriculture
- Livelihood diversification and off-farm activities
- Access to credit
- Area of land under irrigation
- Market access
- Size of land holding and security of tenure
- Prevalence of pests and diseases affecting crops and livestockThe application of a Systematic Review was a novel methodological approach to evaluating the determinants of vulnerability. The next stage of the case study will be the development of an instrument to carry out a methodologically sound quality review applied to the studies. This instrument and accompanying analysis will directly address the conceptual and contextual difficulties in critically appraising the 30 papers. The instrument and critical analysis will allow us to evaluate the strength of the causal relationships, with the goal of establishing a set of indicators that can be replicated across sites. In addition it will be a novel contribution to the field of systematic review, by directly addressing the methodological questions around its application to qualitative research and a non-definitive concept like vulnerability. It is hoped this case study on vulnerability assessments and the development of the instrument will also serve as a pilot for the development of a case study around adaptive capacity and indicators for this.

Partners:

Wageningen University: new hire Todd Crane has brought in an expert on systematic reviews (Peter Tamas) to help us finalise the most difficult step, which is the quality review of the causal relationships.

Links/sources for further information:

all the articles and data extraction sheets can be found in a DropBox folder:
https://www.dropbox.com/sh/antkjx33y2oyrel/XzxYpVDqKm

Case Study #3

Title: Climate Change Social Learning Sandbox

Author: Ewen LeBorgne, Pete Cranston, Carl Jackson

Type: Successful communications,Participatory action research

Project description:

As part of the Theme 4 work on social learning, a "Sandbox" was set up in September 2012, hosted at ILRI in collaboration with UK-based partners. The Sandbox is a safe space to discuss and work on social learning in climate change. It performs various functions:A space for discussion among parties interested in social learning in climate change;A repository to find information related to social learning in climate change;A peer-learning and peer-support network where practical challenges and issues encountered can be discussed and supported by the collective wisdom of other Sandbox members;An informal testing ground for concepts, ideas, approaches and initiatives - both theoretically and practically;A funding mechanism to encourage interesting ideas round social learning in climate change to be developed and rolled out;A reflexive space to tease out lessons from the discussions and the initiatives funded by the Sandbox

Introduction / objectives:

The Climate Change Social Learning (CCSL) Sandbox opened in September 2012 as a mechanism to sustain work on the ideas and activities that surfaced during a workshop on Communications and Social Learning in Climate Change held by the Climate Change Agriculture and Food Security (CCAFS) CGIAR Research Program and the International Livestock Research Institute. It was designed for the use of CCAFS and partners to enthuse and catalyze interaction, innovation and concrete collaboration using social learning to inform local decision-making. The vision was that the Sandbox could evolve into a self-governing community of practice and be a genuine reflection of how social learning works in practice

Project results:

Through facilitation, convening, research, synthesis, documentation, editing, onboarding and advice, the CCSL Sandbox has supported:

- Progressing three innovation grants (to ILEIA, IIED and IDS) and reviewing two other applications (pending)

- Two international workshops ('Acting on What We Know and How we Learn for Climate and Development Policy' - IDS March 2013; 'Science Meeting' - CCAFS CGIAR April 2013
- The CCSL Framework and Toolkit
- Two CCSL Core Team meetings in June and December 2013
- The CCSL Narrative
- The 'SL in CGIAR' stocktaking paperIn July 2013 twelve members of the CCSL group offered

feedback on the Sandbox's activities and their future needs in response to a survey. Feedback suggested that:

- Resources about CCSL practice are valued most
- More practitioner members were needed
- Facilitation should promote active involvement in discussions
- It is too early to see concrete benefits from membership of the Sandbox
- Experience of CCSL implementation, tools, indigenous knowledge, and innovation is needs to be shared
- Solution-focused rather than more open ended learning processes are preferred
- Email alerts on online group activity prompt most engagemen
- Satisfaction with the Sandbox is based on quite low levels of expectation about how much time CGIAR staff and other sandbox members can dedicate to this kind of knowledge sharingIn response the Sandbox facilitators have been prioritising membership invitations to practitioners, connecting members with shared interests and focusing on content and discussions that reflect on practice. Peer assist type problem solving events are planned.ExperienceJust over a year isn't a long enough time to draw very certain lessons from the Sandbox. Online participation in the Sandbox so far is pretty typical for an emerging peer group. The majority of members though not commenting say when directly asked that they gain value from lurking and wish to remain in the Sandbox group (see above). The minority commenting and sharing resources have had several face to face meetings as a subset of the larger group and have wider professional roles in bridging, brokering, communicating and shaping knowledge and relationships.We have argued elsewhere (1) that climate change as a knowledge domain within international development is both atypical and complex and put forward the seven capacities this requires of networks, organisations and initiatives aiming to manage knowledge successfully in this context. So far the Sandbox can be said to have most of these capacities. Three areas that may need attention soon include increasing the multiplicity of perspectives shared, growing membership through hubs rather than one central group, and increasing the plurality of approaches used to run the Sandbox.DirectionOver the course of 2014 the Sandbox will continue to support members in the CCSL group on Yammer, in the wiki, at face-to-face events (notably by connecting with akin communities of practice or networks), by co-creating knowledge and through innovation grants. However, the reduction in the size of the Innovation Fund means that it is likely only one project can be supported, or the funds could be used to support meeting attendance for people whose work is seen as innovative. It is also likely that the Sandbox will begin convening peer assists, supporting thematic resource collections, further growing practitioner membership and engagement.

Partners:

Carl Jackson (Westhill Knowledge Group)Pete Cranston (Euforic Services)

Links/sources for further information:

http://ccsl.wikispaces.com/Sandbox and Cranston, P and Jackson, C (2013) Editorial - Knowledge Management and Climate Change, 'Knowledge Mangement for Development Journal', 9 (1): 1-5 http://journal.km4dev.org/index.php/km4dj/article/view/129/207

Case Study #4

Title: IMPACTLite benchmark data cleaned and ready for use

Author: Silvia Silvestri, Mark van Wijk

Type: Inter-center collaboration,Breakthrough science

Project description:

IMPACTlite is a tool that provides a unifying framework for collecting detailed informationon farm resources, farm management strategies, farm productivity and householdeconomics at the household-level. Household surveys can be implemented using this tool tocapture diversity on farming activities at household level to characterize main agriculturalproduction systems. The household surveys implemented with IMPACTlite allow collectingdetailed data to i) define representative farm types for the main agricultural productionsystems, ii) generate sufficiently accurate aggregated values for each representative farmtype to calculate performance and livelihood indicators, and iii) parameterize householdmodels with values for farm resources and assets, technical input/output coefficientsdescribing farming activities and contributions to indicators represented ad objectivefunctions.

Introduction / objectives:

In 2013 major efforts were expended to clean and upload the IMPACTLite data for the 15 benchmark sites. This required a considerable effort from the ILRI PI (Silvia Silvestri) in cooperation with colleagues from ICRAF, ILRI and CIFOR as well as Theme 4 staff and the West Africa regional programme team.

Project results:

the outputs of a standardized detailed survey instrument (IMPACTlite) carried on in 15 benchmark sites were cleaned, and will be made available via open access together wih supporting material (at 'data.ilri.org'). The data presented include detailed information about household composition, production systems and activities, land and labour allocation, income from on farm and off farm activities, household consumption of food,and asset, with a particular gender lens on control over resources, land ownership and allocation of activities. Numerous training materials have been developed and shared already with CCAFS Theme 4.2. A significant amount of learning about the time and quality control needed for such ambitious data collection exercises has been documented. The IMPACTlite tool has already been adopted by the Humid Tropics CRP for use in benchmark characterization. As result of this process, a database of household information across East Africa, West Africa and South Asia has been generated and can now be used for characterization and modelling exercises. Two 'writeshops' with involvement of multiple CG centres took place in 2013; these strengthened inter center collaboration about how to meaningfully use the data in targeting and ex-ante impact assessment

activities. They also led to the development of two advanced drafts of scientific papers. The dataset is going to represent an important source of information for the scientific community and will allow CCAFS to capture within-site variability on key performance and livelihood indicators that could be used for a range of analysis including the modelling of impact of adaptation and mitigation strategies on livelihoods, food security and the environment across different production systems and agro-ecological zones. This dataset represents a great example of cross- sites and cross-teams collaboration, together with an excellent learning opportunity about data analysis and household modelling, a rare achievement indeed.

Partners:

CIFOR, ICRAF, Theme 4.1 and 4.2, RPL West Africa

Links/sources for further information:

data.ilri.org

6. Outcomes

Title:

Greenhouse Gas emissions measurements and capacity strengthening

What is the outcome of the research (i.e. use of research results by non-research partners)?

In addition to the peer reviewed evidence base produced (see activity 598 report) in this area, the activity has significantly enhanced capacity building due to innovative university research partnerships the project has cemented. Currently four PhD students and six Masters students from four different Kenya and two European universities have been trained in the GHG emissions measurement process. This has focused on soils and livestock systems as well as the targeting of socio-economic assessments of mitigation options. The capacity embedded within the students is also being shared with the partner institutions within the CGIAR hosting their research projects, as well as the field sites and practitioners involved in assisting their research trials. The capacity building has included training of technicians from NARES, further imbedding the capacity to government technicians and institutions. This capacity generated by the activity has been spread through the initial steps and establishment of a regional GHG emissions working group to showcase the methodologies, results and learning of the initial work to the wider regional community. This has included contributions to the Kenya National Roundtable as well as ground level contributions through the establishment of demonstration plots within the CCAFS regional benchmark sites.

What outputs produced in the three preceding years resulted in this outcome?

The activities focus on the development of low cost protocols for assessing GHG emissions at farm and landscape level. The work has yielded a significantly enhanced understanding of GHG emissions from smallholder farms, which before the project was largely unknown at this scale, despite its high significance for national GHG emissions in developing countries. Four significant research papers have been published as part of the work, detailing work around the protocol for targeting, GHG emission measurements and up-scaling of the work. The activity has also helped in the initial identification of global GHG hotspots through a workshop and associated outputs from a Workshop hosted with 18 international participants working in the field of global GHG emissions from terrestrial systems.

What partners helped in producing the outcome?

See partners listed in the report of deliverables 598 and 599, but note CIFOR and Maseno University as well as the the East Africa Regional Programme.

Who used the output?

as noted above, a number of MSc and PhD students are being trained. The results on the use and success of the monitoring equipment is directly feeding into national policy concerns, with the Kenyan National Climate Change Action Plan (NCCAP) using it as a case study for motivation to the UNFCCC for funding as a home grown adaptation solution. In addition, when The World Bank's Vice President, Rachel Kyte, visited the Nyando sites and particularly highlighted the policy applications of the laboratory work at village level which was tracking [1] .

She summarized that the on-farm experimentation and establishment of mini meteorology stations are generating significant data. The greenhouse gas measurements sites and output data from the activity has provided a significant evidence base for multiple agencies to focus on sustainable intensification of agriculture, with empirical knowledge of processes which have enhanced mitigation potential. Rachel Kyte fed her project summary of the activity as key evidence piece to the UNFCCC hosted Global Landscapes Forum.

How was the output used?

It is actually very early days to call this an outcome as the work has only been in place for two years. HOwever as noted above, students are being trained and scientists are advising the Kenya National Action Plan..

What is the evidence for this outcome? Specifically, what kind of study was conducted to show the connection between the research and the outcome? Who conducted it? Please provide a reference or source.

No study has been conducted yet. The East Africa programme has reported on this work in its newsletter. “Roundtable discussions on Taking Forward Agricultural Priority Actions in the National Climate Change Action Plan of Kenya for 2013-2017” [1] The SmartAG Partner. CCAFS East Africa Quarterly Newsletter. October – December 2013. CGIAR Research Program on Climate Change Agriculture and Food Security.(2) The SmartAG Partner. CCAFS East Africa Quarterly Newsletter. July – September 2013. CGIAR Research Program on Climate Change Agriculture and Food Security

7. Outcome indicators

Outcome indicator #1

Outcome indicator:

One to five flagship risk management interventions evaluated and demonstrated by farmers and agencies at benchmark locations in three regions

Achievements:

Index-Based Livestock Insurance product continues to be offered to the area. Pastoralists pay premiums for coverage and while uptake is still low, the program continues to build partnerships, revise strategy and hopes to gain momentum over the increase year due to increased financial and human capital commitment of donors, implementation support agents and the insurance company. Research agenda to critically evaluate uptake and impact in place. Draft paper on uptake ongoing while paper on (direct impact) requires actual payout on contract which has not triggered due to good conditions.

Evidence:

Increase in number and financial resources of partners including continued commitment of insurance company as demonstrated by increased staff numbers.

Outcome indicator #2

Outcome indicator:

Project design and monitoring guidelines for smallholder agriculture in developing countries produced and contributing to global standards

Achievements:

Four papers published on the protocol for targeting, GHG emissions measurements and upscaling.Butterbach-Bahl and Rufino attended workshop on National Plan for Climate Change (see outcome story).

Evidence:

Arias-Navarro C, Díaz-Pinés E, Kiese R, Rosenstock TS, Rufino MC, Stern D, Neufeldt H, Verchot LV, Butterbach-Bahl K, 2013, Gas pooling: A sampling technique to overcome spatial heterogeneity of soil carbon dioxide and nitrous oxide fluxes. Soil Biology and Biogeochemistry 67, 20-23Ogle SM, Buendia L, Butterbach-Bahl K, Breidt FJ, Hartman M, Yagi K, Nayamuth R, Spencer S, Wirth T, Smith P, 2013, Advancing national greenhouse gas inventories for agriculture in developing countries: improving activity data, emission factors and software technology. Environ. Res. Lett. 8, 015030 (8pp), doi:10.1088/1748-9326/8/1/015030Rosenstock TS, Rufino MC, Butterbach-Bahl K, Wollenberg E, 2013, Toward a protocol for quantifying the greenhouse gas balance and

identifying mitigation options in smallholder farming systems. Environ. Res. Lett. 8, 021003, doi:10.1088/1748-9326/8/2/021003Rosenstock TS, Diaz-Pines E, Zuazo P, Jordan G, Predotova M, Mutuo P, Abwanda S, Thiong'o M, Buerkert A, Rufino MC, Kiese R, Neufeldt H, Butterbach-Bahl K, 2013, Accuracy and precision of photoacoustic spectroscopy not guaranteed. Global Change Biology 19, 3565-3567.

Outcome indicator #3

Outcome indicator:

Global database and set of tools for climate-smart agriculture established and used by key international and regional agencies

Achievements:

IMPACTLite data now fully cleaned and ready for use (see case study).Data set of future climate scenarios available on line for use by the scientific community (see case study).Note that we will do a separate impact assessment on the uptake of ILRI's work on Livestock systems and GHG emissions (contributions to IPCC AR5 and the PNAS special issue).

Evidence:

see the two case studies.