



RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
Food Security**



IITA

2013 technical report

1. Activity Reporting

Activity 718-2013 (Milestone 1.2.1 2013 (2).)

Title: Assess risks and test strategies for adaptation to significant crop biotic threats due to climate change

Status: Partially complete. A joint CCAFS-RTB review and planning workshop was organised in February 2013 by CIP, IITA, Bioversity and CIAT on "Management of critical pests and diseases through enhanced risk assessment and surveillance and understanding of climate impacts through enhanced modelling". A report was published (http://www.rtb.cgiar.org/publication/rtb-and-ccafs-scientific-and-planning-workshop-report/wppa_open/) and was a major deliverable for the 2013 milestone. The knowledge on plant health issues for RTB crops was also taken into account in a broad research priority setting exercise for these crops through a large expert survey and through ex-ante assessment of yield constraints and potential technical solutions to overcome these. A workshop on plant health x climate change issues with national partners and organised by IITA-Benin has been postponed to May 2014, following expression of CORAF to participate and support his event. More efforts are needed to build the modelling capacity with the national partners in the CCAFS target regions in Africa. An in-depth study was conducted on the impact of climate gradients on cassava white fly problems. This included and MSc thesis. In addition to the RTB crops, the CCAFS-IITA team investigated complex interactions between cowpea, varying watering regimes simulating adverse climatic conditions (with regards to rainfall), endophytic organisms and a cowpea pest, the pod borer *Maruca vitrata*. This was carried out both as a greenhouse experiment using potted plants and artificial pod borer infestation, and as a set of field experiments under different climatic conditions with natural infestation. Key findings particularly highlighted the potential benefit of endophytes to overcome these climate-induced stresses. Work done in partnership with Dr. Elie Dannon, University of Ketou, Benin and to be published in 2014. Besides the work by CCAFS-IITA plant health specialists, work was advanced on GxE and breeding. After the germplasm catalogue work for cassava (reported in 2012), catalogue work was also initiated for cowpea with 75 new entries being uploaded in an effort to strengthen diversity to tackle climate change. In addition to the above activity, sets of historical cowpea breeding trials data from different projects are being organized and converted into Ag-trial format. This activity is conducted in close collaboration with the IITA biometric unit.

Gender component:

This activity is more 'upstream' and looks at pest/disease dynamics at the level of the causal agent, the crop, and alternative hosts. Only when solutions are identified to reduce and pre-empt the impact of major pest- and disease outbreaks, participatory testing including a gender focus will be relevant.

Deliverables:

- Report on ranking of importance of biotic stresses in cassava and banana, with quantitative sensitivity analysis and priority setting for monitoring and adaptation

Joint RTB-CCAFS report on priority ranking of plant health threats for cassava, banana, and other RTB crops.

Partners:

ICIPE; CIP; KSU

Locations:

Global

Activity 719-2013 (Milestone 3.1.1 2013.)

Title: Develop new knowledge and tools to assess potential emission reductions from various crop systems and technology options to improve productivity and enhance food security

Status: Partially complete. CCAFS-IITA contributed actively to the development of the product category rules (PCR) for quantifying the carbon footprint of coffee production. This was led by the SAI platform as part of their "New Green Coffee Carbon Footprint Product Category Rule (CFP-PCR) launched for global coffee industry". The CCAFS-IITA contribution focused on defining the boundaries of the systems (e.g. intercrop vs mono crop coffee), providing SAI platform staff an opportunity to visit the coffee smallholder systems, and direct participation in a SAI platform meetings in Brussels with the industry. They adopted the Cool Farm Tool as their primary tool to quantify carbon footprints. CCAFS-IITA staff have engaged with the developers of the tool to further explore the 'wet processing' component of the carbon footprint. This will be part of a PhD project that is housed in SAMPLES and with IITA staff collaborating with ILRI. With support of CCAFS-theme 3, a study was conducted on cocoa as a driver for deforestation in DR Congo. The key findings showed that deforestation is still largely driven by population movements and expansion, with staple food crops being most important. For now, the trend seen in West Africa where cocoa has been identified as a major driver for deforestation, is not yet observed in DR Congo. IITA is partnering with ICRAF in the REALU project entitled 'Towards a Landscape approach for Reducing Emissions' in Cameroon. This is part of the ASB project http://www.asb.cgiar.org/PDFwebdocs/CAMEROON_REALU.pdf. A manuscript has been drafted by IITA (lead) and ICRAF scientists entitled "Profitability, carbon stock and paths for intensification of smallholders cocoa agroforests in Southern Cameroon".

Gender component:

The work on GHG emissions related to land use changes was already part of the ABS-related REALU project in Cameroon. In addition, we've now also worked in the Rakai site. Here, we try to link vulnerability assessment, participatory adaptation approaches, and land use options and to land use changes and related GHG emissions. The research does not look at the direct link of gender dimensions in GHG emissions, but we are building a logical link between livelihood and land use options and related land use changes and GHG emissions. The participatory adoption approaches include gender-disaggregated focus group discussions to bring out differences in land use access and preferred land use options by women and men. In 2014-2015, we will build further on this through the CCAFS-FP4 work. We have also made some communication materials, bringing out the gender aspects that relate to changes in land use - e.g. illegal sale and drainage of wetlands by big land owners has not only forced women out of the wetland margins which served as buffer during period of drought. Moreover, the wetland drainage has led to wells falling dry and women and children having to walk 4km for the nearest well. The wetland drainage is quite likely (i.e. we're currently quantifying this) the single most important GHG emission factor in Rakai.

Deliverables:

- Report on carbon footprint quantification of coffee and cocoa systems for at least 4 sites in WA and EA with recommendations on potential interventions

PCR for coffee developed and published by SAI platform: <http://www.saiplatform.org/activities/alias/climate-change/coffee-pcr-project> Joint CIAT-IITA publication in 2013 on 'climate-smart coffee systems for EA highlands' - chapter 13 in Earthscan book: <http://routledge-ny.com/books/details/9780415532730/> Policy brief: Linking development pathways and emission reduction at local levels: an analysis of feasibility in the Efoulan

municipality, Cameroon, ASB Policy Brief , issue 39, p.1-4,
http://asb.cgiar.org/PDFwebdocs/asb_policy_brief_39.pdf

Partners:

CIAT; WUR; ICRAF; SAI

Locations:

East Africa (EA), West Africa (WA)

Activity 720-2013 (Milestone 3.3.1 2013.)

Title: Assessment of cocoa and coffee based agricultural systems for carbon sequestration potential to mitigate risk of climate change and enhance food security

Status: Partially complete. A major joint project (1.2M Euro - 3 yrs) with CIAT and partners was launched in 2013. This included launching workshops with NARS partners and the recruitment of 5 PhD students with university partners in Germany (Göttingen and Hannover), Netherlands (WUR), Switzerland (ETH). In addition, a project entitled Cocoa-Eco to develop climate smart cocoa systems in Ghana was funded by SNV in partnership with Ghana's largest cocoa cooperative (Kuapa Kokoo). The projects already delivered update coffee and cocoa suitability maps (with CIAT team) and initiated characterisation work of adaptation and mitigation potential of various coffee and cocoa systems. The project also started exploring the role of coffee in smallholder farming systems in the highland forest margins on Mt. Elgon, Uganda. Work is progressing as planned.

Gender component:

Characterization of coffee and cocoa farming systems is currently taking place using gender-disaggregated focus group discussions to understand the role and opportunities for women to benefit from these cash crops. Gender-disaggregated focus group discussions have been conducted on various locations in Uganda - for Tanzania and Ghana, this will happen in 2014. Training materials have been developed to raise the awareness of change agents of climate change, agriculture, and the role of women at finding integrated solutions that take into account trade-offs across actors, spatial scales, and time.

Deliverables:

- Workshop with coffee and cocoa stakeholders organized to evaluate mitigation options and identify policy recommendations

Workshop organised with key partners to discuss adaptation-mitigation options and research needs for the coffee sector.

Partners:

CIAT; WUR; ICRAF

Locations:

East Africa (EA), West Africa (WA)

2. Succinct summary of activities and deliverables by Output level

Output: 1.2.1

Summary:

This activity both includes both the work from the crop breeders (GxE) and plant health specialists. As indicated in the activity summary progress on the outputs was made in particular on:

1. Reviewing, modelling, and ranking plant health threats in RTB through joint research and workshop with RTB. A workshop is planned in 2014 to further advance this agenda with the NARS partners in SSA.
2. Cassava databases have continued to be uploaded into agtrials, but there is a need to liaise with CIAT to: (i) solve upload problems that cassava and cowpea colleagues experienced, and (ii) advance GxE analysis on this data. Besides the cassava catalogue, a new cowpea catalogue was initiated and filled.
3. In-depth studies (as part of post-graduate training) were conducted on specific cassava and banana pests that are used to develop and calibrate the models. Some of this can already be accessed in the theses.

Output: 3.1.1

Summary:

Progress towards achieving the outputs is as follows:

1. CCAFS-IITA contributed actively to the development of the product category rules (PCR) for quantifying the carbon footprint of coffee production by the industry. This was led by the SAI platform as part of their "New Green Coffee Carbon Footprint Product Category Rule (CFP-PCR).
2. In partnership with ILRI in the framework of the SAMPLES project, IITA has started to quantify land use changes in the CCAFS-Rakai block. In 2013, soil carbon stocks per land use unit were quantified and land use changes were mapped using aerial photographs and satellite images from 1954 to date.
3. A report was written on a study that examined cocoa as a driver for deforestation in DR Congo. This study received 20k USD funding support from CCAFS theme 3.
4. IITA is partnering with ICRAF in the REALU project entitled 'Towards a Landscape approach for Reducing Emissions' in Cameroon as part of ASB. A policy brief was released to guide on GHG emissions from cocoa-based systems.
5. IITA with support of CCAFS-theme 4 organised a workshop in February 2013 in Wageningen on trade-off

analysis in agricultural systems. A report was drafted and circulated. A blog message was drafted. A paper was published (but appeared in Jan 2014) on trade-off analysis in agricultural systems.

Output: 3.3.1

Summary:

Progress towards achieving the outputs is as follows:

1. As part of the joint IITA-CIAT project on climate change mitigation and adaptation trade-offs and synergies in coffee and cocoa systems, a series of suitability maps were produced for cocoa (west-Africa) and coffee (east-Africa). These were made available to partners through national forums and (popular) publications, as well as engaging with the coffee industry (e.g. 4C meeting, Coffee & Climate toolbox).
2. Research sites have been discussed and prioritised with NARS partners on cocoa and coffee in Ghana, Uganda, and Tanzania. The students will start the characterisation of the livelihoods, coffee/cocoa production systems, and opportunities for improvement in early 2014.
3. Study was conducted on (i) the impact of the coffee industry's certification on coffee farmers' practices (incl. climate change adaptation), (ii) the impact of smallholder coffee systems on the forest margins in the highlands, (iii) quantification on the relationship between environmental parameters (incl. climate gradients) and coffee yield quantity and quality in Uganda.

3. Publications

Publication #1

Type: Journal papers

CCAFS Themes: Theme 3

Citation: Gockowski, J., Afari-Sefa, V., Sarpong, D. B.*, Osei-Asare, Y. B.* and Agyeman, N. F.*, 2013. Improving the productivity and income of Ghanaian cocoa farmers while maintaining environmental services: what role for certification?, *International Journal of Agricultural Sustainability*, pages 1-18, ISSN 1473-5903

Publication #2

Type: Journal papers

CCAFS Themes: Theme 3

Citation: Erika Romijn, John Herbert Ainembabazi, Arief Wijaya, Martin Herold, Arild Angelsen, Louis Verchot, Daniel Murdiyarsa. 2013, Exploring different forest definitions and their impact on developing REDD+ reference emission levels: A case study for Indonesia. *Environmental Science & Policy* (33): 246-259

Publication #3

Type: Book chapters

CCAFS Themes: Theme 1, Theme 3

Citation: H. van Rikxoort, L. Jassogne, P. Laderach, P. van Asten, 2013. Integrating climate change adaptation and mitigation in East African coffee ecosystems. In: B. Vanlauwe, P. van Asten, G. Blomme. *Agro-ecological Intensification of Farming Systems in the East and Central African Highlands*, pages 175-183, chapter 1, Routledge, ISBN 978-0415532730.

Publication #4

Type: Journal papers

CCAFS Themes: Theme 1, Theme 3

Citation: Jassogne, L., Van Asten, P., Wanyama, I. and Baret, P., 2013. Perceptions and outlook on intercropping coffee with banana as an opportunity for smallholder coffee farmers in Uganda *International Journal of Agricultural Sustainability* 11 (2): 144-158

Publication #5

Type: Books

CCAFS Themes: Theme 1

Citation: L. Jassogne, P. Laderach, P. van Asten, 2013. The impact of climate change on coffee in Uganda: lessons from a case study in the Rwenzori mountains. Oxfam Research Reports. 16p

Publication #6

Type: Working papers

CCAFS Themes: Theme 1, Theme 4.2

Citation: Kroschel, J., Beed, F., Garrett, K., Coyne, D., van Etten, J., Forbes, G., Herrera, B., Kreuze, J., Parsa, S., Sparks, A., Tamo, M., Subramanian, S. and Tonnang, H., 2013. Management of critical pests and diseases through enhanced risk assessment and surveillance and understanding climate impacts through enhanced modeling. CCAFS and CRP-RTB Workshop Report, 92p

Publication #7

Type: Journal papers

CCAFS Themes: Theme 3

Citation: Norgrove, L., Hauser, S., 2013. Carbon stocks in shaded Theobroma cacao farms and adjacent secondary forests of similar age in Cameroon. Tropical Ecology 54(1): 15-22

4. Communications

Media campaigns:

Developed and shared climate change x coffee videos. They can be accessed from youtube.

Currently developing video training material and PREZI presentations - example of work in progress:

Climate Change Heavy Version:

http://prezi.com/r6unkf_vzjfk/?utm_campaign=share&utm_medium=copy&rc=ex0share

Climate Change Light Version:

http://prezi.com/ulin-wtrmkn6/?utm_campaign=share&utm_medium=copy&rc=ex0share

Blogs:

<http://www.agriculturesnetwork.org/resources/extra/news/looking-into-the-future-how-models-can-help-us-assess-agricultural-trade-offs>

<http://ccafs.cgiar.org/blog/Shining-light-trade-offs-agricultural-systems>

<http://dapa.ciat.cgiar.org/launching-workshop-of-bmz-project-trade-offs-and-synergies-in-climate-change-adaptation-and-mitigation-in-coffee-and-cocoa-systems/>

<http://ccafs.cgiar.org/blog/are-there-synergies-between-climate-change-adaptation-and-mitigation-coffee-production>

Websites:

<http://start.org/programs/africangec/2013-grants/van-asten>

Climate Change Heavy Version:

http://prezi.com/r6unkf_vzjfk/?utm_campaign=share&utm_medium=copy&rc=ex0share

Climate Change Light Version:

http://prezi.com/ulin-wtrmkn6/?utm_campaign=share&utm_medium=copy&rc=ex0share

Social media campaigns:

Linkedin - uploaded the videos to numerous working groups in CCAFS

https://twitter.com/fse_wur/status/298744269743738880

Newsletters:

No separate IITA newsletter on CCAFS

Events:

Trade-off analysis workshop in Wageningen for CCAFS-CRPs in February 2013

BMZ launching workshop with partners on cocoa/coffee x climate change in June 2013 in Nairobi

Presentation on climate change and smallholder coffee producers: what does it mean, what can we do? Proceedings of the 3rd African Coffee Sustainability Forum, Kampala, Uganda, Van Asten, P., Jassogne, L., Mukasa, D. and Laderach, P., 4C Coffee Association, 2013.

IITA and CIAT organised a regional science workshop (East Africa) on what's happening in the sites and how to setup a collective and collaborative framework - this was the basis for Flagship 4 - EA proposal

Videos and other multimedia:

Videos being developed to use with partners and to engage policy actors.

Draft material being exchanged and discussed with CCAFS media team (Torben)

<http://www.youtube.com/watch?v=vhl1BcWRfnI&feature=youtu.be>

Videos on coffee and climate change - ccafs acknowledged:

<http://www.youtube.com/watch?v=5bwTQQLiZG8>

<http://www.youtube.com/watch?v=iEAOdDSSVN8>

Other communications and outreach:

Effects of temperature and relative humidity on immature development and survival of *Stictococcus vayssierei* Richard, a pest of some tropical root and tuber crops, Doumtsop, A., Hanna, R. and Tindo, M.*, Abstract, P. 109 in the book of abstracts of the 20th Biennial Conference of the African Association of Insect Scientist, 28-31 October, 2013 Yaounde, Cameroon, 2013.

Ecology of the banana aphid *Pentalonia nigronervosa*, the vector of banana bunchy top virus, Hanna, R., Ngatat, S., Ndjab, M. R., Fotso Kuate, A., Doumtsop, A. and Kumar, P. L., Abstract, P. 45, in the Book of Abstracts of the 12th International Plant Virus Epidemiology Symposium, 28 January to 1 February 2013, the Ngurdoto Mountain Lodge, Arusha, Tanzania, 2013.

5. Case studies

Case Study #1

Title: Trade-off analysis workshop

Author: Piet van Asten, Lotte Klapwijk, Ken Giller, Pablo Tittonell.

Type: Inter-center collaboration, Capacity enhancement

Project description:

A workshop was organised with some 30 participants and key-note speakers representing 5 CRP's and even more CGIAR centres. The workshop was initiated and organised by CCAFS-IITA. The workshop looked at both technical approaches to trade-off analysis, as well as theory of change and other underlying assumptions that need to be address to reach impact at scale from such analysis.

Introduction / objectives:

(i) share experiences and lessons on available methods and tools to identify and analyse trade-offs in agricultural systems, (ii) to discuss and explore how we can apply the lessons learned within the respective CRPs, (iii) to explore potential for synergies and collaboration between scientists and programs on trade-off analysis in agricultural systems, (iv) to dis

Project results:

Online slideshare presentations: example - <http://www.slideshare.net/LotteKlapwijk/19-feb-2013-crp-7-phil-thornton- lini-wollenberg> A technical report summarising the key results A Thomson-indexed journal in Communications in Environmental Sustainability.

Partners:

CCAFS CGIAR centres CRP 1, 3, 5, 6, 7.

Links/sources for further information:

<http://www.agriculturesnetwork.org/resources/extra/news/looking-into-the-future-how-models-can-help-us-assess-agricultural-trade-offs>
<http://ccafs.cgiar.org/blog/Shining-light-trade-offs-agricultural-systems>
<http://www.wageningenur.nl/en/show/Workshop-febr-19-and-20-Analysis-of-Tradeoffs-in-Agricultural-Systems.htm>



Case Study #2

Title: Participatory vulnerability assessment and exploration of adaptation options for climate change in Uganda

Author: Edidah Ampaire, Laurence Jassoge, Piet van Asten

Type: Social differentiation and gender, Innovative non-research partnerships, Participatory action research

Project description:

IITA, in partnership with ILRI and CIAT and the local partners CIDI and RaDFA organised a series of surveys with smallholder groups, PRA's and focus group discussions with farmers and people higher in the the value / political system. This revealed increase vulnerability to climate change and shocks appeared particularly caused by the limited farm land. Farmers that harvest in the wetland margins to overcome droughts are now excluded from using them. Farmers were guided through a climate change analysis and then asked in groups to present their key constraints and opportunities to adapt. This revealed that women preferred climate change adaptation by increasing the areal of crops traditionally managed by women. Women also indicate that dropping groundwater levels due to the wetland conversions particularly affected them and young children responsible for collecting water. A policy analysis and interactions with policy makers revealed poor connections and weak institutional mandates to effect limited climate-smart approaches and protect farmers from increasing their vulnerability.

Introduction / objectives:

1. Understand current and past vulnerability of the smallholder farmers.
2. Understand gender dimensions in vulnerability and adaptive capacity.
3. Unravel preferred adaptation options as perceived by women and male farmers.
4. Policy analysis to identify conflicts, gaps and opportunities for enhancing the policy analysis for improved climate change adaptation.

Project results:

Training video that was developed (and critically reviewed) with the farming community. A draft report outlining farmer vulnerability and gender-disaggregated adaptation preferences. An assessment of policy gaps and conflicts

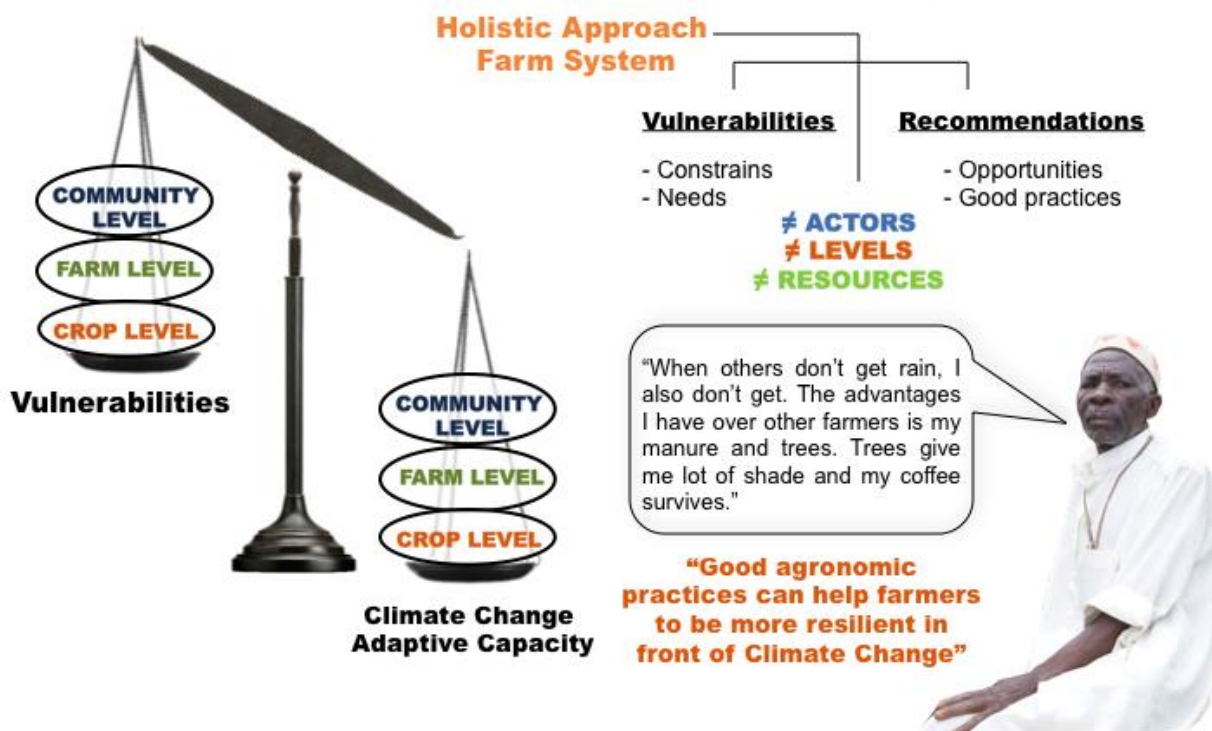
Partners:

Local partners: CIDI (NGO) and RADFA (farmer organisation) CGIAR: ILRI, CIAT

Links/sources for further information:

Can send the policy analysis reports

COMMUNICATION TOOLS – VIDEOS
Climate change and its effect on small scale farmers
- Ugandan Reacts -



6. Outcome indicators

Outcome indicator:

One to five flagship technical and/or institutional approaches identified and developed with farmers, key development and funding agencies (national and international), civil society organizations and private sector in three regions, which would directly enhance the adaptive capacity of the farming systems to the climate change conditions

Achievements:

IITA reported on this last year with a story on banana-coffee.FYI: after Rwanda, the Burundian Minister of Agriculture has now said that she also wanted to get the technology to her country, whereas it had been forbidden since the colonial period. We have that in an email... other than that, the outcome and outcome indicator of last year is still valid.

Evidence:

Leveraged funds

Title:

BMZ-funded: Synergies and trade-offs for climate change adaptation and mitigation in cocoa and coffee systems

Partner name: University of Goettingen, CRIG (Ghana), TaCRI (Tanzania), NaCORRI (Ug), CIAT

Budget: \$1600000

Theme: T3

Title:

USAID-funded: Enhancing Climate-Resilience of Agricultural Livelihoods (in Uganda)

Partner name: NARO

Budget: \$1000000

Theme: T1

Title:

SNV-funded: Increased Cocoa Productivity for Improved Ecosystem Services

Partner name: SNV (in collaboration with CIAT through BMZ funded project)

Budget: \$300000

Theme: T3