## Contents

### Policy News

1. **Climate change and Africa: Connecting land, food security, and gender**  
   Kathlee A. Freeman and Seble Samuel

2. **Experts demystify climate-smart agriculture financing in Kenya**  
   Faith Gikunda

3. **How can low-emissions development ensure social equity during intensification?**  
   Sadie Shelton

### Science News

4. **We can’t afford to waste more food - The next crisis is already here**

5. **Flipping the script on rainfall data**  
   Pierre C. Sibiry Traoré, Steven Ndung’u, Rachael Kyalo, Daniel Annerose, Anthony Whitbread and Ramadjita Tabo

6. **Deep dive into climate-smart practices for Ethiopia’s livestock systems**  
   John Recha

### Field Updates

7. **Unearthing the unknown: Developing small-scale irrigation spatial information systems to support value chain transformation**  
   Lulseged Tamene, Wuletawu Ahera, Ermias Teferi, Degefie Tibebe, Tibebu Kassawmar, John W. Recha and Dawit Solomon

### Engagement

8. **North-South collaboration through rapid prototyping: Doing it the minimum-viable way**  
   Rob Lubberink

9. **A decade of CCAFS: Two big lessons for the future of climate-smart food systems**  
   Bruce Campbell

10. **What’s at stake: Gender, agriculture and crisis**  
    Kathlee A. Freeman

11. **Science-Policy Dialogues Ensure Low Emission Development Research Impact**  
    Arun Khatri-Chhetri

12. **Combating a triple threat to Kenya's food security**  
    John Recha and Oscar Nzoka

### Out & About

11. **In our diary**  
    CCAFS EA in the media

12. **Further reading and CCAFS tools**
Message From
The Program Leader

We are pleased to share with you our SmartAg Partner newsletter, highlighting policy engagement and ongoing research from the second half of 2020.

We have been hard at work shaping the future of our programming across the Eastern Africa Region. We are excited to announce the launch of a new project “AICCRA: Accelerating the Impact of CGIAR Climate Research for Africa” funded by the World Bank. This multidisciplinary project aims to strengthen the climate resilience of food systems and smallholder farmer livelihoods across the continent, and will be implemented in collaboration with CGIAR centers, regional and national partners in Eastern and Southern Africa (Ethiopia, Kenya and Zambia) and West Africa (Ghana, Senegal and Mali).

We are delighted to announce the launch of Ethiopia’s Climate-Smart Agriculture Roadmap, by Ethiopia’s Ministry of Agriculture (MoA). The roadmap effectively integrates the research for development, policy and science outputs of CCAFS, and our CGIAR, national and international partners into Ethiopia’s national CSA policy. The roadmap provides a ten-year pathway of CSA actions to implement at scale to ensure climate-resilient food systems across the country.

In partnership with Ethiopia’s MoA, UNIQUE Forestry and Land Use, the Environment, Forest and Climate Change Commission (EFCCC), and the Ethiopian Institute of Agricultural Research (EIAR), we have finalized the Inventory of Greenhouse Gas Emissions from Cattle, Sheep and Goats in Ethiopia. This inventory uses the rigorous Tier 2 Approach of the Intergovernmental Panel on Climate Change (IPCC), a first of its kind in Ethiopia to track and support GHG emissions reduction from Ethiopia’s highest emitting sector. The inventory has successfully been used to support Ethiopia’s recently submitted enhanced Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC).

Our innovative Climate Resilient Agribusiness for Tomorrow (CRAFT) project continues to hold virtual meetings on advocacy, policy and scaling engagement with small and medium enterprises, farmer cooperatives and country project teams in Kenya, Tanzania and Uganda. In addition, CRAFT has produced a dynamic Climate Resilient Farmer Field School Handbook, pulling experiences from the field in Kenya, Tanzania and Uganda to serve as a training model for climate-resilient farming.

As the Food & Business Global Challenges Program (GCP4) comes to a close, we co-organized a virtual session on Scaling Climate-Smart Agriculture in Eastern and Southern Africa for Resilient Food Systems, as part of the Food & Business Research Final Conference: Scaling Insights for Sustainable Food Systems organized by NWO-WOTRO and the Food & Business Knowledge Platform (F&BKP).

We have continued to participate in virtual spaces at the nexus of climate and food security, including the African Green Revolution Forum Virtual Summit: Feed the Cities Grow the Continent, and in the Food Systems Policy Dialogue for a Food and Agriculture Policy Roadmap organized by the World Business Council for Sustainable Development.

Read on for details from the second half of 2020 and please share this newsletter with your networks.

Dr. Dawit Solomon
Innovative policy approaches can help tackle land degradation, desertification, food insecurity, and gender inequality within the context of climate change in Africa.

By Kathlee A. Freeman and Seble Samuel

A large proportion of Africa’s population is vulnerable to climate change due to their dependence on climate-sensitive livelihoods—including rainfed agriculture and natural resources—to meet food, nutrition, and income needs. In the coming decades, climate change will continue to strain resources such as soil, land, water, and forests, putting undue burdens on the most vulnerable as a result.

To avoid the most dire climate change predictions and increase the adaptive capacity of vulnerable populations, climate-related policies must be data-driven and scientifically informed. An example of this includes the work done by the Africa Group of Negotiators Expert Support (AGNES), who are committed to informing and increasing the capacity of African policy makers and leaders to make climate-related policy decisions. AGNES spearheaded the process of unpacking Climate Change and Land—an Intergovernmental Panel on Climate Change (IPCC) special report—from which four policy briefs have been prepared, covering desertification, land degradation, food security and gender.

Desertification

A type of land degradation, desertification is specific to drylands, and is often caused by unsustainable human activities and worsened by climate change. Desertification exacerbates reductions in crop yield and weakens the resiliency of agricultural and pastoral systems, with adverse impacts on human health, food security, economic activity, physical infrastructure, natural resources, physical security, and the environment, often disproportionately affecting women and youth. Africa is especially vulnerable to this threat as an estimated 66 percent of the continent is classified as drylands and about 319 million hectares are considered especially vulnerable. According to AGNES, combating desertification requires multi-faced approaches and tools, including policy interventions, integrated land management practices, and the use of indigenous knowledge at local and regional levels.

Land degradation

Agriculture and deforestation are dominant drivers of land degradation, especially the inefficient use of agricultural resources, soil loss in cultivated lands, and expansion of cultivated land. Available estimates show that 46 percent of Africa’s land is degraded, affecting at least 485 million people, translating to an annual cost of USD 9.3 billion. Continued land degradation will render more than half of all cultivated land in Africa unproductive by 2050, with the cyclical relationship between land degradation and climate change intensifying food insecurity, biodiversity loss, and economic underdevelopment. To curb degradation, AGNES calls for inclusive early warning systems and an integrated landscape approach to land management.
Climate change adaptation and mitigation require data-driven and science-backed policy.
Food security

Climate change directly impacts food systems, and likewise, food and nutrition security. As productive land becomes increasingly scarce, food security in Africa will require a coordinated effort across multiple sectors. Empowering women is critical to develop synergies between food security and climate change adaptation and mitigation. AGNES stresses the need for an evidence-based approach, with food production research focused on resilience to both acute and long-term climatic events. Another set of tools lies in the development and diffusion of innovations and technologies. Additionally, priority should be given to food security across climate-related adaptation and mitigation plans at local, regional, and national levels.

Gender

While gender is colloquially used to describe the needs and issues facing women and girls, AGNES stresses the term’s broader implications, including the social norms, roles, relationships, access to and control of resources, and responsibilities afforded to men and women. Women are constrained by traditional household and care duties as well as social norms which prevent them from taking an active role in power and decision-making spaces. Applying a gendered perspective to climate change policies and projects includes gender analysis, the collection of sex-disaggregated data, and proper budgeting for gender needs. AGNES also points to the need for national Gender Action Plans (GAPs) with well-designed monitoring and evaluation tools and regular audits to track gender equity progress.

Accelerated transformation across the continent must include enabling policy environments accompanied by early warning systems, support to scientific innovations, capacity building, and equitable knowledge and technology transfer systems to ensure widespread uptake. Building inclusivity into integrated landscape approaches is critical to address the needs of distinct agro-ecological and climatic zones across Africa. Inclusive actions and policies must be participatory, with tracked gender outcomes, the creation of learning platforms, and training and capacity building for policymakers. Development strategies should contribute to low-emissions and climate-resilient agricultural pathways that center food security, are bolstered by data-rich analysis, and include climate modelling.

Climate change is a profound threat the African continent is currently facing and is especially devastating for vulnerable populations. The themes explored in these briefs are important not only for understanding the current and ongoing impacts of climate change in Africa, but also for charting the way forward, towards a more resilient and equitable Africa.

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), along with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), New Partnership for Africa’s Development (NEPAD), Food and Agriculture Organization of the United Nations (FAO), The Aga Khan University’s East Africa Institute, African Centre for Technology Studies (ACTS), International Development Research Council (IDRC), International Livestock Research Institute (ILRI), International Center for Tropical Agriculture (CIAT), and the African Union Commision (AUC), provided financial and technical support to the production of the briefs.

Kathlee Freeman is Communications Consultant for the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) Gender and Social Inclusion Flagship. Seble Samuel is Communications and Knowledge Management Officer for CCAFS East Africa.
Experts demystify climate-smart agriculture financing in Kenya

A recent webinar provided an opportunity for investors and climate-smart agriculture actors in Kenya to connect to share knowledge and inform policies.

By Faith Gikunda

Finance is increasingly becoming a critical tool for addressing climate change challenges. All the agriculture sectors—crops, livestock and fisheries—are heavily impacted by climate change. The increasing impacts imply the urgency to financially empower farmers and other food system actors to adopt technologies and practices that cushion them against the impacts of climate change. However, while there are financial access opportunities, the availability of information on existing financing instruments remains scanty, making it difficult for small-scale farmers to utilize existing opportunities.

To combat this difficulty, dozens of organizations in Kenya have come together to form the Climate Smart Agriculture Multi-Stakeholder Platform (CSA-MSP), to support stakeholders working on agriculture and climate change to share knowledge and inform policies. The CSA-MSP has a thematic group on financing and investments whose role is to seek intelligence and develop connections between the platform members and existing investors.

Ms. Veronica Ndetu, the head of the Climate Change Unit at the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MOALFC) and coordinator of the CSA-MSP, notes “there are numerous opportunities that climate-smart agriculture (CSA) investors could provide towards implementing the existing Climate Smart Agriculture Implementation Framework, hence the main purpose of the CSA platform is to connect investors with existing CSA actors.” The impact of this linkage is two-fold; not only does it spur financial investment but it also supports the sharing of technical expertise by platform members with investors in the development of CSA-focused investable cases.

A recent webinar provided an opportunity for investors and CSA actors to connect. Several investment portfolios were presented by invited organizations, including SNV, Solidaridad, Oikocredit and Financial Access.

Existing potential CSA investment tickets

According to Sebastian Oggema, Project Manager of the SNV-led Climate Resilient Agribusiness for Tomorrow (CRAFT) project, it is necessary to avail funds for CSA investments and to ensure that ventures meet the basic requirements to qualify them as climate-smart by addressing adaptation and mitigation objectives. The CRAFT investment focuses on the potential to engage and impact small-scale farmers, food security, and innovative CSA practices and technologies. The project also addresses income generation and job creation for women and youth, and addresses the gender gap by enhancing women’s control over equipment, assets and sales income. The CRAFT investment uses a value chain, market-led approach, which is a critical component in fostering an entrepreneurial community of small and medium enterprises (SMEs), farmers’ enterprises (cooperatives), service providers and government practitioners.
Photo from a project in Kenya looking at the impact of climate change on agriculture. Farmers need to be provided financial access opportunities to tackle the effects of climate change.
According to Rakula Okoth of Solidaridad, investment-funding opportunities for CSA investments are limitless and have moved from the traditional lending to newer technology-supported approaches. Given the example of PlusPlus, a European NGO-backed impact investment platform which supports SMEs by mobilizing investors via an online platform, he observed that it is possible for start-ups to get funding which was initially very difficult with the traditional lending approach due to collateral requirements. PlusPlus provides crowd-sourced funding to agri-food smallholders in emerging markets, which contributes to sustainable economic development.

To Oikocredit, their entry point on climate change is through environmentally compliant enterprises. In Kenya, they focus on key commodities like coffee and tea. This, according to Geoffrey Kioko Musyoki from Okiocredit, translates to an improved quality of life for smallholder farmers and rural low-income households and communities. Oikocredit’s short-term plan focuses on stimulating increases in farm productivity, greater crop diversification and farm resilience through CSA, which in the long-term ensures that the smallholders and rural households increase their income.

Building capacity for CSA investment

Federico Lande, Partnerships Manager at Financial Access, stressed the need for capacity building of financial institutions to sustainably build or expand their agri-finance business and investment portfolios. This is essential in ensuring that the institutions understand the investments they are funding and strengthen their capacity to offer suitable solutions. Financial Access works with both financial institutions and smallholder farmers in emerging markets to provide data analytics, risk scoring, tailored financial advisory services and fine-tuning solutions to make small-scale lending profitable, climate-smart and scalable. This helps reduce operating costs and lowers credit risks for financial institutions.

Nancy Rapando, a steering committee member for the CSA-MSP and a member of the technical working group on investments, observed that the platform will continue to profile more public and private financial providers and identify opportunities for investment in CSA and link SMEs to investors. A key role that the platform will play beyond linkages is to support existing cases by actors to become investment-ready depending on the type of finance they would be interested in.

Read more:

News update: Stakeholders come together in Nairobi to create a vibrant platform for climate-smart agriculture across Kenya: https://bit.ly/3us1EOs

Faith Gikunda is an independent Communications Specialist.
How can low-emissions development ensure social equity during intensification?

Low-emissions development initiatives must understand gender dynamics to develop technical interventions that do not exacerbate gender norms or stereotypes.

By Sadie Shelton

The Government of Kenya has been pushing to intensify the dairy sector for many years to increase productivity to meet the rapidly growing demand for milk products. Developing the dairy sector is often favorably viewed by policymakers. However, it is important to consider how development policies can have different benefits or consequences for different communities and social groups.

The relationship between societal equity, agriculture, and emission reduction efforts is rarely explored in agriculture and climate change mitigation research. Implementing new formal markets in dairy can shift workloads between women and men, depending on their role in agriculture production and local gender norms. However, the extent to which intensification impacts societal equity is mostly unknown.

Formalization of dairy markets in Kenya

In the dairy sector, low-emissions development (LED) often utilizes intensification practices that reduce greenhouse gas (GHG) emissions and increase yield. However, LED focuses on technical practices and outcomes, seldom considering the subsequent impacts on women’s and men’s social distribution of burdens and benefits.

Recent research, supported by the CGIAR Research Program on Climate Change, Agriculture, and Food Security (CCAFS), examines the relationship between agricultural intensification and gender equity outcomes in Kenya’s dairy system. A CCAFS working paper reviewed the literature on this relationship and a journal article examined the same system change but analyzed the spectrum of women’s informal milk market practices where the dairy system was undergoing intensification.

These studies suggest that intensification and the ensuing commercialization of dairy systems often increase women’s labor in households and excludes them from other economic opportunities.

Market access and social consequences

Women generally choose to use informal markets to sell milk in Kenya, which gives them more control over the proceeds. Men usually have complete control over all other milk sales and use formal markets.

There is a push in Kenya to increase the use of formal markets, which impacts informal market use and limits women’s ability to sell milk. However, an increase in use of informal markets by women in some areas disrupts the boundaries between socially acceptable and socially disruptive gender relations by reinforcing and aggravating existing unequal dynamics.

Women participating in these informal markets face high social culpability and danger from engaging in activities that break normalcy, like riding a motorcycle to deliver milk or...
Boran cow at the ILRI farm in Nairobi
being branded as a market “loser” for using informal markets. These women face disapproval from both men and other women.

**Dual interventions to boost intensification and social equity**

Women have limited rights to own livestock, especially large livestock like cows. Dairy interventions that do not consider gender dynamics often reinforce men’s cultural claims to livestock. Livestock often has highly variable cultural and gendered significance attached to them. Place-based research is a crucial step to understanding local dynamics when designing livestock interventions.

Development investors can use research and local data to design gender-responsive or -transformative approaches to intensification interventions. For example, where cattle are under men’s control, instead of increasing women’s access to cattle-incomes, promote other activities where women already have more control, like poultry or small stock farming.

As much of women’s time on-farm is spent on domestic and dairying activities, interventions should focus on time- and labor-saving technologies to reduce their household workload. Joint initiatives that include gender-transformative approaches and technical interventions could provide workshops to sensitize women and men about the benefits of sharing decision making power and income more equitably.

If LED interventions to intensify dairy do not wish to create adverse effects, they must anticipate the existence of gender dynamics and plan to identify them and develop social interventions to accompany technical interventions.

Sadie Shelton is the Communications Officer and a part-time research assistant for the CCAFS Low-Emissions Development Flagship.

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Read the publications


Read more:

Info Note: Youth opportunity spaces in low-emission dairy development in Kenya: https://bit.ly/2O64LuG

Sadie Shelton is the Communications Officer and a part-time research assistant for the CCAFS Low-Emissions Development Flagship.
Our food systems are failing and must be transformed.

To celebrate the first International Day of Awareness on Food Loss and Waste (IDAFLW), we share our vision of more efficient supply chains delivering food with minimal loss and waste and outline how to get there.

The Transformation Initiative (TI), led by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), proposes four action areas where we must collectively act now in its recent flagship report on, Actions to Transform Food Systems Under Climate Change.

Reducing food loss and waste (FLW) is one of 11 essential actions this report identifies to achieve the United Nations’ Sustainable Development Goals (SDGs) focused on food security and the environment. The transformative action sets out to reduce the amount of food that is lost or wasted by 50% in five major supply chains where both greenhouse gasses and loss or waste are high.

Over 12% of the world’s people are hungry, and our global population is rising faster than ever. If the current trajectories of population growth, shifting diets and food waste management remain unchanged, agricultural production will need to increase by 60% to meet demand in 2050. This is impossible with current agriculture practices and available arable land. However, converting more land to agriculture is not the answer.
During COVID-19, many perishable foods like fruits and vegetables went to waste as both farmers and consumers couldn’t access markets.

Currently, one-third of all food produced is lost. Food systems and agriculture will need to be more productive than ever in the future.

In 2013, FLW-associated greenhouse gas (GHG) emissions accounted for almost 25% of food system emissions. Wasted food accounts for 6-10% of global GHG emissions. If food waste were a country, it would be the third-largest emitter behind China (21%) and the US (13%).

Bovine meat, vegetables, fruits, dairy, and root and tuber supply chains have the highest associated GHG emissions and have contributed the most to global FLW. These supply chains are responsible for a majority of global FLW and half of the associated GHG emissions. Fruits, vegetables, and roots and tubers have some of the highest losses during handling, distribution, in storage, and after they reach the consumer. However, associated GHG emissions are relatively low. Conversely, bovine meat and dairy have lower losses along the supply chain—still among the highest—but have disproportionately higher emissions associated with those losses.
FLW does not look the same in every supply chain around the world. However, losses are much higher in low- to middle-income countries during storage, transport, and processing than in higher-income countries where the highest losses occur once reaching stores and consumers.

North America and Oceania (including Australia) are responsible for the highest per capita consumer GHG emissions associated with FLW (Figures 8-14), while sub-Saharan Africa has the lowest per capita consumer emissions from FLW.

There are numerous opportunities to reduce food waste and its associated emissions. However, finding the most effective places to intervene requires investigating where the highest points of loss and waste are along supply chains and around the world.

**Reduce waste**

- Develop early warning systems and information management for gauging future food demand and supply outlook.
- Organize FLW awareness campaigns in school food programs and institutional food services.
- Develop regulations and incentives for smaller and appropriate portions and reduced food waste.
- Recycle and upcycle waste between cities and peri-urban agriculture to support the reuse of biowaste as a renewable energy source or soil amendment in areas with high densities of livestock or urban waste.

**Reduce loss**

- Improve harvesting, processing, and storage in low- and middle-income countries.

**Reduce both**

- Create incentives for companies to measure food loss and waste and implement food loss and waste policies.

**Better storage, better savings**

Reducing food loss can provide economic returns and reduce emissions. Approximately 10–20% of cereal production in sub-Saharan Africa is lost post-harvest, which results in decreased farmer income and food insecurity. There are several ways to improve post-harvest losses, including building warehouses and cold storage, training farmers for proper harvest handling, and the use of hermetically sealed storage bags for cereal crops. However, these come with the burden of cost, one that many smallholder farmers are unable to overcome without assistance.

The “Purdue Improved Crop Storage” (PICS) bag was developed in the 1980s at Purdue University to reduce post-harvest losses in cowpeas. The use of PICS bags has been supported by the Gates Foundation in sub-Saharan Africa, including Tanzania where maize is a staple crop. A CCAFS business case examined the use of PICS bags in Tanzania among smallholder farmers and found two main financial impact than if the whole food system was considered. The TI report sets a target to reduce FLW by 50% by 2030 and focuses on the five major supply chains described above. The report gives an overview of the current situation, where to go from here, and, more importantly, how to get there.
benefits for farmers who use the bags.

First is that grain infested by insects or otherwise lost post-harvest is reduced by keeping the harvest free of insects, excess moisture, and mold. Second is that the ability to store grain for longer periods protects farmers from the extreme price volatility of the Tanzanian maize market. Currently, all farmers in a region harvest and sell at the same time, which often causes prices to fall rapidly. Farmers who use the bags can wait to sell when prices are high again.

The bags reduce post-harvest loss from an average of 14% to less than 1%, thus, increasing productivity and reducing emissions proportionally. The PICS bags have a relatively low upfront cost, which farmers can quickly recoup. Simple methods to reduce waste before it leaves the farm are more accessible to small-scale farmers and have a significant impact.

**A private solution**

High-income countries are largely responsible for the highest rates of food waste from retailers and consumers. Retail food waste is linked to the limited shelf life of perishable foods and private quality standards of buyers and the variability of demand, especially fresh produce. Storage conditions, packaging quality, and handling practices also impact the quality, shelf life, and acceptability of products to consumers.

The 10x20x30 initiative was launched by Champions 12.3’s in 2019. The initiative brings together 10+ of the world’s largest food retailers and providers to each engage at least 20 suppliers to halve their FLW by 2030.

IKEA is one of these retailers. It operates over 400 stores and has almost one billion visitors each year, including 680 million visitors in 2018, who spent €2.15 billion in IKEA’s food outlets. In 2016, IKEA launched the “Food is Precious” initiative, setting a target to reduce its food waste by 50% by August 2020.

To reduce waste in their food outlets, IKEA has notably:

1. Used a smart-scale system to monitor food waste, which resulted in a 23–54% decrease in food waste in only six months;
2. Appointed “Food Waste Champions” in each store to motivate colleagues at work and home; and
3. Established a “Country Implementation Responsible” person to lead implementation and support co-workers.

IKEA showed a 20% reduction of waste within 12 weeks of starting the initiative and found that additional investments had a 20-week average payback period. The company plans to address FLW with its suppliers and encourages consumers to reduce food waste at home.

Everyone is responsible for food waste. There is room for improvement all along the supply chain. From before produce leaves the farm to the grocery store and finally your kitchen. Now is the time to take action and transform the food system to be more productive, less wasteful, and more accessible to everyone.

**Key messages**

1. Reducing global FLW by 50% by 2030 is possible but requires swift action and behavior change along the value chain in both high- and low-income countries.
2. Food systems must become more productive and efficient if we are to eradicate hunger in a rapidly growing population.
3. Reducing FLW will not look the same everywhere and there is not a silver bullet or strategy that will work in all countries or for all people.

Read more:


Sadie Shelton is the Communications Officer and a part-time research assistant for the CCAFS Low-Emissions Development Flagship.
Flipping the script on rainfall data

Simple rain gauges are positioned to be a gamechanger in helping farmers manage agricultural risk.

By Pierre C. Sibiry Traoré, Steven Ndung’u, Rachael Kyalo, Daniel Annerose, Anthony Whitbread and Ramadjita Tabo

In the last few hours before COIVD-19 locked the Consultive Group on International Agricultural Research (CGIAR) centers staff into remote work, a handful of International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) researchers traveled to Kenya’s Makueni County with a dozen seemingly innocuous devices, roughly packed inside plain A4 paper boxes. Virtually unnoticed, they were on a mission to plant what they hope will become a game-changer in agricultural risk management: a set of unpretentious rain gauges.

Outwardly old-fashioned if not outright obsolete, these minimalistic receptacles the size of a large mug however hid a powerful stunt: Internet-Of-Things (IoT) at a very affordable price. And this is significant.

The number of operational ground observation stations decreased by 85% over the past 5 decades in Africa.

This is a big issue, given the continent’s dependence on rainfed agriculture and the considerable spatial and temporal heterogeneity of tropical rainfall. Promising approaches that combine satellite rainfall estimates with scarce ground data have started addressing the problem to provide near real-time, continuous spatial and temporal coverage of weather conditions. Co-opted by over 14 national hydrological and meteorological services (NHMS) across Africa, the Enhancing National Climate Services (ENACTS) initiative is one such successful example of how the gridded data revolution can improve early warning systems and climate outlooks from regional to sub-national scales. Being deployed in Mali, Ethiopia and Ghana, the CCAFS Regional Agricultural Forecasting Tool (CRAFT) is yet another innovation to improve the skill, lead time and spatialization of seasonal production forecasts and food security outlooks, down to the district level.

The ubiquitous big data craze meanwhile lures many aspiring businesses into targeting smallholder farmers with ambitious agronomic advisory services, based likewise on satellite rainfall estimates or other elaborate combinations of remote observing systems and model outputs, some of which are offered as services by the private sector. Claiming to reach farmers by the hundreds of thousands or more, e.g. through SMS and community radios delivering tailored advice on optimal sowing dates and fertilization rates, such services offer rewarding dissemination metrics that tick all the boxes on benevolent donor dashboards. Yet, the relevance of these services for farm-level decision making, their uptake by farmers and impact on rural livelihoods remain euphemistically elusive.

The problem is that we are so consumed with fashionable technologies that we tend to lose sight of the actual value of the data they generate, and more generally of data fitness for purpose. Satellite rainfall estimates are notoriously unreliable at quantifying the highly localized rainfall events (and dry conditions in-between) that are meaningful for farm-level decision making at the tails of the growing season, when rainfall is most heterogeneous. They are equally known for systematic underestimation of high rainfall amounts, another significant peril to crops and rural dwellers. The disruptive innovation of measuring rainfall through mobile signal attenuation is still a distant prospect in a continent where mobile tower density is one order of magnitude lower.
than elsewhere. Restocking NHMS with automatic weather stations is useful but under no realistic scenario will it ever suffice in the medium term to yield skillful rainfall estimates for informed farm-level decisions at scale. Besides, it is rare that such publicly collected data becomes available in the spatial and temporal resolution it is needed for decision-making or for the provision of third-party services.

Enter cheap, recycleable IoT rain gauges

A brainchild concept of Manobi Africa targeting an industrial manufacturing cost of $50 a piece and purposefully limited to the sole measurement of daily rainfall as the single most important agro-meteorological variable under the tropics, these no-frills gadgets should become a standard staple as part of the suite of inputs needed to de-risk agricultural investments. Leveraging the steady penetration of Low Power Wide Area Networking (LPWAN) technologies such as Narrowband IoT (NB-IoT) and Long Range (LoRa), they could provide the next building block of IoT mainstreaming in rural smallholder communities.

Of course, the purists may argue that such layman devices do not meet rainfall measurement accuracy standards. That is true, but irrelevant. Because farmers and agricultural stakeholders do not need accurate measurements 30km away. They need robust measurements that are just good enough, but on their farm.

Of course, it is highly doubtful a smallholder farmer would even consider paying for an IoT rain gauge anytime soon. But that’s a non-event. Because the bank will pay for it. And will lower interest rates on the farmer’s loan.

The development and production of IoT rain gauges prototypes reported here is funded by the European Commission’s Horizon 2020 research and innovation program under grant agreement No 776309 (NADiRA – Nurturing Africa’s Digital Revolution for Agriculture) and supported by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) project on Capacitating African Stakeholders with Climate Advisories and Insurance Development (CASCAID). This is facilitated by the International Fund for Agricultural Development (IFAD) under grant number 2000002575, implemented by Alliance Bioversity-CIAT with AR4D support from the European Commission for the year 2019. IoT rain gauges and other IoT sensors are deployed as integral components of agCelerant value chain orchestrators and data ecosystems.

The opinions expressed in this publication are those of the authors. They do not purport to reflect the official opinions or views of ICRISAT, Manobi Africa, Viveris or cited donor agencies.

Pierre C. Sibiry Traoré is Director, R&D Digital Agriculture (MANOBI Africa) & Principal In-Business Researcher (ICRISAT). Steven Ndung’u is a Scientific Officer at ICRISAT. Rachael Kyalo is a Data Research Analyst at MANOBI Africa. Daniel Annerose is the CEO and founder of Manobi Africa. Anthony Whitbread is the Research Program Director for Innovation Systems for the Drylands (ISD) at ICRISAT. Ramadjita Tabo is the Director of the Regional Hub West and Central Africa at ICRISAT.
Deep dive into climate-smart practices for Ethiopia’s livestock systems

A timely analysis explores climate-smart practices for Africa’s largest livestock population.

By John Recha

Ethiopia boasts Africa’s largest livestock population and the tenth largest globally. Livestock represents an integral part of the farming systems in the country and constitutes the source of numerous social and economic values such as food, draught power, fuel, cash income, security and investment in the highland, lowland, and pastoral farming areas.

Livestock systems in Ethiopia are a critical element of the country’s dominant agriculture sector, which contributes approximately 42% of the national gross domestic product, and is the primary livelihood source for around 80% of the country’s population. Overall, the agriculture sector is highly vulnerable to the impacts of climate change. Droughts periodically reverse performance gains in the agricultural sector, with devastating effects on household food security and poverty levels. Vulnerability to droughts is greatest in the pastoral areas of the lowlands and the densely populated, food-insecure districts of the highlands. Drought-induced famines are further exacerbated by limited coping mechanisms and inadequate contingency planning for drought mitigation and the threat of climate change.

To help address the challenges, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), established a learning site in the Yabello District of Borena Zone in the lowlands of Oromia Region in Southern Ethiopia in 2011. The objective of the learning site was to partner with the pastoralists, development organizations, and research organizations to test and promote a portfolio of climate-smart agricultural (CSA) technologies and practices, including institutional innovations and linking with policymakers at sub-national and national levels.

The CCAFS Regional Program in East Africa, therefore, partnered with the United States Agency for International Development (USAID), the Alliance of Bioversity International and CIAT (the Alliance), Crown Agents USA and Abt Associates to undertake a study on cost-benefit analysis of improved livestock management approaches in the Yabello District of the Borena Zone, Ethiopia.
The analysis focused on exploring the following three key improved livestock management practices:

**Deferred-rotation grazing:** features longer resting times between livestock grazing to allow for natural regeneration of vegetation.

**Active restoration of degraded rangelands:** involves planting herbaceous plants and removing woody species to boost grazing productivity.

**Fodder cultivation:** involves planting crops with high nutritional value for livestock, and creates important benefits such as reducing dependency on purchased feed and can also reduce greenhouse gas emissions.

The study analyzed the costs and benefits of these CSA practices, and specifically, improved management practices for cattle, small ruminants, camels, and poultry through the lens of the above mentioned approaches.

*John Recha is a Climate Smart Agriculture Policy Scientist, and the CRAFT Coordinator for CCAFS East Africa.*
Small-scale irrigation systems are vital for the resilience of smallholder farmers. Explore a leading interactive platform for small-scale irrigation spatial mapping in Ethiopia.

By Lulseged Tamene, Wuletawu Adera, Ermias Teferi, Degefi Tibebe, Tibebu Kassawmar, John W. Recha and Dawit Solomon

Ethiopia is known as the water tower of East Africa due to its abundant water resources. Recent figures estimate that the country has around 124.4 billion cubic meters (BCM) of river water, 70 BCM lake water, and 30 BCM groundwater resources. This potential can enable the development of 3.8 million hectares of irrigation and 45,000 MW of hydropower production. This is a massive potential in a country where millions are food insecure with limited electricity coverage.

To address these challenges, the country is exploring the potential of available water resources to provide irrigation and power supply. The effort to expand mechanized irrigation in the lowlands of the country for irrigation of wheat and reduce imports is one critical example. In addition, the national government has been introducing new irrigation technologies under its various water harvesting schemes, which include ponds, hand-dug wells, and stream and flood diversions. The Ministry of Agriculture (MoA) and the Ministry of Water, Irrigation and Electricity (MoWIE) jointly prepared the National Smallholder Irrigation and Drainage Strategy in 2011 with the aim of identifying priority areas of intervention for rapidly and effectively scaling up smallholder-irrigated agriculture across Ethiopia. These strategies highlight the government’s commitment to transforming smallholder agriculture through developing smallholding irrigation systems. The various hydroelectric power dams including the Grand Ethiopian Renaissance Dam are a means to address the challenge of power supply, of which nearly 50% of the population lacks access.

Importance of small-scale irrigation systems for smallholder farmers

While the effort to harness the irrigation potential is commendable, there is an important gap as the focus is largely on medium- and large-scale irrigation systems, forgetting the most important small-scale irrigation schemes that provide nutrition and resilience to smallholder farmers. By ‘small-scale’ we are referring to irrigation schemes operated by smallholder farmers to meet their income, nutrition and food security needs.
Small-scale irrigation is a lifeline for smallholder farmers.
The farmers use available means including diversion from rivers to irrigate small farmlands or forage for livestock around their homesteads or off-field. These schemes are not necessarily linked with the extension system and are not a result of the “water harvested-based campaign.” The observed challenge is that the potential assessments and efforts to promote irrigation systems in the country completely ignore these very localized but effective small-scale irrigation schemes used by farmers. Because of this, the potential, opportunities, constraints and challenges of these farmers are not known. Smallholder farmers often plan crop choice, method of water application, and market linkages without support from extension services and generally struggle to obtain optimal benefits. Because of a lack of experience and advisories, households tend to plant non-commercial crops, and in most cases, grow the same type of crop and vegetable. In many cases, this leads to price failure and income loss.

Considering the importance of such small-scale irrigation schemes to complement food and nutrition security in most rural areas, it is essential to understand their constraints, challenges, potential and opportunities to provide a basis for knowledge-based decision-making. To achieve this, it will be essential to identify, map and characterize the conditions, production systems and value chains associated with small-scale irrigation practices to develop advisory services. The Amhara Region, the International Water Management Institute (IWMI) and the MoA have been collaborating to create an inventory of smallholding-irrigated areas in some parts of the region. However, the ongoing effort does not provide spatial information and essential data to improve the performance of the irrigations systems including the type of crops grown, crop yield, market access and storage are missing. Knowledge of the spatial distribution of these schemes and a sound understanding of their operating modalities as well as biophysical and socio-economic conditions can provide valuable information related to crop
choice, amount and timing of irrigation, market availability, price information, and development of storage and transport facilities. Such engagement aligns with the digitalization efforts the country is putting in place under its Digital Ethiopia 2025 Strategy.

**Interactive platforms for data visualization of small-scale irrigation**

The Alliance of Bioversity and CIAT (The Alliance), in collaboration with the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), Addis Ababa University (AAU) and the MoA ventured into using up-to-date technologies to identify and map small-scale irrigation schemes and develop a web-based dashboard for visualization. The aim is to develop a web-based Small-Scale Irrigation Management Information System (SSSIM) to facilitate data collection, storage, management and analysis. This adds value to improve the current simplified ‘table-based’ system by MoA, which is mainly stored in a traditional analogue format at the development agents’ offices. When it is finalized and scaled, the SSIMIS will provide multiple benefits including enhancing agricultural productivity (through tailored advisories to farmers employing small-scale irrigation schemes), enabling the adoption of green revolution technologies, creating additional employment opportunities, contributing to economic growth and poverty alleviation and building resilience to climate change.

The SSMIS employs a combination of earth observation, citizen science and geospatial techniques. In developing the web-enabled spatial information system, three integrated approaches were implemented: (1) advanced geospatial analysis and remote sensing, (2) citizen science, and (3) machine learning approaches. The system provide timely, accurate and a readily available database on small-scale irrigation schemes.

The prototype dashboard is under development and will be ready by 2021. The dashboard will be linked with relevant geospatial datasets and the system will be updated in near real-time. In due course, an app will be developed to disseminate advisories related to crop choice, input use and market information. Feedback from the farmers and extension workers will be used to fine-tune the system through adaptive learning.

Read more:

Implementing solar irrigation to achieve resilient livelihoods in Southern Ethiopia: https://bit.ly/3q7VQpM
Are solar powered irrigation systems scalable in India?: https://bit.ly/3b3ZwF1

EU-IFAD and GIZ Ethiopia have provided financial support for the work. Members of the “coalition of the willing” (team of willing experts working to support agricultural transformation) have provided inputs at various stages of the exercise.

Lulseged Tamene is a Senior Researcher at The Alliance of Bioversity International and CIAT. Wuletawu Abera is a Scientist at The Alliance of Bioversity International and CIAT. Ermias Teferi is a Lecturer of Hydrology at the Center for Environment and Development Studies, Addis Ababa University. Degefie Tibebe is a Scientist at the Water and Land Resources Center, Addis Ababa University. Tibebu Kassawmar is a Scientist at the Water and Land Resources Center, Addis Ababa University. John Recha is a Climate Smart Agriculture Policy Scientist, and the CRAFT Coordinator for CCAFS East Africa. Dawit Solomon is the Regional Program Leader for CCAFS East Africa.
North-South collaboration through rapid prototyping: Doing it the minimum-viable way

Researchers walk the talk of North-South collaboration using international rapid prototyping.

By Rob Lubberink

Everyone seems to be talking about fostering collaboration between actors in the Global North and the Global South. However, “putting your money where your mouth is” does not always come easily. There are many challenges that come into play when trying to facilitate such collaborations. However, in a recent publication, we, researchers at Wageningen University and Research (WUR) and Lilongwe University of Agriculture and Natural Resources (LUANAR), explain how North-South collaboration can be put into practice using international rapid prototyping events (IRPE). During an IRPE, participants form international teams to collectively brainstorm, develop and test minimum-viable solutions for challenges experienced by a local case owner. In our recent journal article, we also demonstrate how such an IRPE can be organized while using very minimal resources.

Putting emerging economies at the center of entrepreneurship and innovation

While teaching the university course “Entrepreneurship and innovation in emerging economies,” at WUR, three of the authors, including myself, kept running into an important challenge: how to get “emerging economies” to the forefront of the classroom, as opposed to merely being a contextual add-on. We aimed to connect and weave experiences of emerging economies with the various understandings and teachings of entrepreneurship and innovation and the tools already offered. At the same time, we also wanted to make entrepreneurship education more inclusive to students from the Global South.

The idea then emerged to have students from the Global South and North work together in an IRPE using a minimum-viable approach. Why not start by making use of the resources (e.g. social media platforms and mainstream communication technologies) and networks at hand? Would it not be better to allow the students to work on a real-life entrepreneurial case located in the emerging economy? This approach could boost inclusion while also moving the context of the emerging economy to the forefront.

Continuing or “minimum-viable” North-South collaboration

As IRPE researchers involved in the “Understanding and scaling organizations for smallholder resilience” (OSMARE) research project, we were conducting fieldwork on entrepreneurship in the dairy industry in the Central Region of Malawi when we bumped into a cheesemaker at a local farmers market. The local cheesemaker shared critical challenges he faced in scaling his business. We therefore suggested he serve as the case study for our IRPE to allow for a practical experience of collaborative problem-solving and solution-building.
While reflecting upon the intended outputs and outcomes of the IRPE, the project researchers identified that developing boundary crossing competencies are crucial skills for all participants to master during the IRPE, in order to thrive in dynamic and turbulent contexts. Such an approach implies that learning is not merely a process of acquisition of knowledge or skills, it is one of collaboration across a wide range of learning environments. Indispensable components of this process are situatedness, contextuality, cultural embeddedness and social mediation.

Participants learned how to ideate and work with minimal resources and infrastructure to co-create appropriate solutions on the ground. They were able to apply systems thinking, cross-cultural collaboration and action-research to gain insights for the development of new knowledge and practices. The result from this fusion of diverse perspectives is the production of alternative ingredients that the cheesemaker can use to develop new varieties of their product. In addition, a new product is created by repurposing what is considered, in the current production process, as “waste.” Not only was the actual IRPE an experience in prototyping, but in fact the process engaged in a unique sort of rapid prototyping all along. It was by making use of the resources available at hand, the courses we were teaching, and our surrounding networks, that we effectuated our way to the article about the IRPE. We hope that this how-to article for IRPE inspires others to experiment with North-South collaborations.

Read more:
Journal article: Entrepreneurial learning at the boundary: How to learn from a local cheese maker: https://bit.ly/3uJyF8M
Journal article: Linking sustainable business models to socio-ecological resilience through cross-sector partnerships: A complex adaptive systems view: https://bit.ly/3uiVm1F
Infographic: Are certain CSA business models stimulating or stunting smallholder resilience and entrepreneurship?: https://bit.ly/3bNxej1
Blog: Milk and money in Malawi: Reconnaissance visit to learn about the business challenges of smallholder dairy farming: https://bit.ly/3kwU0O6

Rob Lubberink is a Post-Doc Researcher for the OSMARE project at Wageningen University & Research.
A decade of CCAFS: Two big lessons for the future of climate-smart food systems

Our food systems are failing us—the wealth of literature that’s now available tells us this fact unequivocally.

By Bruce Campbell

The recent Actions to Transform Food Systems Under Climate Change report pinpoints the stark deficiencies and colossal challenge we face. We must reach half a billion small-scale agricultural producers around the world to change how they work—so often in difficult conditions worsened by a changing climate—to make them “climate-smart.”

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) has worked to address the twin challenges of global warming and declining food security for over a decade now. Our research and partnerships with hundreds of organizations all over the world have taught me two big lessons.

Firstly, we can only transform food systems if we change the very way we manage and reward research for development.

“Without engagement, science too often fails to reach its transformative potential.”

Secondly, researchers must work hand-in-glove with partners on the ground to ensure research has impact. Without engagement, science too often fails to reach its transformative potential.

CCAFS research

More than this, these talented researchers are doing things differently, with some really compelling examples which can be found in our 2019 Annual Report.

CCAFS is a USD$50 million a year program through which I’ve had the pleasure of employing some of the world’s best researchers who identify and address some of the most important interactions, synergies and trade-offs between climate change and agriculture.

In Vietnam, we not only earned the trust of senior policymakers; we also built up our credibility in delivering successful farm-based projects. As a result, CCAFS helped inform a multitude of Vietnamese national strategies, resolutions and actions.

These government initiatives mobilized more than a billion dollars of investment. They include an early warning system for salinity intrusion, which saved 200,000 acres of rice land in 2019.

As a result of the CCAFS work, our South East Asia regional lead Dr. Leo Sebastian was awarded the Medal for the contribution to the Cause of Agriculture and Rural Development by the Vietnamese Ministry of Agriculture.
Farmers display different varieties of beans

We infuse these partnerships with science and knowledge. We generated 139 papers in 2019, many of which were published by top journals such as Nature, PLoS ONE and The Lancet. Our commitment to open access remains unwavering, with 78 percent of our papers published in this format last year.

We know from our partnerships that opening up our knowledge in this way is often the best way to diffuse what we have learned through our networks to reach all the intended beneficiaries and more.

What’s more interesting to me is that more than half of these papers were produced in collaboration with our partners, drawing on local knowledge and enhancing local capacity to produce such rigorous research in the future.

Impact on the ground

What ultimately excites me is seeing CCAFS impact on the ground. We worked with farmers in 25 countries, testing workable climate-smart practices and assessing how these solutions enhance their livelihoods.

In Senegal, seven million farmers received climate-informed agricultural advisories through a partnership with the country’s meteorological and agricultural departments, as well as the support of a local farmers’ network.

Its impact was clear—68% of farmers used these advisory services, resulting in a 10–25% increase in their crop income. CCAFS program leader Robert Zougmore, who did so much to spearhead this work, received the prestigious 2019 Crawford Award.

Meanwhile in Rwanda, we reached around 110,000 farmers with climate information services, with 81 percent subsequently using the information to improve crop management to increase crop income by up to 30%. This is a compelling testament to how such services can help farmers better plan irrigation and boost their productivity and ultimately their livelihoods. The project was awarded the Climate Smart Agriculture Project of the Year 2018.

Changing research for development

Of all CCAFS achievements over the years, its role in changing the nature of research for development is probably it’s most significant, moving on the fulcrums of partnerships, outcomes, impact and performance-based budgeting.

“I agree with Agnes Kalibata, former Rwandan Minister for Agriculture and now UN envoy for its first-ever food systems summit—set to take place in 2021—that “hunger is a solvable problem.”

Achieving a climate-smart future for global food systems is possible if only we commit ourselves to that ambition.”

I agree with Agnes Kalibata, former Rwandan Minister for Agriculture and now UN envoy for its first-ever food systems summit—set to take place in 2021—that “hunger is a solvable problem.”

Achieving a climate-smart future for global food systems is possible if only we commit ourselves to that ambition, effectively sharing knowledge and acting on that knowledge, taking innovations from research labs to the field.

If we continue to transform research systems now, then just imagine what a difference we could make to the climate for future generations.

Read more:


Bruce Campbell is Program Director of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).
As women face unprecedented upheavals, the development community has an opportunity to not only meet immediate needs, but to support a more innovative, equitable future.

While agriculture is the primary source of income and food security for billions of people globally, the sector suffers from a gender gap which often leaves women with limited access to resources, finance, decision-making spaces, and information. Generally, these limitations contribute to the differences in agricultural productivity between women and men. During times of crisis, however, these barriers leave women with fewer resources to manage shocks and makes recovery an uphill battle.

System shocks, such as COVID-19, illustrate the fragility of global economic, political, and social systems and may undo much of the gender-related progress made over the last decade. For women in developing countries, who struggled to meet the needs of their families before the pandemic, COVID-19 has made their situations even more untenable. These upheavals are taking place against the backdrop of climate change, which contributes its own set of shocks through extreme weather events and shifting, long-term weather patterns.

Without a doubt, the issues that women farmers face are serious and will require coordinated efforts across sectors to overcome. It is too simplistic, however, to view women only through the lens of vulnerability. For example, research which links women leaders with more gender equitable outcomes during crisis, including successful country-level responses to COVID-19, illustrate how women are catalysts for rebuilding more equitable, resilient systems.

Gender and system shocks

In most countries, women are the primary caretakers for the sick, both professionally as healthcare workers and in the home. In the case of COVID-19, this puts them on the frontlines of a deadly, novel disease, while also taking up an enormous amount of time and energy. Closed borders and restrictions on movement place burdens on women and their ability to earn an income. Families may experience a loss of financial security as assets are sold to cope with income loss. Women also face higher rates of domestic violence, food insecurity, and an overall loss of traction in gender equality gains.

While the world is focused on COVID-19, climate change remains a stressor, especially for those who rely on natural resources to meet their needs. For example, weather shifts stress crops and animals, making agricultural activities less productive. Nearby water sources may be depleted, forcing women and girls to walk long distances to locate water for cooking, cleaning, and drinking. Climate-induced disasters, such as floods, can displace entire populations, making them even more susceptible to disease.
To address these concerns and possibilities, the CGIAR GENDER Platform recently hosted a virtual conversation to discuss gender considerations in agriculture during crises.

#GenderConversations

The virtual conversation, the first in a series hosted by the CGIAR GENDER Platform, took place on 12 August and included presentations by gender experts as well as interactive breakouts for participants.

Sophia Huyer, Gender and Social Inclusion Research Leader with the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), stressed the need to support women producers, especially through the promotion of women in decision-making spaces and agricultural innovations which reduce labor. Building on this, Maureen Miruka, Director for Gender, Youth and Livelihoods with CARE USA, pointed to the work that still needs to be done in shifting social norms towards equitable workloads.

Miruka spoke about the centering of women in her work at CARE USA, explaining the need for knowledge about gender needs at the household level. For instance, understanding how household assets are divided, decisions are made, and women access productive resources, help organizations more effectively meet the needs of women during crisis. Huyer also stressed the need for more research to support women producers to meet the quality and quantity demands of the market at moments of crisis.

As the development community continues to grapple with the realities of COVID-19, including the implications for entire systems, stakeholders have an opportunity to not only meet the needs of vulnerable populations, but to rethink the future.

Read more:

Partnership note: The role of the Self Employed Women’s Association (SEWA) in providing financial services to rural women: https://bit.ly/3rST0GT

Kathlee Freeman is a Communications Consultant with the Gender and Social Inclusion Research Flagship for the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).
Low emissions development (LED) policymakers, practitioners, researchers, and development organizations worked together to co-design research priorities, outputs, and impact pathways for greenhouse gas (GHG) mitigation impacts.

By Arun Khatri-Chhetri

Uptake of low emissions agriculture research outputs by policymakers and other stakeholders requires time. Even when researchers are interested in pursuing the scaling and use of research outputs, most are not incentivized to take this on. Allocating targeted resources and donor support, while involving science communicators and outreach specialists can be effective in overcoming constraints to delivering low emission development research to policymakers.

In Colombia, Kenya, and Vietnam, national low emissions development (LED) policymakers, practitioners, researchers, and development organizations worked together to co-design LED research priorities, outputs, and impact pathways for integration into the LED strategies for large greenhouse gas (GHG) mitigation impacts. Key users of the research outputs include national climate change units within ministries of agriculture and environment, producer organizations, and local governments.

The U.S. Department of Agriculture’s (USDA) Foreign Agricultural Service, with funding from the Department of State through the Enhancing Capacity for Low Emission Development Strategies (EC-LEDS) program, partners with the agriculture ministries and research organizations in Colombia, Kenya, and Vietnam. This capacity-building program developed several technical outputs, including activity data for fertilizer emissions estimates and mitigation potentials for cacao plantation (Colombia), climate-smart agriculture (CSA) data atlas, a CSA planning guidebook (Kenya), and national feed database and feed ration formulation tool (Vietnam).

The USDA EC-LEDS program partnered with the University of Vermont/CGIAR Research Program on Climate Change, Agriculture, and Food Security (CCAFS) to scale the use of these research outputs and evaluate opportunities for uptake of research into policy decisions in Colombia, Kenya, and Vietnam.

**Colombia: Fertilizer activity data used in the national inventory**

The research output targeting activity data related to fertilizer emissions estimation has contributed to improving Colombia’s National GHG Inventory. These data for Colombia are disaggregated by the amount of nitrogen fertilizer use by crops, areas, and sources. These data help to reduce the uncertainties in nitrous oxide emissions calculation associated with applied nitrogen fertilizer in the crops. The data for fertilizer also help in planning mitigation activities such as improving nitrogen use efficiency by changing the rates and methods of fertilizer application and agronomic practices.

As a result, the Institute of Hydrology, Meteorology, and Environmental Studies, responsible for improving the National GHG Inventory, has incorporated these data for fertilizer emissions estimation. The Ministry of Agriculture and Rural Development also included the data in its climate...
Farmer Rachael Njeri has started growing forage strips on her farm which prevent soil erosion and provide feed for her cattle.
change plans (PIGCCS-Agriculture in Spanish). The mitigation measures defined in PIGCCS-Agriculture are included in the nationally determined contribution (NDC) accountability. The updated plan highlights the importance of fertilizer use and emission reduction from the different crops in Colombia.

**Kenya: Data books support the development of County CSA programs**

Translating the Kenyan National Climate-Smart Agriculture Strategy into action at the local level is a key priority of government agricultural policymakers. Kenya’s Public Finance Management Act (2012) mandates that all counties develop a County Integrated Development Plan (CIDP) for budget management at the county level. A CIDP provides an overall framework for development. County CSA Action Plans are being integrated into the CIDPs.

The CSA planning guidebook and data atlas help to operationalize CSA into local adaptation and mitigation planning while building the capacity of sub-national agriculture development planners and extension service providers. The use of the CSA planning guidebook and data atlas in some counties has already shown potential for improved participatory and evidence-based CSA planning at the local level. The updated NDC recognizes the need for capacity building at the county level. Therefore, the value of the research outputs (CSA guidebook and data atlas) is evident for capacity building and CSA planning at the national level.

**Vietnam: Database and software for decreased livestock emission intensity**

The EC-LEDS research outputs in Vietnam were tailored to support the national Low Carbon Development Strategy
that identifies the actions necessary to achieve the emission reduction goal proposed in the country’s NDC. Improved feed for dairy cattle can have multiple benefits: improvement in milk or meat yield and production efficiency, as well as reduction of GHG emission intensity from the dairy sector. The Ministry of Agriculture and Rural Development participated in developing the national feed database and customizing the ration formulation tool through the advocacy of the research activities, including meetings and workshops with the key actors in the livestock sector. Vietnam’s NDC update and submission to the Subsidiary Body of Scientific and Technological Advice recognized improved feed formulation for the low emission feed management in the livestock sector. This recognition supports the planning and implementation of mitigation options in livestock.

**Key lessons**

Co-develop and action planning among scientists, policymakers, and implementers results in better integration of research outputs and LED decision making in the country and extends the impact of each research and capacity building initiative. Outputs such as activity data, emission factors, technical options, and tools, databases, knowledge portals, and guidance are needed to improve LED decision-making. However, research institutes need to include this outreach phase in their programs explicitly.

The USDA EC-LEDS’s bilateral partnership with the national governments and research organizations targeted technical assistance and building the shared knowledge base on low emissions development strategies. Evidence-based decision making is critical to ensure LED strategies, NDC updating, implementation, and national inventories track emissions accurately to support national reporting and identify high-impact opportunities. There are many evidence gaps related to LEDS and capacity development, which need enhancing research outputs and for decision makers to use them.

Read more:

Scaling up the use of low-emissions development (LED) research outputs in Colombia: https://bit.ly/3b4afzb
Scaling up the use of low-emissions development (LED) research outputs in Kenya: https://bit.ly/3078OJL
Scaling up the use of low-emissions development (LED) research outputs in Vietnam: https://bit.ly/300DHj7

Arun Khatri-Chhetri is an Agricultural Economist currently working for the Low Emissions Development Flagship of CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) based at the University of Vermont, Burlington, VT. He specializes in climate change adaptation and mitigation in agriculture, including scaling and impact analysis, capacity building, and outreach.
Combating a triple threat to Kenya’s food security

Improving food security requires partnership between private sector actors.

By John Recha and Oscar Nzoka

Climate change, unsustainable farming practices, and increased food prices due to supply chain disruptions caused by Covid-19 form a deadly combination that will exacerbate food insecurity in Kenya.

Changes in weather seasons, high frequency of extreme events such as floods, droughts, disease infestation and pest invasions like the desert locusts and army worms, are crippling the ability of most Kenyans to feed themselves.

Scientists attribute the causes of climate change to a number of human activities including deforestation, unsustainable livestock farming practices, improper use of nitrogen-based fertilizers, and poor manure management which increase the concentrations of carbon dioxide, methane, and nitrous oxide gases in the atmosphere.

Adding to the threat is the pandemic, which until the recent phased reopening, has disrupted food supply channels because the country’s food system heavily relies on transportation to consumers and smaller retailers in urban areas.

The 2020/21 budget cut on the agriculture sector is also a threat amplifier that could jeopardize efforts towards attaining food and nutrition security in the country by 2022.

For example, potato is one of Kenya’s most important food crops after maize due to its nutritional value, high yields and relatively short growth periods of only about 90-120 days.

It has progressively become a valuable source of cash for small-scale farmers, cooperatives, SMEs and others along the value chain.

Potatoes generate considerable employment with over 800,000 farmers growing it, and an estimated 2.5 million people employed at various level of the value chain including inputs, production, marketing, processing, trade and consumption.

Despite its economic potential, potato yields have continued to decline due to erratic rains, floods, droughts and soil infertility.

This has also affected the quantity and quality of potatoes required by aggregators and processors.

The current average yield in Kenya is approximately eight tonnes per hectare, significantly lower than other African and global benchmarks at 20-40 tonnes per hectare.

This has reduced smallholders’ profitability and industry competitiveness.

Although, the highlands where potatoes are cultivated tend to have sufficient rain, its irregularity adversely affects yields especially when it fails to come during the crucial growing stage of the crop.

This is aggravated by poor farming practices such as shallow bed preparation, failure to plant in ridges, use of both inappropriate and inadequate quantities of fertilizer than is
Hindered by a lack of awareness and availability of expert guidance, small farmers continue to be exposed to climate-related risks eroding food security and overall crop resilience to climate change.

Improving food security requires partnership between private sector actors in various food value chains and government institutions to review and develop crop specific climate-smart training manuals and aids that will be used by extension service providers and farmers.

Climate-smart agricultural practices and access to certified seeds supported with extension services will more likely generate more productivity at farmer level, improve food security and ultimately lead to increased incomes at all levels of the value chain.

The increase in income will reinforce uptake of new technology and improved farming practices that will boost smallholder farmers’ resilience to climate change.

The Climate Resilient Agribusiness for Tomorrow (CRAFT) project is one of the interventions working in partnership with private sector actors and the government to provide climate-smart training manuals on good agriculture practices as well as certified short cycle potato seed suitable to the farmers in different agro-ecological zones.

The project also provides auxiliary services such as soil testing and mechanization in soil tillage technology to protect soil quality.

This piece was originally published in People Daily

John Recha is a Scientist, CGIAR Research Program on Climate Change, Agriculture and Food Security. Oscar Nzoka is a Climate Smart Innovation Advisor, SNV Netherlands Development Organisation.
Out & About

1. Participants at the *Scaling climate-smart agriculture in Eastern and Southern Africa for Resilient food systems* session as part of the Food & Business Research Conference on Scaling Insights for Sustainable Food Systems, organized by NWO-WOTRO, the Food & Business Knowledge Platform, and CCAFS. 2. Scientists from the International Maize and Wheat Improvement Center (CIMMYT), the Ethiopian Institute of Agricultural Research (EIAR) and CCAFS, speak live on radio broadcast for FANA Broadcasting Corporate in Ethiopia to provide climate forecasting for smallholder farmers. 3. Ethiopia’s National Meteorological Agency (NMA), under the support of the International Research Institute for Climate and Society (IRI), through the project *Adapting Agriculture to Climate Today, for Tomorrow (ACToday)*, is working with CCAFS to train different stakeholders by conducting staff training to improve the generation of reliable, timely and accurate weather and seasonal forecasts.

In our diary

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<tr>
<th>March</th>
<th>April</th>
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<td>15-19</td>
<td>Pledge now to transform</td>
<td>26-30</td>
<td>16th Session of the UN Forum</td>
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<td>2021</td>
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The struggle to halt food loss and waste amidst the pandemic | Food Tank: https://bit.ly/2Oi7zVq
Combating a triple threat to Kenya’s food security | People Daily: https://bit.ly/3e6fKiR
Tanzania, Kenya, Uganda agribusinesses secure Sh5 billion grants | The Citizen: https://bit.ly/3sCoaCv
Climate-Smart Agriculture: Why is it needed in developing countries? | SciencexMedia: https://bit.ly/3q7BxsO
Climate change and resilience in food systems | Vimeo: https://bit.ly/3b5VnAc
Further reading

CCAFS latest publications


GHG Inventory: Inventory of greenhouse gas emissions from cattle, sheep and goats in Ethiopia (1994-2018) calculated using the IPCC Tier 2 approach: https://bit.ly/3r7uQbu

Info Note: Review of policies and frameworks on climate change, agriculture, food and nutrition security in Rwanda: https://bit.ly/2OcdrjI


Journal article: Did ERA5 Improve Temperature and Precipitation Reanalysis over East Africa?: https://bit.ly/3q8GKAD


Journal article: Soil carbon sequestration potential of Climate-Smart Villages in East African Countries: https://bit.ly/3uL9Nh2

Policy brief: Building transformative change in Africa’s smallholder food systems: Contributions from climate-smart agriculture and agroecology: https://bit.ly/3sGQ3Js

Working paper: Climate change, agriculture, food and nutrition security policies and frameworks in Kenya: https://bit.ly/3qgAwid

Working paper: Rwanda Climate Services for Agriculture: Farmers willingness to pay for improved climate services: https://bit.ly/3bWgVyi

CCAFS Tools


**AgTrials** Large public repository of agricultural trial data sets, with different crops, technologies and climates. http://bit.ly/AgTrials


**MarkSim II Generator** Future location-specific rainfall series, based on a choice of General Circulation Models: http://bit.ly/MarkSimGCM


**Dataverse public portal** Full CCAFS data sets such as the baseline surveys from CCAFS East Africa sites that include information on farmers’ current adaptive practices. http://bit.ly/Baseline-Surveys

**Big Facts website** Get all the links on climate change, agriculture and food security: http://bit.ly/1gYWjWt

**Atlas of CCAFS sites** Browse colorful maps of CCAFS research sites in three regions: East Africa, West Africa and South Asia: http://bit.ly/1s5fwHd

**Core sites in the CCAFS regions** This portfolio includes brief descriptions of CCAFS core sites in East Africa, West Africa and South Asia, including coordinates of the sampling frames of the baseline surveys: http://bit.ly/1dKwrfG

**Adaptation and Mitigation Knowledge Network** Map-based platform for sharing data and knowledge on agricultural adaptation and mitigation: http://bit.ly/1kiEnng

**Climate Analogues** This is a tool that uses spatial and temporal variability in climate projections to identify and map sites with statistically similar climates across space and time: http://bit.ly/1pzmVhl

**Climate and Agriculture Network for Africa** This web-based platform seeks to link scientists with policy makers to address climate change, agriculture and food security issues in Africa. http://bit.ly/1BHmhG0

**CSA Roadmap: Ethiopia climate-smart agriculture roadmap:**


**GHG Inventory: Inventory of greenhouse gas emissions from cattle, sheep and goats in Ethiopia (1994-2018) calculated using the IPCC Tier 2 approach:**

https://bit.ly/3r7uQbu

**Info Note: Review of policies and frameworks on climate change, agriculture, food and nutrition security in Rwanda:**


**Journal article: COVID-19 and food security in Sub-Saharan Africa: Implications of lockdown during agricultural planting seasons:**

https://bit.ly/3bWQ6dH

**Journal article: Did ERA5 Improve Temperature and Precipitation Reanalysis over East Africa?:**

https://bit.ly/3q8GKAD

**Journal article: Political economy challenges for climate smart agriculture in Africa:**


**Journal article: Soil carbon sequestration potential of Climate-Smart Villages in East African Countries:**

https://bit.ly/3uL9Nh2

**Policy brief: Building transformative change in Africa’s smallholder food systems:**

Contributions from climate-smart agriculture and agroecology: https://bit.ly/3sGQ3Js

**Working paper: Climate change, agriculture, food and nutrition security policies and frameworks in Kenya:**


**Working paper: Rwanda Climate Services for Agriculture:**

Farmers willingness to pay for improved climate services: https://bit.ly/3bWgVyi