Digital Agri Hub

digitalagrihub.org

Collaborating organisations

Hosted on the Digitalisation for Agriculture or D4Ag dgroup, this eConversation has been organised by the Wageningen University and Research (WUR) in partnership with the Alliance for a Green Revolution in Africa (AGRA) and run by the Digital Agri Hub.

Antecedent

This eConversation has been preceded by a side event at the Africa Food Systems Forum in Kigali, Rwanda which took place on 2 September 2024. The side event has been co-organised by The EU Delegation to Rwanda, the Rwanda Ministry of Agriculture and Animal Resources (MINAGRI), Wageningen University and Research (WUR) represented by the the Digital Agri Hub and Smart Agri Hubs, AGRA, the EU-Support to Agriculture and Climate Action (SACA), the Rwanda Green Fund (FONERWA), IFC and CGIAR – The Alliance of Bioversity International and CIAT.

eConversation framework:
About Climate Smart Agriculture

Climate Smart Agriculture (CSA) represents an evolving and increasingly vital approach to farming that aims to enhance productivity, boost resilience, and reduce greenhouse gas emissions in response to the challenges posed by climate change. This approach is gaining momentum globally, driven by a combination of innovative practices, technological advancements, and supportive policies.

Across various regions, farmers are increasingly adopting climate-smart practices. For example, conservation agriculture techniques, such as no-till farming, cover cropping, mulching and crop rotation, are becoming more widespread. These practices not only improve soil health by enhancing water retention and reducing erosion but also play a crucial role in restoring soil fertility and sequestering carbon in the soil. Furthermore, integrated water management strategies, such as the use of efficient water delivery systems like drip or subsurface irrigation complemented by decision

support systems allowing for 'precision irrigation' like high quality weather forecasting, sensors and water measurement devices. These integrated solutions help conserve water and make crops more resilient to the increasing risks of droughts.

The role of technology in CSA is expanding rapidly. Digital agriculture tools, including sensors, drones, satellite imagery, and big data analytics, have the potential to revolutionise how farmers monitor their crops, predict weather patterns, and optimise the use of inputs like fertilisers and pesticides.

Government policies are playing a crucial role in supporting the adoption of CSA. Many governments have started incorporating CSA into their national agricultural strategies, offering incentives like subsidies for renewable energy adoption and funding for research and training programmes. International initiatives, such as the Global Alliance for Climate-Smart Agriculture (GACSA) and programmes led by the Food and Agriculture Organization (FAO), are promoting CSA on a global scale by providing platforms for knowledge sharing and capacity building. Public-private partnerships are also emerging as a significant force, bringing together governments, NGOs, and private companies to develop and disseminate climate-smart technologies. These collaborations are essential for scaling up the adoption of CSA practices.

Despite progress, **the picture is not necessarily rosy**, as we are observing the **rapid acceleration in the different manifestations of climate change**.

One wonders whether the sense of urgency to mobilise resources, develop appropriate solutions and... deploy them successfully, is really shared by all those who should be doing something.

Several challenges remain. Among the others what CSA solutions entail may be not clear enough. Tomaso Ceccarelli wrote a blog article for the Digital Agri Hub which tries, perhaps a little provocatively, to bring some order to this.

This is also a prerequisite for assessing CSA's functions and possible impacts.

More work is needed to better understand and then possibly overcome the challenges and barriers that remain in CSA solutions adoption and scaling, ensuring that all farmers, regardless of their location or resources, can access the practices and technologies that will enable them to thrive in the face of climate change.

As part of the **Africa Food System Forum**, held in Kigali from 2 to 6 September 2024, one of the side events was organised by Wageningen University and Research/ Digital Agri Hub, among others, on the topic '*Climate Smart Solutions: scaling pathways*.' Three insights from that discussion needs to be recalled and consider as the takeaways of the eConversation:

A. **Collaborative Efforts Are Essential to Streamline Investments in CSA:** No single actor in the D4Ag space can drive the transformation of CSA alone. Programme-based investment planning is required to boost sustainable partnerships. Sustainable partnerships are crucial to making a meaningful impact on food and nutrition security for small-scale farmers. Programme-based investments should focus on resource mobilization, fund management, programme design and coordination, and capacity building and development.

B. **Policy Support is Critical for Success:** Effective policy frameworks are needed to support the growth of climate-smart agriculture. These policies will enable successful partnerships and create a conducive environment for the sector to thrive. Out of 54 countries in the continent, only 15 countries currently have policy support for CSA.

C. **Prioritize Trust and Inclusivity in Digital Solutions:** For CSA-based digital solutions and services to be effective, they must build trust among farmers. This requires, for instance, translating knowledge and information into local languages and contexts. Additionally, ensuring the inclusion of women in these initiatives is vital for their success.

Taking stock of the above takeaways, with this eConversation The Hub intends to gather more evidence and facilitate further reflection, also based on cases that are proving to work, as an inspiration to actions needed for further adoption and scaling of CSA.

Questions

1. When it comes to adoption of innovative agtech and data-driven CSA solutions, a main cause indicated by several is the lack of trust by farmers. Do you agree, and in your view, what are the reasons behind this?

2. How could development actors intervene to counteract this growing gap in the adoption of innovative agtech and data-driven CSA solutions between suppliers and users (small-scale producers (SSP))?

3. Are you aware of CSA solutions and best practices addressing more specifically agroforestry, aquaculture, and livestock? And if so, what actions are needed to further scale innovative ag-tech and data-driven CSA solutions in agroforestry, aquaculture, and livestock?

Some Stats:

Starting date	Closing date
9 September 2024	**30 September 2024**

Number of posts	Number of contributors
43	**19**

New members
108

Summary of the exchanges

Root causes of lack of trust agtech and data-driven CSA solutions

The discussion about the adoption of innovative agricultural technologies and data-driven Climate-Smart Agriculture (CSA) solutions reveals a consensus around the issue of farmers' lack of trust, and various factors and various factors have been cited as contributors to this scepticism.

One participant in the eConversation emphasised that climate change is not the root problem but an outcome of poor management of natural and human resources, especially in agriculture. Technologies from industrialised countries, particularly those introduced in tropical regions, have worsened issues like greenhouse gas emissions and deforestation. There is a call for holistic solutions that address these interconnected global problems, with political will and leadership seen as essential to tackling these issues.

Several contributors noted that subsistence farmers, particularly those in developing countries, are rightfully cautious of costly new ideas. Farmers, who often live on very low incomes, may be sceptical due to past failures of new technologies, insufficient understanding, or hidden costs. Another common theme was the disconnect between immediate needs and long-term benefits. Farmers need practical, immediate solutions that improve yields or reduce costs in a given season, not promises of future returns.

Some highlighted the challenge of retention, pointing out that small-scale farming often lacks the margins necessary to absorb the costs of new technologies. Participants in the eConversation also recalled specific challenges for women and marginalised groups, who may be excluded from these innovations, further eroding trust.

It was suggested that solutions should be co-designed with farmers to ensure relevance, and that trust could be fostered by demonstrating value clearly and engaging local communities. Concerns about data privacy and the complexity of new technologies also contribute to the scepticism.

To sum up, according to the discussants, the scepticism small-scale producers exhibit toward innovative Agtech and CSA data-based solutions stems from factors like past negative experiences, lack of local relevance, immediate economic needs, exclusion of marginalised groups, and concerns about costs, complexity, and privacy. To overcome this, there needs to be a shift toward more inclusive, contextually appropriate, and farmer-centric approaches, coupled with an enabling policy environment, good governance and clear communication.

Addressing the gap in the adoption of innovative agtech and data-driven CSA solutions

The discussion around how development actors can address the widening gap in the adoption of innovative Agtech and data-driven CSA solutions between suppliers and small-scale producers (SSPs) yielded several key recommendations.

First, addressing the root causes of poverty is essential, as poverty limits SSPs' ability to adopt tested technologies. Policy development was another strong theme, with a focus on creating frameworks that support the development, rollout, adoption, and retention of innovative CSA data-driven technologies. This includes data protection regulations, privacy-by-design approaches, and clear data-sharing guidelines to build farmers' trust.

Reformed agricultural practices are also recommended to address the physical, social, economic, and environmental degradation that hinders adoption. An inclusive, user-centric approach should guide the co-design of solutions tailored to the specific needs of SSPs. Training, financial support, and peer-to-peer learning among farmers could further encourage adoption.

Impact assessments are necessary to measure the effectiveness of innovative CSA solutions, and the documentation of success (and failure) stories and challenges in local languages can help build trust. Unbiased, well-documented information on CSA solutions should be widely disseminated to inform farmers.

Organizing small-holder farmers into production organisations and offering strong support systems are important steps toward adoption and retention. Engaging younger farmers is crucial, providing them with opportunities to explore and implement Agtech solutions. Big data and analytics should be offered as a public good to provide free advisory services to farmers, while integrated systems and bundled solutions are recommended to support also those not online.

Additionally, community-level initiatives like low-tech, farmer-driven approaches were noted as effective in addressing global issues like climate change. The human factor is critical in agricultural innovation, and solutions must consider the psychological behaviours and motivations of farmers to ensure long-term success.

Scaling CSA solutions in agroforestry, aquaculture, and livestock

The discussion on scaling CSA solutions in agroforestry, aquaculture, and livestock highlighted several key insights, focusing on the need for tailored strategies to overcome challenges and leverage opportunities within these industries.

One of the central themes was the balance between adaptation and mitigation. While adaptation to climate change is critical for small-scale producers, mitigation should not be overlooked. In aquaculture, for instance, rising sea temperatures are affecting industries like shellfish and seaweed farming, and smallholders need immediate, tangible benefits from CSA solutions. Digital tools were suggested as a key avenue to deliver such benefits, helping producers respond more effectively to climate challenges.

A holistic and community-based approach to CSA, integrating agroforestry, livestock, and aquaculture into diversified production systems, was also emphasised. Income generation is crucial in these efforts, as poverty and limited financial resources often hinder the adoption of sustainable practices. Farmers are more likely to embrace CSA solutions if they can clearly see long-term economic benefits, making income a core element of successful programmes.

Digital tools, particularly GIS-based monitoring systems, were mentioned as effective in helping farmers manage resources and improve resilience. These tools, while generally applicable across various farming systems, must be adapted to suit the specific needs of small-scale producers in agroforestry, aquaculture, and livestock. Tailoring technology to the realities of these producers is essential for enhancing its usability and impact.

However, political and policy challenges remain significant obstacles to scaling CSA solutions. The lack of political will and the influence of powerful lobbyists favouring high input, monocultural production systems continue to stifle progress. To overcome this, stronger policy frameworks are needed to support sustainable, diversified farming practices, along with efforts to challenge the entrenched interests that maintain the status quo.

It was noted that most digital Agtech providers focus predominantly on crop farming when developing CSA solutions. This is likely due to the clearer and more immediate business cases in crop farming, where solutions can demonstrate short-term yield improvements or cost reductions within a single growing season. Conversely, agroforestry, aquaculture, and livestock face unique challenges, such as longer production cycles and more complex ecosystems, making it harder to showcase immediate benefits. Additionally, these industries are highly fragmented, with significant variation in species, practices, and local environmental factors, complicating the scaling of universal solutions.

The exchanges around this topic saw lower engagement, potentially due to the perception that the sectors at stake are more difficult to digitalise. Challenges such as real-time data collection and high environmental variability make it harder for Agtech providers to create scalable solutions. Furthermore, the lack of proven business models for CSA innovations in these areas may explain the hesitance of tech companies to engage deeply with smallholders in these industries.

Recommendations resulting from the exchanges

The discussion on the lack of trust in Agtech and data-driven CSA solutions identified key factors contributing to farmers' scepticism. These include negative past experiences, insufficient local relevance, immediate economic needs, exclusion of marginalised groups, and concerns about costs, complexity, and data privacy. Farmers, particularly in developing regions, are wary of costly technologies that fail to address their immediate needs. To build trust, it was suggested that solutions should be co-designed with farmers, tailored to their contexts, and demonstrate clear value through local engagement and practical benefits. Addressing poverty, a significant barrier, is essential for increasing adoption.

To counter the growing adoption gap in Agtech, several recommendations emerged. Addressing the root causes of poverty and creating supportive policy frameworks are essential, especially policies focused on data protection, privacy-by-design, and clear data-sharing guidelines. Agricultural reforms should reverse degradation and focus on co-designing solutions with small-scale producers. Training, peer-to-peer learning, and financial support for farmers are critical to promoting adoption. Impact assessments, local-language documentation of success and failure stories, and the dissemination of unbiased information can further build trust. Additionally, organising small-holder farmers, engaging younger farmers, and offering bundled solutions and advisory services through big data can help bridge the gap. Integrated systems can support farmers without access to online resources.

The discussion on scaling CSA solutions in agroforestry, aquaculture, and livestock revealed the need for tailored strategies. Adaptation to climate change remains critical, but mitigation must also be prioritised. Farmers in aquaculture and livestock need short-term, tangible benefits, and digital tools could help manage resources more effectively.

Shared Resources
Cited literature:

- Almond l., Dubois F. and Halliday P. 2022. Forests for Climate: Scaling up Forest Conservation to Reach Net Zero. White Paper. World Economic Forum. https://www.weforum.org/publications/forests-for-climate-scaling-up-forest-conservation-to-reach-net-zero/
- Ceccarelli, T., Chauhan, A., Rambaldi, G., Kumar, I., Cappello, C., Janssen, S. & McCampbell, M. 2022. Leveraging automation and digitalization for precision agriculture: Evidence from the case studies. Background paper for The State of Food and Agriculture 2022. FAO Agricultural Development Economics. Technical Study, No. 24. Rome, FAO. https://doi.org/10.4060/cc2912en
- FAO. 2013. Climate-Smart Agriculture Sourcebook. 570 pages. FAO, Rome, Italy https://openknowledge.fao.org/handle/20.500.14283/i3325e
- FAO. 2019. Climate-smart agriculture and the Sustainable Development Goals. 144 pages. FAO, Rome, Italy. https://openknowledge.fao.org/handle/20.500.14283/ca6043en
- Leakey, R.R.B. 2020. A re-boot of tropical agriculture benefits food production, rural economies, health, social justice and the environment. Nature Food 1: 260-265. https://www.nature.com/articles/s43016-020-0076-z
- Leakey, R.R.B. 2024. A multifunctional future for tropical agriculture: scoring multiple sustainable development goals Simultaneously? Agriculture for Development. 47: 22-46. https://www.researchgate.net/publication/380493213_A_Multifunctional_Future_for_Tropical_Agriculture_Scoring_Multiple_Sustainable_Development_Goals_Simultaneously
- Leakey, R.R.B. et al. 2022. The future of food: domestication and commercialization of indigenous food crops in Africa over the third decade (2012-2021), Sustainability 14:2355. https://www.mdpi.com/2071-1050/14/4/2355
- Pisano M. 2017. Climate-Smart Agriculture Sourcebook Summary - Second Edition. 56 pages. FAO, Rome, Italy https://openknowledge.fao.org/handle/20.500.14283/i7994en