

# PRODUCERS DIRECT

BY FARMERS  
FOR FARMERS



# DIGITAL FARM

## Final Report

## December 2019

## **Project Title:**

Digital Farm (Contract: 7187208)

## **Date:**

13 December 2019

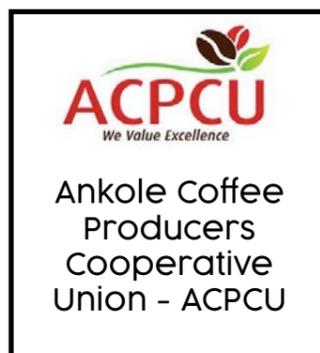
## **Lead Organisation:**

Producers Direct

## **Collaborators:**



## **Producer Organisations:**



## **Countries:**



Uganda

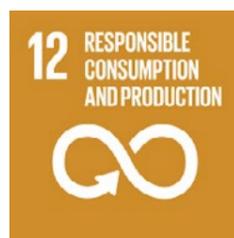


Kenya



Tanzania

## **SDGS**



## **PROJECT GOALS**

The goal of our project was to share and integrate past, current and future climate, sensor, satellite, farmer-generated, and farm-level data to produce comprehensive datasets and farmer-friendly, dynamic dashboards and visualisations for smallholders.

We will empower farmers with intelligence needed to make data-driven climate decisions at the farm level, promoting improved sustainable farming practices, increased food and nutrition security, strengthened resilience, and improved livelihoods and resilience.

## **DATA TYPES & TECHNOLOGY USED:**

Climatic data was collected via the NEXO weather stations. IoT M2M SIM cards were utilised to maximise the ability to send data in remote environments. Due to challenges in connectivity we are looking to partner with local network providers such as safaricom so we can ensure data is transferred more consistently.

To validate producer's perceptions about observed climate changes, CIAT developed bioclimatic variables with trends in coffee regions that could potentially have a biophysical impact. As a data basis we used Terraclimate interpolated monthly climate data for temperature, precipitation and potential evapotranspiration. For each cropping year, we derived 31 bioclimatic variables that describe annual and seasonal patterns. We defined the cropping year to start with the three months that are the driest of the year on the multi-decadal average and the following 9 months.

In addition, we worked with the Climate Hazards group Infrared Precipitation with Stations (CHIRPS) data set to better understand more detailed perceptions of farmers, such as length, and onset of the rainy season. CHIRPS uses satellite estimates of precipitation to improve interpolation skill in sparsely gauged locations. This data set provides daily estimates of rainfall can be used to describe fine scale shifts over the last three decades.

FarmDirect is built as a Progressive Web Application developed using Laravel Framework and Vue.js. The Laravel Framework is used for the back-end while vue.js is used for the front-end. FarmDirect's database is SQL and to support our use of DevOps, we host the entire infrastructure in a Virtual Private Hosting.

## **EXECUTIVE SUMMARY**

As our project comes to a close, we are proud of what we've achieved as a team. We set out with an ambitious target to identify, generate, integrate, and share multiple sources of data with smallholders, empowering them with data, information and knowledge to make climate-smart decisions.

We worked in partnership with the International Centre for Tropical Agriculture (CIAT), Climate Edge, and 4 coffee and tea cooperatives / Producers Organisations in East Africa. Although we are a diverse group of partners - a UK-headquartered charity with a branch office and team in Nairobi, 4 East African smallholder-owned cooperatives, a UK-headquartered tech startup, and a scientific research and development organisation, we worked together productively and were able to harness each others strengths to have a positive impact on smallholder farmers.

### **Key achievements included:**

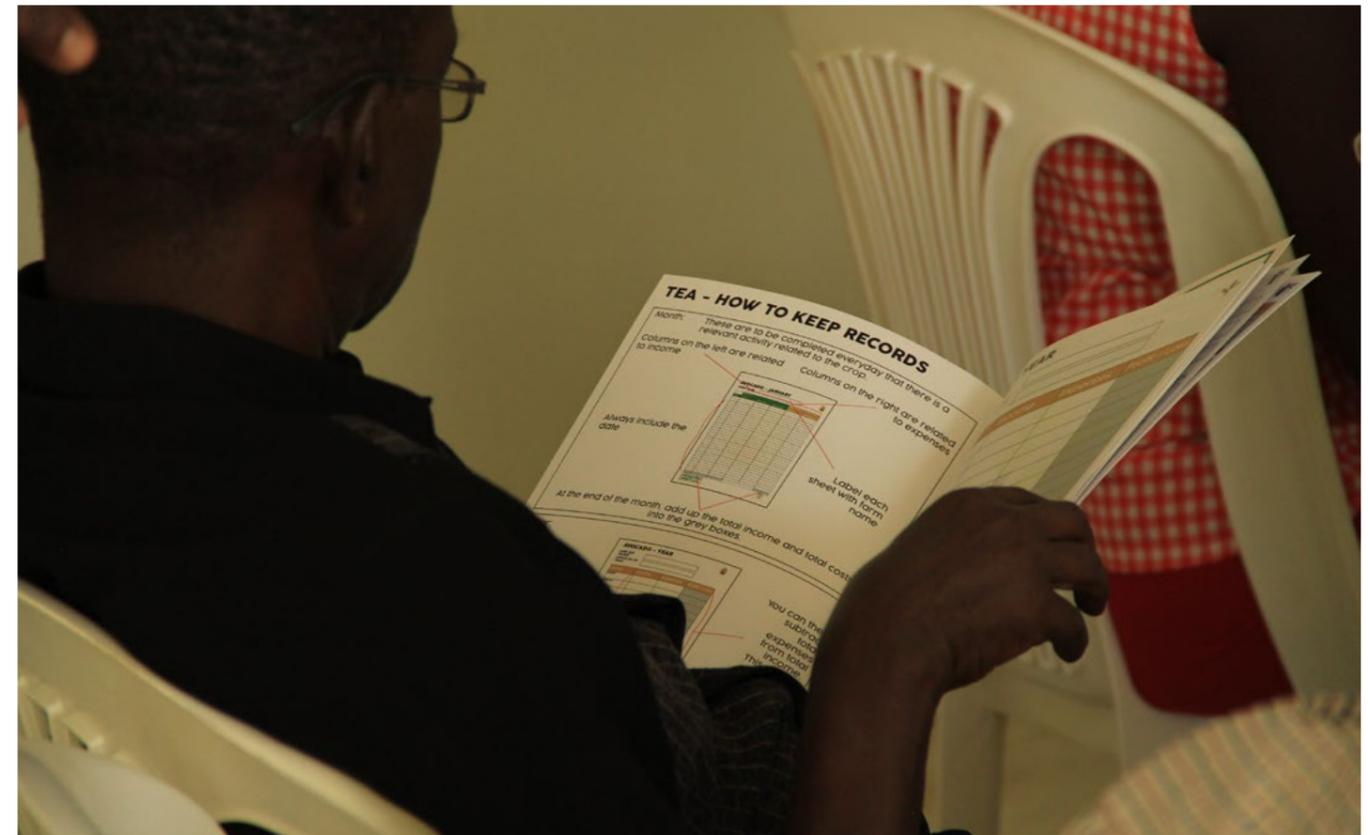
- Training Lead Farmers on prototype of digital record keeping app, and installation and use of Climate Edge's Nexo Weather stations.
  - Producers Direct worked through its network of Lead Farmers across its Centre of Excellence network in East Africa to upskill smallholders on utilising the analogue and a digital version of logbooks, enabling smallholders to generate and utilise their own data, whilst having more holistic farm views across multiple crops to make climate-smart decisions.
  - Producers Direct and Climate Edge installed 20 on-farm NEXO weather stations in Kenya and Uganda, recording real-time climatic data.

- Producers Direct developed farmer friendly training materials and upskilled Lead Farmers, Smallholders and Youth Agents on how to use and scale-out digital logbooks.
  - 394 people are now actively using our logbooks/FarmDirect App and are empowered to make climate-smart decisions.
  - Our user-centre developer based in Nairobi continues to liaise with a network of Youth Leaders to ensure logbooks are accessible and sharing relevant data with smallholders.
  - Since January 2019, 4,126 smallholders have been directly trained (indirectly benefiting 16,504 people) in Kenya, Uganda and Tanzania on key areas including:
    - Digital tool access and use to catalyse climate-smart decision making.
    - On-farm diversification to strengthen resilience to changing climates and decrease dependence on a single cash crop.
    - Crop quality and yields (tea, coffee) paired with climate-smart agricultural practices. This training is now responding to lessons learnt from the logbooks, Nexo weather stations and key information from the 5Q calls, PICSA workshops and historical data from CIAT, ensuring our trainings are relevant and responsive to smallholders' needs and climatic trends.
    - Climate adaptation and resilience. Lead Farmers are scaling-out climate adaptation and environmental sustainability trainings promoting climate smart practices and sustainability.



- Household level profiles developed by CIAT including resource-specific adaptation options responding to specific challenges. CIAT developed portfolios addressing climate related on-farm challenges and the potential impact of various adaptation options for smallholders. After the initial PICSA workshop and the development of the household level profiles, CIAT conducted follow-up workshops with lower-resource smallholder coffee farmers in Uganda (noting the first workshop focused on working with Producers Direct's network of Lead Farmers in Uganda) to assess and develop further resource-specific adaptations for farmers with multiple resource levels. Producers Direct will now work with CIAT to ensure these key learnings are embedded into future trainings at ACPCU and across Producers Direct's wider network. In sum, the followup PICSA workshop repeated the initial workshop with local, lower-resource farmers from multiple districts. Please note the report for the follow-up workshop will be sent with the final report.

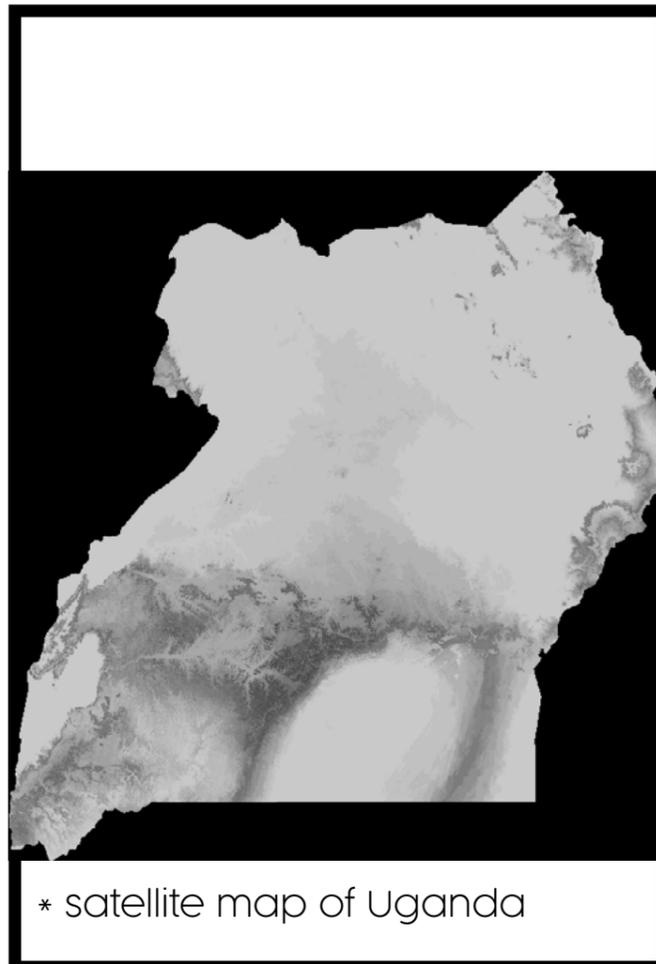
- Conducted 3 sets of 5Q phone calls with 200 Ugandan smallholders. The 5Q approach is a rapid way to check realities and perceptions of smallholder farmers. A set of 5 questions is asked (via phone calls), with the average call lasting just over 3 minutes, placing limited burden on smallholders. CIAT, Producers Direct and ACPCU conducted 3 sets of 5Q calls focused on specific climate adaptations to strengthen resilience, sustainable production and incomes.



- Open sourced complex datasets based on data from various public and private sources, including citizen (farmer) generated mobile data, geospatial and satellite data, sensor data and farm-level data. We provide more details below about the benefits of integrating multiple data points to support cooperatives and their smallholders to increase resilience to climate change, along with the benefits of working across diverse partners to aggregate data and information.
- Farmer-friendly, dynamic dashboards (available online and offline), inspiring smallholders to make smarter on-farm decisions to strengthen resilience to changing climates.
- Publication and dissemination of reports generated by project to key stakeholders, including CIAT and IITA.
- Effective working relationship across consortium partners. Working across a diverse network of partners enabled us to aggregate key data points and to share and learn across the network, providing more valuable insights to cooperatives and smallholders.

In sum, Digital Farm worked across a diverse network of partners to generate, share and integrate multiple data points, producing comprehensive datasets and farmer-friendly dashboards and visualisations for smallholders, empowering them to strengthen resilience and make climate-smart decisions at the farm-level.

| Farmer             | Plot Name |
|--------------------|-----------|
| Paul Tirop         | Farm      |
| MICHAEL SAWE       | Etc932    |
| Pius Rono          | Etc934    |
| Lawrence Kipkurgat | Etc936    |
| Mark Mitei         | Etc937    |
| Shadrack Kosgei    | Etc938    |



| Producer Group                            | Membership No | Age      | Gender |
|---|---------------|----------|--------|
| KAYONZA                                   | 28            | 36 years | male   |
| SIREET OEP                                | 048           | 24 years | male   |
| SIREET OEP                                | 017           | 35 years | male   |
| Rungwe Smallholder Tea Grower Association | 58009         | 48 years | male   |
| Rungwe Smallholder Tea Grower Association | 12198         | 58 years | male   |
| Rungwe Smallholder Tea Grower Association | 111199        | 51 years | male   |
| KAYONZA                                   | 011           | 33 years | male   |
| Rungwe Smallholder Tea Grower Association | 690751        | 48 years | male   |
| ACPCU                                     | 512           | 30 years | male   |

## OPEN SOURCED COMPLEX DATASETS

BASED ON DATA FROM VARIOUS PUBLIC AND PRIVATE SOURCES, INCLUDING CITIZEN (FARMER) GENERATED MOBILE DATA, GEOSPATIAL AND SATELLITE DATA, SENSOR DATA AND FARM-LEVEL DATA

In this project we demonstrated the ability to integrate a range of data types at multiple scales.

At the cooperative level farmer name, national ID, farm outgrower references and GPS coordinates are collected for the purposes of certification. These unique IDs were uploaded onto Climate Edge's software for over 10,000 farmers and formed the foundation for integrating the various datasets.

Climatic data collected using the NEXO was linked to specific plots as identified by the outgrower number. The national ID forms the basis of integrating this high scale data with the high resolution data on on-farm financial and farming activities, collected in the logbooks/ FarmDirect App. While the integration has not been completed for all farmers using the FarmDirect app, Climate Edge has built the API necessary to link the datasets and we are conducted initial tests of this deployment.

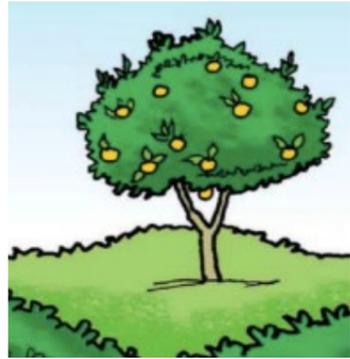
The satellite maps can be integrated in two forms and we are currently testing which has more value to the farmers and the cooperatives. The simplest form is making the maps available via Climate Edge's document storage software. This allows the maps to be made available to all cooperative staff in a central location. A second option is overlaying the plot locations on the maps. We are currently testing whether this affects decision making.

### Please find attached:

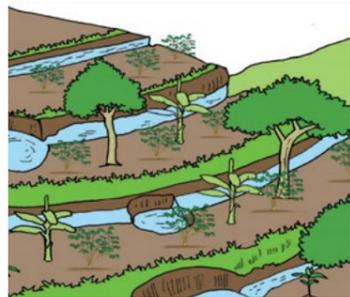
- Published Policy Brief from CIAT
- Workshop Report by Theresa Liebig (formerly IITA) & Christian Bunn (CIAT): Evaluating Needs for Applying Climate Smart Practices & Climate Services for Organic Robusta Coffee Systems in Bushenyi, Uganda - please note this is a followup report (and workshop) to what we shared from IITA in prior reports.

## UPDATE ON 5Q

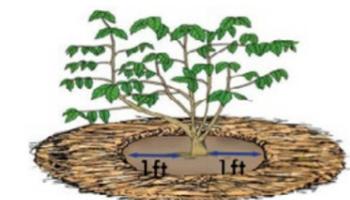
We conducted 3 sets of 5Q phone calls focused on the below adaptations:



- **Shade Trees:** We learned that in the last year, over 80% of farmers had implemented shade trees on their farm as a way to mitigate the impacts of changing climates, improve production and quality and strengthen household incomes. The key impact reported by farmers was better soil retention (65%) and more productive plants (26%). Another key learning is that over 80% of farmers would like more information about shade trees, which is critical data for Producers Direct and their cooperative partners to know and integrate into in-person training for resilience strengthening. The final key learning was 70% of farmers reported they needed increased financing to plant shade trees (to purchase seedlings), another key learning for cooperatives and Producers Direct who provide low-interest loans. It's also key to identify the connection between training and adoption, as oftentimes financing is a key barrier.



- **Terracing:** 83% of smallholders had adopted terracing in the last year, with 63% reporting this led to improved soil retention. 100% of smallholders said they needed more information about terracing, again a key data point to integrate into on-farm training.

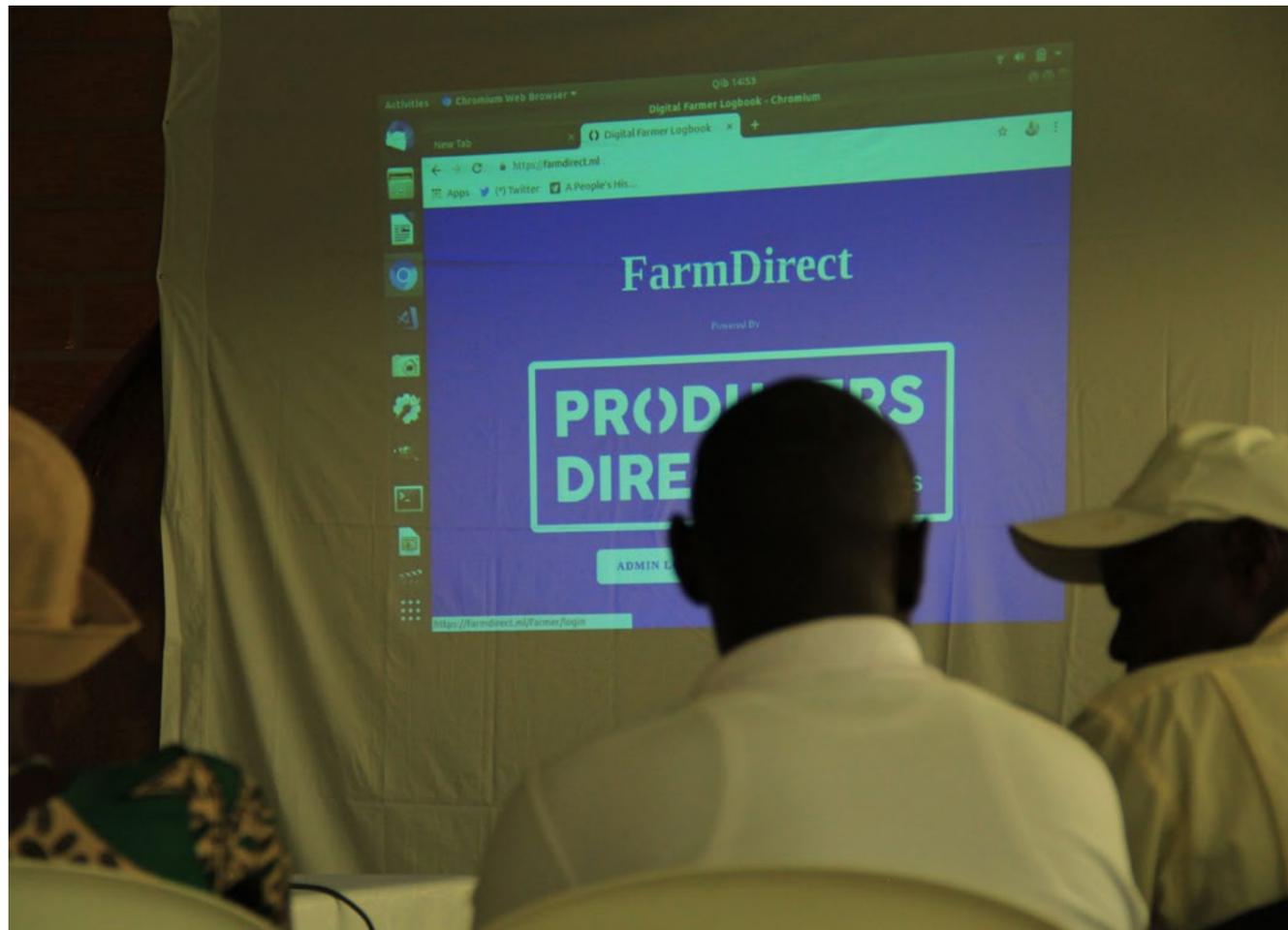


- **Mulching:** Although over 95% of farmers had heard about mulching, only 70% of farmers had adopted mulching on their farm in the last year. 100% of farmers said they needed improved financing to adopt mulching at the farm level, demonstrating the importance of accessing financing to make on farm adaptations to strengthen climate resilience.

## NEXOS:

We installed 20 on-farm NEXO weather stations in Kenya and Uganda. The NEXOs are providing real-time data information that is being integrated into our FarmDirect App and empowering smallholders to analyse data to make better decisions. As we've referenced in earlier reports, the key challenge we are facing with the NEXOs is connectivity and data transfers. We have faced significant challenges in Kenya with Sireet's smallholders that are directly linked to local connectivity. Climate Edge recently installed an additional 10 stations in Kericho, which is close to Nandi Hills (where Sireet is located) and these stations are seamlessly transferring data. Climate Edge is now looking into connecting with local mobile providers, including Safaricom, who have developed IoT SIM cards to improve connectivity, this may solve the problem. Climate Edge is also looking at working with Microsoft who are developing novel connectivity solutions (such as TV white space). Fully resolving this challenge is likely to require extended research.



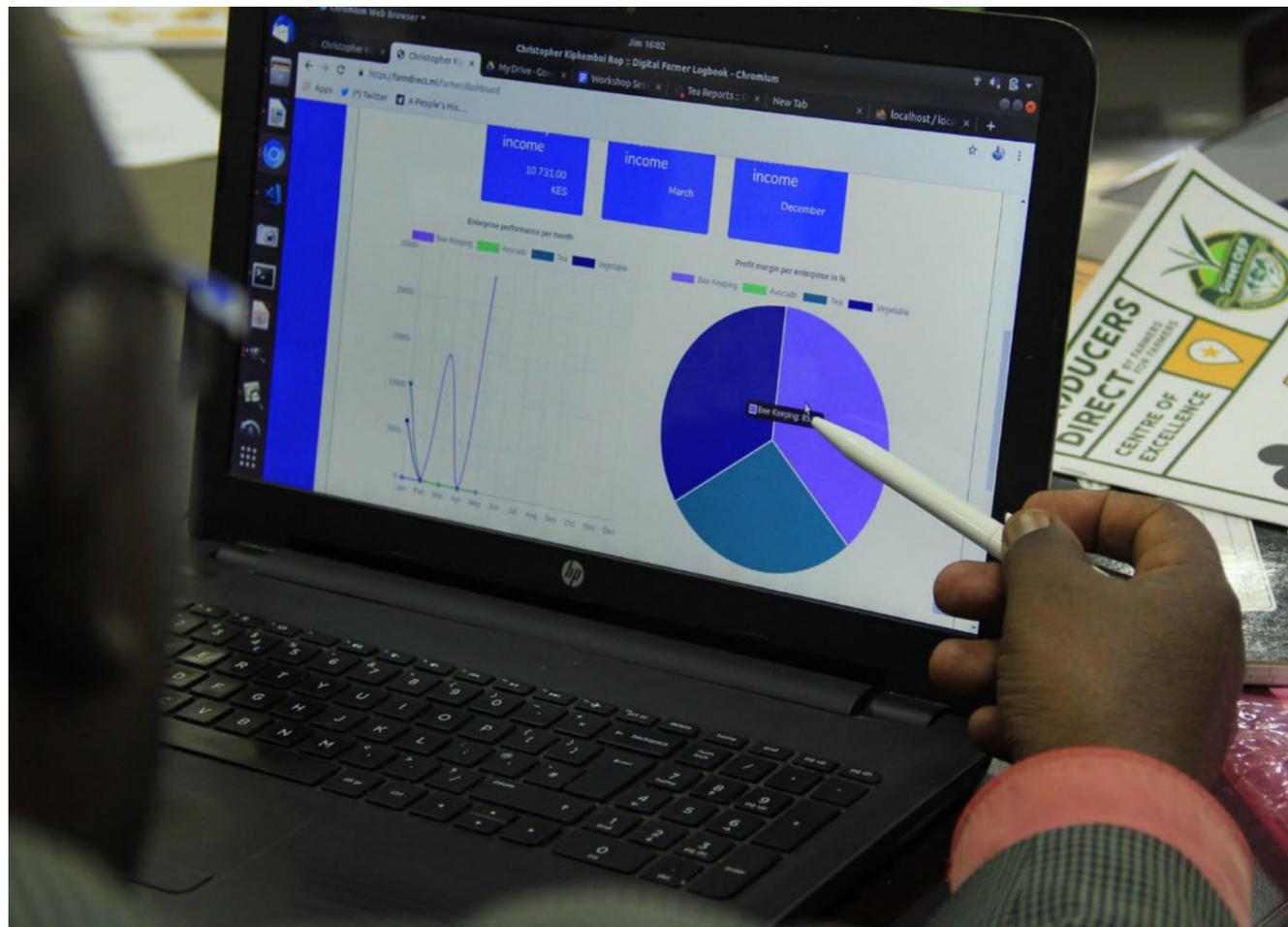


## FARMDIRECT APP (LOGBOOKS) & DYNAMIC DATA DASHBOARDS

In our app, FarmDirect, we now have farmer-friendly, dynamic dashboards available online and offline that smallholders and Producer Organisations can use to strengthen decision making and to build resilience to changing climates. To date, 394 smallholders are using the dashboards in analogue and digital form, supported by young people.

The data produced by dashboards is critical for smallholders and their Producer Organisations to prioritise decision making at the farm level and to decide what training is needed to support smallholders to strengthen resilience to climate change and make on-farm adaptations. Currently, our FarmDirect App enables smallholders to:

- Track the profit and loss across multiple on-farm enterprises (i.e. coffee, tea, honey/beekeeping, poultry, dairy, mango, avocado, fruits/vegetables), enabling farmers to visualise and understand which on-farm enterprises are making a profit, and if any are loss making. We are working to identify the 'ideal' number of enterprises to ensure smallholders are profit-making, and resilient to climate change (with limited dependence on a sole cash crop).
- Access a portal where farmers can access further information and data. For instance, farmers can access information from weather stations or other external data-sets. This means that data is built so farmers can access and understand it to improve decision making. Further, data is generated by farmers - and owned by farmers, empowering them to generate, analyse and utilise their own data for smarter decision making for strengthened resilience.



Smallholders with limited connectivity are able to see offline versions of data visualisation and dashboards presented to them by Youth Agents who are able to visit farms showing screenshots and/or printouts of the dashboards to farmers.

## Responses to Output Indicator Questions:

Have there been any final results or outcomes in which data or methods have allowed data to be produced: faster; more cheaply; at a higher resolution or granularity, or where there was no data before? If yes, please describe.

- **FarmDirect:** As we continue to adapt and improve our FarmDirect App, we are now in a position to utilise the app to capture survey data including household level livelihoods data, which would typically depend on an extension team member or member or an INGO to travel to the field and to farmers' farms to collect data. Now this information can be input by a farmer (or facilitated by a Young Person until connectivity challenges are addressed). Because youth are already traveling to farmers farms for other reasons (to support with digitisation and to collect products for market sales), this is not adding an additional trip and we are working within established systems. Thus, data can be collected faster and more cheaply. We are currently collecting survey data from roughly 400 farmers utilising the App.
- **NEXOs:** When the NEXOs have been able to collect data they have produced an extremely high resolution, rich dataset. For example, the chairman of Sireet now has access to over 6 months of temperature, humidity, light intensity and soil temperature data. This information is simply not available through alternative means.

Has the project contributed to the production and/or use of data disaggregated by a) sex b) disability c) age, d) geography (or other)? If yes, please summarize the of types of disaggregations and the context.

- As mentioned in prior reports, we are aware of the sex, age, geography and disability of farmers we are collecting data from – noting that we are not currently working with/collecting data from disabled farmers. We have detailed information on the farmers using the logbooks and those who now have weather stations on their farms including: age, sex, geography, income, crops (including diversification crops), and family size/dependents.

Has the project contributed to the use and/or production of gender statistics? If yes, please describe.

- As stated in prior reports, DigitalFarm has not contributed to the use and or production of gender statistics. Logbooks are collecting data from women's farms. And the NEXO's are installed on female-head-of-household farms, but we are not doing any specific analysis of the data as it links to gender/sex. We could potentially look at analysing the women's data against other farmers, but this has not been part of the project. As mentioned before, we are committed to working with and empowering women (including young women) with equal access to digital tools and data for decision making. Currently, 5 of the 20 Nexos are installed on women's farms.



# Lessons Learnt

## Overall:

- Farmers respond well to data when it is presented in farmer-friendly formats and links to broader farmer-facing models (our digital tools and data are embedded into a larger farmer-led model blending data, digital tools and in-person support services), ensuring data is used effectively and is accessible to smallholders.
- Data literacy amongst smallholders is limited, thus heavy investment in ensuring digital tools and data can be used effectively is needed. Currently, our digital tools are dependent on an agent based models (youth agents), in this case cohorts of youth to support smallholders to understand and utilise the data for smarter decision making. This is linked to digital literacy and limited access to smartphones (dashboards and data are best accessed via smartphones) and most smallholders have non-smart phones.
- Data alone can not solve all the problems - or even just the climate problems - facing smallholder farmers. Having a digital and in-person system provides additional support.
- Ensuring the data that is generated, analysed and integrated into dashboards and visualisations is accessible and relevant to smallholder farmers is paramount. A priority is to ensure that all lessons learnt and data collected is shared back with cooperatives and smallholders to promote behaviour change and to improve in-person training systems to strengthen resilience and promote climate-smart decision making.
- Employing Human Centred Design is paramount when developing and utilising digital tools intended to benefit smallholder farmers. We have found that employing HCD takes a very long time, yet this is key time to spend with farmers to ensure systems respond to their needs and will be adopted and used to catalyse behaviour change. When tools are developed in isolation they do not work, which is why we've seen so little uptake of ICT4Ag tools. Thus, we are grateful to our donors for enabling and allowing us to move slowly and learn with this system, ensuring we build something sustainable that will have lasting impact and scale.

## NEXO Weather Stations:

- NEXO weather stations are easy to set up and use for smallholders, and the data produced is relevant and helpful for smallholders. The key lesson learnt here is that although the NEXOs are easy to setup and use, we are struggling to relay data linked to limited connectivity, as referenced in earlier sections and prior reports.
- As referenced in an earlier report, shipping, customs and import challenges posed initial delays to install the NEXOs in Uganda, yet we were able to address these problems to address the NEXOs in early November 2018. Looking forward toward scale, we'll need to work with Climate Edge to identify a more streamlined system to import or build the machines locally.
- Security - one of the NEXOs was damaged and a solar panel stolen (as mentioned in our interim report, noting no NEXOs have been stolen since). We are working through local Producer Organisation partners to address this and to protect the stations moving forward. We've also worked closely with Climate Edge to identify solutions looking forward to protect the equipment.



## **Logbooks/FarmDirect App:**

- Farmers value their data and the work done to help them organise and analyse their own information was very well received. Farmers' experiences in increasingly managing multiple enterprises in an effort to diversify has led to much more complexity on their farms. Farmers involved in the pilot have already been able to identify specific issues on costs and prices that can help them better manage their overall profitability.
- The paper-based logbooks enhance the feeling of farmer ownership over the data as well as enabling them to collect it in a form that is more familiar to them. Additionally, the in-person element of enabling youth agents to support farmers in data upload and analysis not only helps to bridge the gap for farmers without smartphones, but also builds relationships across generations and allows young people to learn more about - and seek more opportunities in- rural economies.
- Farmers understand digitised data best when it is their own information presented back to them in new ways and with additional. This means that the FarmDirect app has evolved over the course of the project to not only to help better analyse their own data but also to act as a portal through which to access larger and more complex data sets.
- The farmer-led design process, where farmers have taken the lead in designing and creating the data collection tools has led to a great deal of ownership and better degree of understanding of what the project is trying to achieve on the part of the farmers.
- More work needs to be done on visual design that can appeal to farmers but also that they can actually use to improve decision making. Farmers like graphs and charts, however they are not always clear on what to do with the information that is presented.

## **CIAT Work (PICSA, 5Q, Historical Weather Data):**

- The Participatory integrated climate services assessment approach is a highly useful tool to develop community based adaptation practices at farm scale and to develop clear recommendations for interventions to improve the uptake. We intend to further develop this tool and refine some of the steps. For example, we would like to better understand the financial and labour costs of certain practices.
- The 5Q approach was an easy to implement way to understand

the current adoption rates of key adaptation practices. Response rates were good and the generated data useful. In some cases, limiting answer option to yes/no reduces the insight because it does not allow to understand where practice adoption may be incomplete or incorrect.

- The use of historical weather observations and future projections was highly valuable to contextualize farmer perceptions. Perceptions about climate change were biased by events as recent as the last two years. Thus, to prioritize adaptive practices that are co-developed with farmers, the additional analysis of data is indispensable.

## **Partnership with Collaborators & Looking Forward:**

- Working through partners and aggregating complex and various datasets is complex and can be challenging, though pulling together various kinds of data will enable us to equip smallholders with the best data to improve farming.
- Our team was impressed by how well we worked together - across a tech startup (Climate Edge), Producers Direct (an INGO headquartered in London, with a team in Nairobi), CIAT (with team members across Germany and Colombia contributing to the project and links to IITA in Uganda), and 4 East Africa tea and coffee cooperatives. The project outcomes and impact has been impressive. We've achieved more than we thought possible, with commitments from all partners to take the work forward.
- We have a call scheduled with our two key contacts at CIAT in the New Year to discuss how to take this work forward, with particular reference to the 5Q calls conducted and the latest report from CIAT looking at resource specific adaptations. CIAT and Producers Direct are committed to continuing and scaling the work with other smallholders in the region.
- We are working with Climate Edge, Cervest and CIAT on the World Bank Agricultural Risk Financing project in South Africa, which we hope will be approved by the World Bank in the coming week. Off the back of that project, we will also be submitting a proposal to Innovate UK to support a similar project in Tanzania with tea and maize farmers, working with Cervest and CIAT. These partnerships and work would not have been possible without the partnerships, tools developed and knowledge gained from this initiative. We are also submitting a proposal with Climate Edge to Innovate UK to scale up work in Kenya, also utilising digital tools and supporting the digitisation of systems at the cooperative level.

# Risks

| <u>Risks Addressed</u>  | <u>Mitigation &amp; Management</u>   |
|---|--|
| Functionality of NEXO weather<br>Scalability of Digital Logbooks/FarmDirect<br>Appconsistency of data transfer) | New stations were developed and installed to address challenges. Unfortunately, this did not resolve all issues. The local connectivity - particularly in Kenya - proved to be the largest challenge. As mentioned in the report, Climate Edge is now looking at working with local service providers (Safaricom) to address these challenges.   |
| Scalability of Digital Logbooks/FarmDirect App  | As anticipated, scaling out the digital version of the logbooks (FarmDirect App) is dependent on an agent based model. Because of this, we've employed youth agents from rural communities, addressing both the challenges of scaling out a digital tool and youth under/unemployment in rural smallholder communities. The youth who are scaling out the digital tool have additional roles in supporting smallholders to interpret data and to aggregate/collect surplus produce while visiting farms. |



| <u>Risks Addressed</u>   | <u>Mitigation &amp; Management</u>  |
|--|---|
| Managing a large consortium with diverse partners from the public and private sectors. | Managing and working with our diverse consortium went well. Fortunately, we had prior experience working with Climate Edge. Although this was the first time we worked with CIAT and CIAT and Climate Edge's first time working together, we worked well together. Our first meeting together (Inception meeting) proved an excellent opportunity for team members to meet and work together in person. As a result of this project, we've continued to work together with Climate Edge on additional projects (with funding from Innovate UK - we won another award in December 2019). We have also submitted several additional funding bids in partnership with CIAT.  |
| Partnership with local Producer Organisations (farming cooperatives) in East Africa.   | Building on over a decade of experience working in partnership with a vast network of farming cooperatives/ Producers Organisations proved beneficial for this project. In East Africa, we worked with close partners who are also hosting Centres of Excellence. The close partnership was critical as we were testing and launching pioneering digital tools (NEXO weather stations, digital logbooks etc.) and had new partners (CIAT, IITA) traveling to visit partners. This all went smoothly because of our partnership with local partners and the development of annual joint work-plans with local partners. Further, our local programme team based in Nairobi supported in project design, delivery and monitoring. |

# Conclusions

- Our team worked in partnership with cooperatives in East Africa and smallholder farmers -men, women and youth to improve the way development data is produced, managed and used - with a focus on empowering smallholders and cooperatives to generate, analyse and utilise their data to strengthen resilience to changing climates.
- FarmDirect addressed and solved real problems, working at the grassroots level with farming cooperatives and smallholder farmers, with high representation from women and young people. We utilised advanced technology and digital tools, yet ensured the data generated was accessible and usable to smallholders, even those with limited digital literacy. We will continue to work with smallholders and their cooperatives to ensure the data we will continue to produce - and scale - is accessible to smallholders so they can make smarter decisions at the farm level to strengthen their resilience to rapidly changing climates.
- Our work will continue, sustain and scale long after the project has ended, as our work is embedded in local communities - promoting organic scalability. Further, we had positive working relationships with our diverse team of collaborators and partners, all of whom are committed to continuing to test, learn and scale project goals in East Africa and more widely in Southern Africa and Latin America.
- Digital Farm has supported - and will continue to support - smallholders to respond to climate risks by integrating multiple data sources and presenting them to smallholders in a personalised, accessible format. Smallholders have had - and will continue to have - opportunities to engage with data in meaningful ways and transition from being passive recipients of data to active designers of the very data systems intended to benefit them.

| Activity     | Who does it | Benefit to farmer                         | Benefit to extension worker/youth              | Investment Labour | Investment Money | Investment Time | Time to benefit | Risk           | Barriers          |
|--------------|-------------|---|--|-------------------|------------------|-----------------|-----------------|----------------|-------------------|
| Main harvest | Men         | SALE OF COFFEE                            | Proper decisions on what to do with the coffee | HIGH              | Low              | HIGH            | 3 MONTHS        | THEFT          | Low Labour        |
|              | Men         | BETTER PRICE                              | X/K  | Low               | Low              | Low             | 3 MONTHS        | THEFT          | THEFT             |
|              | Men         | HIGH YIELDS                               | X/K  | Low               | Low              | HIGH            | 1 YEAR          | Low PRODUCTION | LACK OF KNOWLEDGE |
|              | Men         | HIGH YIELDS                               | HIGH GAIN RATE - COFFEE TREE                   | HIGH              | HIGH             | HIGH            | 1 YEAR          | X/K            | Low Labour        |
|              | Women       | WOMEN BENEFIT IN THE SOIL                 | X/K  | HIGH              | HIGH             | Low             | LOW 3 MONTHS    | FIRE OUT BREAK | LACK OF MATERIALS |
|              | Men         | PROPER PRODUCTION OF MAXIMUM WITH MINIMUM | X/K  | HIGH              | HIGH             | Low             | LOW 3 MONTHS    | THEFT          | LACK OF MATERIALS |
|              | Men         | GOOD QUALITY                              | PROPER WATER                                   | HIGH              | HIGH             | Low             | LOW 1 MONTH     | THEFT          | LACK OF CAPITAL   |
|              | Men         | GOOD QUALITY                              | PROPER WATER                                   | Low               | Low              | Low             | HIGH 1 YEAR     | Low production | LACK OF MATERIALS |
|              | Men         | HIGH YIELDS                               | X/K  | Low               | Low              | Low             | HIGH 1 YEAR     | X/K            |                   |
|              | Men         | HIGH YIELDS                               | X/K  | Low               | Low              | HIGH            | 3 MONTHS        | THEFT          | LACK OF MATERIALS |

# PRODUCERS DIRECT BY FARMERS FOR FARMERS

This project, Digital Farm, submitted in response to the 2017 call for proposals by the World Bank's Development Data Group (DECDG) and the Global Partnership for Sustainable Development Data (GPSDD), is supported by the World Bank's Trust Fund for Statistical Capacity Building (TFSCB) with financing from the United Kingdom's Department for International Development (DFID), the Government of Korea, and the Department of Foreign Affairs and Trade of Ireland.

