INGREDIENTS FOR INNOVATION: THE EMERGING DIGITAL AGRICULTURE REVOLUTION IN KENYA
Digital Transformation in Agriculture

Pathways to Digital Interventions – Perspectives for More & Better Data for Transformation

Thule Lenneiye
ATO Coordinator
The Data & Digital Innovation of Kenya’s Agriculture Sector Data is anchored on the 10-year ASTGS, which aims to support 100% food security.

**ASTGS anchors and targets for first 5 years**

**Increase small-scale farmer incomes** of ~3.3mn households and impact ~15 mn Kenyans

**Increase food available year-round** by unlocking > 500,000 acres of agricultural production and agro-processing across priority value chains (~KES 400Bn GDP boost across economy)

**Boost household food resilience** especially for the most vulnerable (~ 4mn during emergencies, 1.3mn chronically):
- reduce by 100% the number of food insecure Kenyans
- reduce the cost of nutritious food

A vibrant, commercial and modern agricultural sector that supports 100% food security in the context of devolution by ensuring access and availability of nutritious food, at affordable prices for entire population.

The ASTGS identified 9 flagships to drive these outcomes. Detail follows.

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1 Over the past ~10 years, incomes have grown 35%, below the pace required to meet SDG goal of doubling incomes between 2016-2030. If incomes are 145k today (~KES 400/day), without transformation in 5 years should grow to 170k (~KES 465/day) based on historical trends. Transformation is estimated to contribute an incremental ~30% to 230k (~KES 625/day). 2 Assumes ~4.5 people per household.

**SOURCE:** ASTGS
Enabler FLAGSHIP 8 seeks to strengthen research and innovation and launch priority digital and data use cases to drive better decision-making and performance management.

To ensure that agriculture continues to play its critical role in socio-economic development, there is need for Data to provide insights and innovative technologies for overcoming challenges along the value chains and increase productivity.

The main activities to achieve this would include among others the Creation of an enabling environment for research and innovation with clear linkages between data, research and innovation.

Similarly, agricultural research and data is necessary for re-engineering agricultural systems to ensure resilience during emergencies such as COVID-19.
The ASTGS flagships must overcome 3 big challenges to ensure the right research, innovation and data is available to guide decision-making:

- Low investment in research and innovation space in agriculture, including big data and advanced analytics (AA)
- Poor access to useable and shareable data;
- Insufficient demand for quality analyses to support evidence-based decisions on performance management, monitoring and evaluation, research and policy

A more targeted approach to research and innovation will improve data collection, data analysis and ultimately create more links between research and action on the frontline and informed decision making.
# Digital Strategy – 7 Digital Use Cases

## ASTGS Anchor

<table>
<thead>
<tr>
<th>Increase SSF income</th>
<th>Boost household food resilience</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Accelerate farmer registration and target eligible farmers with e-incentives, using digital tools and analytics to improve tracking, and payment direct to providers&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3 Monitor emergency food reserve stocks with digital tools (e.g., 1D barcodes); then improve overall national Food Balance Sheet (FBS) data to determine future quantity of stock to buy (e.g., use satellite data, predictive analytics on production, trade, climate)</td>
</tr>
<tr>
<td>2 Improve farmer practices (e.g., input use) by providing farmers with customized e-extension that incorporates current and predictive data (e.g., agro-weather analytics, pest/disease trends, prices)</td>
<td>4 Make more dynamic trade and price stability decisions using the digital Food Balance Sheet &amp; an Early Warning System (EWS) for food price inflation</td>
</tr>
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<td>5 Improve value chain selection with an agricultural land optimization model&lt;sup&gt;2&lt;/sup&gt; that responds to specific outcomes (e.g., job creation, GDP contribution), and incorporates climatic expectations &amp; resilience data</td>
<td>6 Drive M&amp;E with a dashboard to streamline data collection, and verification of ~10 transformation KPIs&lt;sup&gt;3&lt;/sup&gt; linked to the use cases</td>
</tr>
<tr>
<td>7 Establish standards and protocols for a shared data platform to facilitate more evidence-based interventions across all players&lt;sup&gt;4&lt;/sup&gt;</td>
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</table>

## Cross-cutting support

- Drive M&E with a dashboard to streamline data collection, and verification of ~10 transformation KPIs<sup>3</sup> linked to the use cases

## Digital tools alone are insufficient to solve

All the challenges identified on prior page. But they will support more holistic solutions (see ASTGS flagships)

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1 Use case should start focused on existing farmer profiles from on-going government programs (e.g., KCSAP, NARIGP), as complete more holistic Huduma and National Census process for farmer registration | 2 Integrate yield, weather / climate and soil data | 3 For example, yield by commodity by location, compared to target | 4 Should start with government agencies (e.g., ZAMIS in Zambia), then expand to development partners and private sector players as establish data interoperability standards and protocols

**SOURCE:** Expert interviews, World Bank; Tegemo
Digital Transformation Roadmap

Data Integration
- Unified data platform
- Data governance framework

Reporting
- Data driven decision making supported by analytics and reporting

Information Security
- Data and security policies
- Access control management

Infrastructure
- Utilization of modern infrastructure & equipment

Capacity Building & IT Governance
- Setup digital transformation team (DTC)
Digital Transformation Committee

**IT Governance, Modern Workplace, Security Management & Infrastructure.**

**Monitoring & Evaluation Tools**

Farmer Registration, Sector Statistics, Data Governance & Architectures, and Unified Agriculture Data Platform (KUADP).

**e-Subsidy & e-Extension**

Digital Food Balance Sheet (DFBS) & Early Warning System (EWS).

Oversee implementation of IT roadmaps, architectures, standards, policies and solutions.

Dashboard tool for data collection, verification, and visualization.

Central farmer database, KUADP roadmap, sector statistics.

Unified e-Voucher system & national digital extension services.

Oversee implementation of DFBS & EWS.
Data Governance Framework

DATA GOVERNANCE FRAMEWORK PILLARS

Key Considerations
- Data Governance Council
- Data Privacy by Design
- Data Protection and Security Guidelines
- Data Protection Impact Assessment - DPIA
- Data Catalog, flow mapping, monitoring processes

Roles & Responsibilities
Privacy Standards
Policies
Processes & Procedures
Tools and Practices
Deliverable 1: COVID-19 FSWR engaged & coordinated ~50 stakeholders; KUADP brings this same model for coordination to Data & Digital Innovation.
Deliverable 2: E-Voucher Programme

1. MoALFI sets up cloud-based farmer database and e-incentive software at KALRO, with mechanism to integrate existing databases onto one e-incentive platform.
2. Agrodealers and extension service providers register with e-incentive program via smartphone application.
3. Farmers register with e-incentive program through agrodealers and extension service providers.
4. MoALFI and counties send e-voucher annually to phones of eligible farmers.
5. Farmer unlocks the incentive by communicating with extension officer who advises on best inputs (according to e.g. commodities and hyper-localized weather and/or soil testing).
6. Farmer matches incentive amount to unlock the incentive and buys inputs from agrodealer using e-voucher.
7. System automatically captures input traceability data (ideally all inputs are market with scratch/QR codes to eliminate counterfeit products).
8. KALRO sends annual USSD survey to farmer to record geo location and reported yield data.
9. Performance monitoring team at KALRO assesses impact of incentives against KPIs and draw insights from yield estimates and publishes reports.
10. MoALFI decision-makers use latest insights to target future e-incentives.
11. MoALFI updates targeting criteria on the e-incentive platform.

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1. Eligibility criteria may include e.g. farmers with <0.5ha land, <KES 160,000 income per year
2. E.g. KCEP CRAL and E-input subsidy (DigiFarm) programs
3. See proposed partnership framework
Deliverable 3: The Kenya Integrated Agriculture Management Information System (KIAMIS)

An information management platform based for provision of value add services.

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<thead>
<tr>
<th>Vision</th>
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<tr>
<td>Key Modules</td>
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<td>Farmer Registration</td>
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<tr>
<td>E-Voucher</td>
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<td>E-Extension</td>
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<td>Agricultural Statistics</td>
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<td>Food Security &amp; Early Warning</td>
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<tr>
<td>Others</td>
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<table>
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<tr>
<th>Key enablers</th>
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<tr>
<td>County enumerators</td>
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<tr>
<td>Unified subsidy system</td>
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<td>Devolved extension</td>
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<tr>
<td>Routine data collection</td>
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<td>Data &amp; Models</td>
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</tbody>
</table>
**Deliverable 4:** Kenya Unified Agriculture Data Platform (KUADP)

**Principles**
- Customer-Centric
- Adaptable
- Secure
- Smart
- Automated
- Simple
- Governed

**Design**
- End User Layer
  - Dashboards & Reports
- Data Sharing Layer
  - Rule Based Workflow
  - Data Exchange
- Data Storage Layer
  - Secure Storage of Data into Subjects
- Data Intake Layer
  - Real time data intake & data quality process
- Platform Management Layer
  - Platform monitoring and governance

**Pain fixed**
- Lack of traceability of impact of interventions
- Difficulty in seamless data exchange
- Mistrust in data sharing
- Duplicate data sources
- Inconsistent submission and update of data
Building Resilience in Ag Data & Digital Interventions:– What we Have Learned and What Needs to be Done

**Challenges & Solutions**

**Skills**
- Current level of skills are limited; both retooling & increased collaboration with the private sector required
- Support the development of national data systems, statistical capacity, and digital skills that enable countries to meet and monitor their priorities

**Enabling Environment**
- Steering Committees are temporary, there needs to be a more comprehensive enabling environment with our ICT counterparts & Private Partners
- National data strategies for collaboration on agri-food system data, including guidelines for data sharing and use, legal mandates, and the roles and responsibilities of different actors in the data value chain

**Collaboration/Partnerships**
- Longer term Partnerships and Collaborative interventions are required to support continued digitization & data automation within the sector
- An inclusive and multi-stakeholder approach that strengthens data governance and sharing, and establish mechanisms for feedback on data quality and dissemination mechanisms that ensure that information produced on agri-food systems meets users’ needs
Building Resilience in Ag Data & Digital Interventions: What we Have Learned and What Needs to be Done

Challenges & Solutions

Innovation
- Deploy more flexible engagements to allow for through-flow of innovations & innovators to and within Government

Sustainability
- Resource availability and realigning of budgets towards creating a robust digitally enabled work environment conducive for a Data Driven policy development
- Alignment of data collection and capacity strengthening activities by development partners with countries' priorities
- Explore options for improving donor harmonization on results-monitoring frameworks to avoid duplication and facilitate coordination
- Awareness among senior decision-makers within their organizations at the national and county levels on the value of data and the benefits of investing in robust national data and statistics systems
Thank You!
Structure of the Presentation

- Progress Overview - The Portfolio, Scale and Initiatives
  - Productivity Enhancement
  - Research – Extension Linkage
  - Data and Digital
  - Market Linkages
  - Community institutions and Mobilization
Portfolio

778 Million USD All 45 rural counties

National Agricultural & Rural Inclusive Growth Project (NARIGP) : 200 Million USD, Covers 21 counties

Kenya Climate Smart Agriculture Project (KCSAP) : 250 million USD, covers 24 counties

Emergency Locust Response Program, Kenya (ELRP) : 78 Million USD, Covers 15 Counties

National Agriculture Value Chain Development Project (NAVCDP): 250 million USD, Cover 26 counties
1.1: Productivity Enhancement

1.2 Million Farmers mobilized into approx. 50,000 Farmer Groups (15 to 25 farmers) across 19 value chains in 45 rural counties

19,000 Farmer Groups (approx. 350,000 farmers) have already received nearly 10 Billion KSH of Investments in the form of Micro Projects

Hybrid Extension Architecture consists of County Technical Teams, External Service Providers (NGOs and other agencies) and Community Extension Workers (called Lead Farmers/Community Facilitators – 22,000 of them)

300 investments at the county level related to NRM, SLM, Water and market infrastructure with the objective of enhancing productivity & market linkages
1.2 Research Extension Linkages- Investment at KALRO

• **900 Technologies Innovations and Management Practices (TIMPS) across 19 value** chains are ready for upscaling. 252 additional TIMPS are being validated and 140 likely to be released. These have been fully digitized and several of them are being disseminated to the counties.

• **Nearly 10,000 Trainer of Trainers** have been provided with training.

• **Aspiration is that each of the 1.2 million farmers** need to be provided with TIMPs training.

• Implementation of the **51 adaptive research projects (Crops Livestock, NRM, Socio-Economics)** is on in 24 counties and 286 wards. Hosted by **462 CIGs with a membership of nearly 20,000 farmers**.

• **250 CIGs are undertaking commercial seed production** across 4 value chains namely Potato, Banana, Tomato, and Finger Millet.

• **2300 MT of early generation seed/certified seed** has been produced which will significantly improved seed availability among farmers.

• A total of **90 scholarships (54 MSc and 36 PhD) have been awarded** under the component.
1.3 Market Linkages

• Common Interest Groups are being linked to Producer Organizations that are providing market linkages

• Investment of nearly 800 million KSH into 325 Producer Organizations to mobilize new members and federate CIGs/VMGs to the Producer Organizations completed.

• Expected Investment of 1.5 Billion KSH to nearly 250 POs for Enterprise Development Plans to enable them access to:
  • Investments for processing and market infrastructure
  • Working capital
  • Institutional strengthening

• These POs are emerging as community owned commercial entities that are providing agribusiness services and market linkages for farmers across value chains.
With support from World Banks’ investment project, Kenya Agriculture and Research Organisation (KALRO) has developed the **Big Data Platform & the Kenya and Agricultural Observatory Platform (KAOP)**.

**Kenya Big Data Platform**

- Developing solutions and personalized advice to farmers

**Kenya Ag Observatory**

- Supporting agricultural decision making using remote sensing data

**Desert Locusts warning and response**

**Farmers Digital Registry and Farm Geotagging**

- 1.1 million Farmers Digital Registry

**Digital Food Balance Sheet**

**One Million Farmers Platform**

- 25000 producers, organizations and community groups

**Digital e-voucher system**

- 50 Million USD

World Bank is also providing technical support to the e-voucher roll out, digital food balance sheet and other applications of the ICT.
One Million Farmer Platform (OMFP) - Current Cohort Members & scale

- One Million Farmer Platform launched in April 2019 through an innovation challenge and facilitated partnerships between **16 County governments and 14 Agriculture Tech Start ups /Innovators** and County Government

- **Currently 27 AgTech start ups** and innovators providing Data-driven Digital Agriculture solutions and services through partnerships with **26 County Governments**

- **Reached 300K Farmers achieved to date using digital tools through the platform** in under one year.

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**Productivity Track**
- DigiCow
- Digital Green
- Hello Tractor
- Farmers Pride
- Precision Ag. For Development

**Market Linkages Track**
- M-Shamba
- TruTrade
- Kuza Biashara

**Financial Inclusion Track**
- Acre Africa
- AMTECH
- Apollo

**Data Analytics**
- Astral Aerial
- Agrocares
- Oakar Services
- Ujuzi Kilimo
• **620 Community Driven Development Committees** (CDDCs – One in every project ward) that have been established and registered with dedicated bank accounts.

• **These CDDCs are expected to last beyond the project period** and ensure that project farmers can continue accessing a range of input services and financial services extension and market linkages.

• **Creation of a SACCO within every CDDC** (process only initiated recently) to enable access to financial services for farmers

• **556 Producer Organisations** (POs- at least typically 10 in every project county) established/ strengthened.

• These POs will ensure market linkages, input services and extension services with modern HR architecture
Thank You
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revolutionizing
the resilience of
smallholder farmers through
Digital Agripreneurs

Sriram Bharatam
Founder & Chief Mentor
Sri@Kuza.One
Creating opportunities for Youth, Women & Small business owners to Learn, Connect & Grow @Scale.
Focus Areas

Agriculture
- 600,000 Farmers Network
- 4,000 Agripreneurs

Health
- 3,700,000 Care Seekers
- 1,000 Health Workers

Micro Entrepreneurship
- 314,000 Youth
- 229,600 Women
Lack of rural opportunities is forcing Youth to become Entrepreneurs by default not by design.

Lenah Mwangi
28 years, Kenya
Challenges of Smallholders

- Poor public extension services
- Access to quality inputs & credit
- Access to markets

Joseph Ngugi
70 years, Farmer
Challenges of Service Providers

- Dependable channel for extension
- Supply & Demand forecast
- Supply chain Traceability

Joe Kamau
MNC Executive
Digital Extension Services

**Micro Learning**
Digital content to provide technical and leadership skills.

10,000+ bite-sized HD video content in 10 languages covering 40 crops, livestock, social and business skills.

**Micro Distribution**
Portable digital kits to provide advisory & transaction services.

Agripreneurs provide on-demand rural advisory & info. services to smallholder farmers in remote locations with low or no access to internet & other infrastructure.

**Micro Mentoring**
24x7 self service mentorship services across digital channels.

Conversational AI bots provide in-the-moment crop advisory & bite sized knowledge nuggets to farmers & their families in local languages / dialects.

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Kuza’s last-mile Network of Youth Agripreneurs is growing Exponentially.

- 750,000 Small Farmers in 05 countries
- $25m Marketplace Transactions
- 153,321 New Jobs Created

2016
2017
2018
2020
2022

4,000 Agripreneurs
Agripreneurs Income Streams

- Sale Of Inputs: Seeds, Fertilizers, Pesticides, Herbicides Etc.,
- Aggregation of Farm Produce
- Specialized Services: Like Soil Testing, Mechanization Services, Spraying, Threshing, Harrowing,
- Aflatoxin Testing
- Quality Control: For Moisture Content Testing
- Post-Harvest Handling Services
- Sale Of Other Products: Like Tarpaulins, Hermetic Bags Etc.,
- Financing: Credit
When people adopt technology, they do old things in a new way.

When people internalise technology, they find new things to do.
4P Ecosystem Model for Scale & Sustainability

- Public sector
- Private sector
- Philanthropy sector
- Platform

- Scale & Sustainability
- Public good Investment
- Lower Cost of Acquisition
- Service Delivery
- Catalytic Investment

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revolutionizing
the resilience of
smallholder farmers through
Digital Agripreneurs

www.kuza.one
SYSTEMATIC LEARNING FOR INNOVATION
An Integrated Research Approach for Kenya

WORLD BANK GROUP

Dr. Michael Keenan
Rome Program on Jobs, Labor Mobility and Sustainable Development
Presentation Objectives

1. To highlight the need for actionable, innovative, and systematic learning for the Digital Revolution

2. To present an example of how actionable learning can be applied to the Kenyan context
Why Actionable Learning?

- Research was critical in past transformations (e.g. Green Revolution)
- This time is different: transaction costs vs. on-farm technologies
- Little existing evidence for digital market-making technologies
- Researching private-public partnerships for innovation can be difficult
- Are new research tools needed for assessing frameworks instead of specific interventions?
Guidelines for Actionable Learning

THREE R’S OF ACTIONABLE LEARNING

• Trade-offs between different types of researchers
• How can these aspects be combined?

Relevant
Actionable Learning
Rapid
Rigorous
How to Create Systems for Actionable Learning

OPERATIONS SIDE

- Willingness to Learn
- Embedded Action learning
- Streamlined Funding

RESEARCH SIDE

- Aligned Incentives
- Increased Efficiency
- Use of Administrative Data
A PROPOSAL FOR KENYA
Towards a System for Actionable Research
The Research Approach

PROJECT OVERVIEW

• 3 year evaluation

• Goal: to develop an integrated, systematic research approach for the Agripreneur Model

PROJECT PATHWAY TO LEARNING

- Actionable Learning
- Delivery Model Analysis
- Impact Evaluation+
- Economic Framework
Building an Economic Framework

• 21st Century, high-income economies are platform dominated.
• Theory of platform economics has followed.
• How can these frameworks be applied to low-income, rural contexts?
• Structured economic frameworks can guide empirical analysis
  • What behavior should we test for?
  • What survey questions should we ask?
  • What delivery models can be tested?
A Flexible Impact Evaluation

**METHODOLOGY**

- Approach vs. intervention
- Pseudo-experiment based on program rollout
- Baseline, midline, and endline surveys
- Qualitative analysis
- Administrative data analysis

**OUTCOMES**

- Resilience
- Health
- Sustainability
- Poverty
- Inclusivity
- Agripreneurs
- Farmers
Impact Evaluation+
Administrative Data for Continuous Learning

• Digital companies have wealth of administrative data.

• Integrated data approach – using administrative data, market price data, large-scale survey data, climate data, and other geo-spatial data

• Delivering insights continuously

• Taking advantage of Open Data

Source: KAMIS (2022)
Tweaking the Delivery Model: Micro-Changes for Greater Impact

<table>
<thead>
<tr>
<th>METHODOLOGY</th>
<th>OUTCOMES</th>
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<tbody>
<tr>
<td>• Platforms in high-income settings study behavioral economic impacts</td>
<td>• Understanding deviations from economic framework</td>
</tr>
<tr>
<td>• Nudging, changing how agripreneurs work together, commitment devices</td>
<td>• Making psychology work for impact</td>
</tr>
<tr>
<td>• Randomized behavioral experiments (A/B testing)</td>
<td>• Greater efficiency in delivery</td>
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<tr>
<td>• Digital data collection</td>
<td>• Stronger impact</td>
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</table>
Concluding Remarks: Revisiting the Presentation Objectives

1. **To highlight the need for actionable, innovative, and systematic learning for the Digital Revolution**
   - Rapid, Relevant, and Rigorous Research
   - Operations and research meeting in the middle

2. **To present an example of how actionable learning can be applied to the Kenyan context**
   - An integrated research approach with continuous learning
   - Insights from economic frameworks, impact evaluation, administrative data analysis, and behavioral experiments
Thank You

Dr. Michael Keenan
Consultant
mkeenan@worldbank.org
INNOVATION DAY
at IFAD ‘22

INTERCONNECTED REGENERATIVE PRACTICES FOR RURAL DEVELOPMENT: THE ROLE OF INNOVATION AND PUBLIC-PRIVATE PARTNERSHIPS
Sustainable Ecosystems of Connected & Prosperous Communities

A Regenerative Approach

Regenerative Society Foundation’s Regenerative Agriculture

21st June 2022
Summary
“Sustainable Ecosystems of Connected & Prosperous Communities” aims at creating a network of rural interconnected communities able to aggregate large quantities of high-quality produce for sale on domestic and international markets.

Knowledge and innovative technologies are provided directly to farmers for the collection and the analysis of useful information about crops status, finances and operational data.

The objective is to enable the shift from extractive to regenerative agricultural models, promoting social and environmental well-being (co-benefits) while impacting on climate change mitigation and consumption habits.
Why main Value-chains are broken?

MARKET
• Lack of access to formal markets, market information, requirements & compliance
• Unfairness in the price formation and lack of transparency
• High level of indebtedness
• Limited logistics & supply chain services
• Complex bureaucracy and high transaction costs
• Lack of a comprehensive certification for regenerative supply chains and co-benefits

ENVIRONMENT
• Extractive subsistence agriculture driven by poverty
• Improper use of chemicals & fertilizers
• Climate Shocks

SOCIAL
• Limited access to education and health services
• Lack of basic infrastructure (water, storage)
• Limited access to technology and innovation
• Lack of access to adequate financial services
Key outcomes

- **Healthy soils:** through improved soil fertility and increased carbon sequestration
- **Agricultural diversification:** through a combination of crop rotation, intercropping and agroforestry
- **Wealthy families:** by providing access to better market opportunities for farming communities
- **Healthy society members:** through improved access to education and health services;
- **Access to finance:** by providing access to loans for inputs and services
Approach Implementation
## Milestones

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<tr>
<th>IN THE FIELD</th>
<th>IN THE MARKET</th>
<th>CO-BENEFITS</th>
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</thead>
<tbody>
<tr>
<td>Onboarding farmers on Farmshine platform</td>
<td>Certified products through regenerative agriculture targeting EU markets</td>
<td>Measurable reduction of indebtedness</td>
</tr>
<tr>
<td>Regenerative agriculture practices</td>
<td>Contracts signed with end buyers and fair prices</td>
<td>Measurable level of investments</td>
</tr>
<tr>
<td>Predictable plans of production and technical supervision</td>
<td>Provide predictable quantities of different products</td>
<td>Measurable increase in SOC</td>
</tr>
<tr>
<td>Organized aggregation, logistics and quality control</td>
<td></td>
<td>Measurable access to health and education services</td>
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Implementation strategy

MARKET
• Production of specific market driven products
• Identify market solutions for predictable quantities and prices through transparent contracts
• Value sharing based on quality and consistency
• Effective produce aggregation and safe storage procedures
• Full traceability of each bag of produce from farm to fork
• Fully integrated trading and logistic operations through a digital platform

ENVIRONMENT
• Controlled implementation of regenerative agricultural practices
• Innovative water supply for agriculture and human consumption
• Carbon credit generation and sale to generate communities’ additional income

SOCIAL
• Farmers training on targeted regenerative agriculture solutions for consistent high-end quality standards, through supervision and controls
• Communities’ virtual self management and control
• Inter-community exchange of information and crops rotation
Expected Results and Impact

In a time span of 4 years:

• 1000 communities of 200 farmers sustainably engaged in trading quality produce
• 70,000 MT of quality produce traded annually
• Certified ethical trading mechanism
• Market stability and predictable income generation
• Elimination of community's indebtedness
• Development of self-investment capacity for business development
• Improved communities' health, wealth and access to better education
• Income generation through carbon credits sales
• Climate change mitigation benefits
## Traction & Timeline

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<th>Overall results</th>
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<th>Programme KPI</th>
<th>Targets</th>
<th>Time frame</th>
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<tr>
<td>Healthy soils</td>
<td>GHGE Carbon stock</td>
<td>Change in SOC</td>
<td>+ 20%</td>
<td>3 Years</td>
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<tr>
<td>Agricultural diversification</td>
<td>Biodiversity</td>
<td>Agrobiodiversity index (CGIAR)</td>
<td>Positive variation</td>
<td>2 – 5 Years</td>
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<tr>
<td>Wealthy families</td>
<td>Well-being Livelihood</td>
<td>DHS Wealth Index</td>
<td>Quintile progression</td>
<td>3 Years</td>
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<tr>
<td>Healthy society members</td>
<td>Inclusivity</td>
<td>FAO Resilience Index (RIMA)</td>
<td>+ 15%</td>
<td>3 – 8 Years</td>
</tr>
<tr>
<td>Healthy environment</td>
<td>Net primary production</td>
<td>NPP Measurement</td>
<td>Positive variation</td>
<td>3 – 8 Years</td>
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<td>Wealthy families (access to finance)</td>
<td>Access to capital</td>
<td>Financial Inclusion Index</td>
<td>Positive variation</td>
<td>3 years</td>
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<tr>
<td></td>
<td>Invested capital</td>
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<td>Self-financing</td>
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<td>Healthy environment (access to water)</td>
<td>Water management</td>
<td>Rural Water Livelihoods Index (FAO)</td>
<td>Positive variation</td>
<td>3 – 5 years</td>
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<td>Programme scalability</td>
<td>Capacity / scalability Innovation</td>
<td>Scalability Index</td>
<td>&gt;60</td>
<td>5 - 10 years</td>
</tr>
</tbody>
</table>
The theoretical approach here described will be deployed and measured according to a Regenerative Index.

The Index analyzes regenerative entities such as products, processes, structures, systems, etc. rating their capacity to bring environmental and social co-benefits.

No holistic certification can guarantee a regenerative agricultural process with co-benefits for people and the environment, together with the fair and just financial remuneration of farmers.

As a follow up of the measurement activity, a self-certification process audited by RSF and recognized by third parties / international regulatory entities can ensure that a co-benefits approach is adopted with positive outcomes for both people and Planet.
Partnership
We wish to create a long-term collaboration for:

• Putting the smallholder farmers at the center of the global market
• Formalizing African local markets and supply-chains
• Establishing a blended financing system to enable substantial changes in the food systems
• Integrating environmental benefits – social well-being – market & financial sustainability
We unite.
We act.
We flourish.

#StartRegeneratingNow
www.regenerativesocietyfoundation.com
INNOVATION DAY
at IFAD ‘22

TOWARDS A CIRCULAR ECONOMY: EXPERIENCES FROM SOUTHERN AFRICA AND FINLAND
Biogas from market waste Project

www.greenimpacttech.org
Green Impact Technologies (GIT) was established in 2018 to accelerate alternative energy technologies to low-income communities in sub-Saharan Africa countries.

**OUR VISION**
To accelerate a better everyday life for many people.

**OUR MISSION**
To accelerate alternative energy solutions targeting marginalized communities with an aim of eradicating energy poverty.

[Green Impact Technologies logo]

[EEP Africa logo]

[www.greenimpacttech.org]
PROBLEM/VALUE PROPOSITION

- 97% of the population use biomass (firewood or charcoal) for cooking
- High dependence on rain fed agriculture by smallholder farmers
- Rising cost of inorganic fertilizers.
- Lack of Climate smart agriculture technologies for farming
- Waste management challenges
- Lack of alternative energy sources for lighting, phone charging and entertainment
GIT is piloting an innovative circular economy solution at a vegetable market in Malawi. With EEP Africa support, the company has established a biodigester at the market that converts biodegradable waste into biogas, which is stored and distributed in refillable bags to local households, restaurants and businesses.

The bio digester also converts bio slurry into organic fertilizer that shall be sold to smallholder farmers.

www.greenimpacttech.org
In addition, the eHub has been completed a one stop shop for the distribution of a range of clean energy technologies to surrounding communities, such as PAYG solar water pumps, solar home systems and improved cook stoves.

www.greenimpacttech.org
The enterprise uses market systems approach to deploy:

- Solar water pumps,
- Solar home systems,
- Biogas for cooking,
- Bio fertilizers,
Biogas for Cooking and Fertilizer (Bio Slurry)

- Tsangano Market is one of the largest vegetable markets in Malawi.
- Waste management Challenges at the market
- GIT has developed a 40 cubic meters biogas digester

www.greenimpacttech.org
Green Impact eHub-One Stop Shop for Energy solutions

www.greenimpacttech.org
The installed biogas system is expected to generate 0.31 MW of clean energy and reduce 1,900 tCO2e emissions during the life of the project.

Provide gas to 40 HHs and restaurants

Create 200 jobs both part time and full time

The project primarily employ women to collect feedstock at the market, manage the eHub and distribute the biogas.
Admore Chiumia
Chief Executive Officer

THANK YOU!!!
Restoring rangelands

Sequestering carbon, building peace
SoilWatch seeks to support evidence-based and scalable ecosystem restoration

Mission Statement:
To mobilise funding for evidenced and measurable activities that work with vulnerable rural communities to restore ecosystems at the local level, alleviating issues with food security and conflict, and combating climate change at the global level through the provision of better data on impacts of activities on the ecosystems.

Approach:
Identify and fill key gaps in existing funding and implementation systems to unlock their potential for ecosystem restoration in environmentally vulnerable and conflict-affected countries.
Complex environmental issues in Sudano-Sahel

- Land erosion and desertification in the arid and semi-arid lands of the Sudano-Sahel contributes to issues with food security and conflict.
- Discussion around causes often framed around climate-change.
Environmental catastrophe occurs through soil erosion

**Causes**
- Climate change
- Unsustainable land use

**Outcomes**
- Declining water reliability
- Declining land availability
- Declining land productivity
- Increased susceptibility to shocks

**Population growth**
- Increased resource competition

**Impacts**
- Violence and conflict
- Displacement and migration
- Decreasing food security
- Decreasing land availability
- Decreasing land productivity
- Decreasing water reliability
- Increased susceptibility to shocks
Soil erosion is primarily caused by unsustainable land use practices

**Pastoralism**

- Increasingly sedentary lifestyles
- Growing size of herds
- Preference of sheep and goats over cows
- Exacerbated by cropland encroachment and deforestation
Rangelands can be massive carbon sinks

- Rangelands refer to ecosystems where the vegetation is predominantly grasses, grass-like plants, forbs or shrubs, and often with trees that are grazed or have the potential to be grazed by livestock and wildlife.

- **Rangelands cover 54% of the global terrestrial surface** which equals to 79.509.421 km².

- Across rangelands globally, at least 11% of rangelands (approximately 8.000.000 km²) are degraded.

- With a change in management regime, degraded rangelands can be restored.

- Restoring just 5% of the world’s degraded rangelands could remove **16 gigatons** of carbon from the atmosphere.
A grass-roots approach to climate action

- Perennial grasses are particularly efficient carbon removers, due to the massive root structure.
- When roots decompose, they build soil organic material, of which over 50% is carbon.
- Temperate grasslands can store over 150 tons of carbon in soil per hectare, bringing the total carbon sink near to that of tropical rainforests.
Grazing animals are a vital part of a healthy savannah ecosystem.

Equilibrium soil organic carbon densities (Mg ha$^{-1}$) to a depth of 30 cm for different numbers of pastures and stocking densities for the entire grazing system. (A–C), temperate conditions. (D–F), tropical conditions. Note the difference in scales for (A–C) versus (D–F). (Ritchie M.E. 2020)
Our Tech

- A key gap for better rangeland management is access to accurate data on impacts
- SoilWatch is developing a **rangeland management application**, to allow monitoring and modeling key ecosystem services: carbon sequestration, forage production and biodiversity
- The tool utilizes near real-time **satellite data** in combination with limited number of **in-situ samples**. Process-based and machine learning models produce **carbon flux estimations**
- The interface is in **visual spatio-temporal format**, allowing the users to continuously improve their rangeland management practices, and buyers to verify how much carbon is being sequestered
- Collaboration with aid sector actors and carbon project developers for continuous validation
Collaboration with SoilWatch, IFAD, and Finland

- SoilWatch is in discussions with the International Fund Agricultural Development (IFAD) and FinnPartnership to explore the environmental and carbon impact of IFAD’s rangeland management in Sudan
- Learning contributes to scaling up M&E capacity for IFAD and the sector, as well as unlocking funding from carbon credit markets to rangeland restoration
Climate Impact

Total beachhead market calculation:

- Sudan: 600 000 km² of land restored over 30 years = (conservative sequestration rate: 100tCO₂/km²/year)
- Expansion planned across the Sahel to restore 2.5 Mio km² of rangelands over 30 years

1.8 Gt CO₂

CO₂ Sequestration:
Increasing soil organic carbon
- healthier soil / biodiversity
- greater moisture absorption
- resistance to flooding/drought
- greater yields
- increased food security

Financial and social impact:
Additional income for adoption of regenerative management practices
Thank you for your interest

Eero Wahlstedt (eero@soilwatch.eu)
www.soilwatch.eu

Further information

- https://journals.sagepub.com/doi/10.1177/17816858221089487
- https://www.hs.fi/ulkomaat/art-2000008536745.html
MISSION

SOLAR FOODS DISCONNECTS FOOD PRODUCTIONS FROM AGRICULTURE
SOURCES OF GLOBAL GREENHOUSE GAS EMISSIONS

ENERGY: 70%

FOOD PRODUCTION AND LAND USE CHANGE: 30%
CHALLENGES IN FOOD PRODUCTION 1/2

MORE MOUTHS TO FEED

Global population

LIMITED FARMLAND TO EXPAND

Available land suitable for agriculture

GLOBAL FISH CATCH HAS PEAKED

Million tonnes

Source: Company materials, UN, Potsdam Institute for Climate Impact Research, The University of Sheffield’s Grantham Centre for Sustainable Futures, Our World in Data

48% INCREASE IN PROTEIN CONSUMPTION EXPECTED

10% EUROPE

3% NORTH AMERICA

2% ASIA

8 bn

10 bn

2020

2050

1960

2015

180
DEIGNED BY NATURE

WATER  NUTRIENTS  CARBON DIOXIDE CAPTURE

↓  ↓  ↓

SOLEIN BIOPROCESS

↑  ↓  →

RENEWABLE ELECTRICITY  PROTEIN  FOOD

A UNIQUE SINGLE-CELL PROTEIN PRODUCED USING WATER, CO₂ AND ELECTRICITY

FULLY NATURAL FERMENTATION PROCESS SIMILAR TO THE PRODUCTION OF YEAST OR LACTIC ACID BACTERIA

INSTEAD OF CAUSING CO₂ EMISSIONS, SOLEIN BINDS CO₂

FORTUM PROVIDES SOLAR FOODS 100% RENEWABLE ENERGY
FOOD PRODUCTION DISCONNECTED FROM TRADITIONAL AGRICULTURE

\[ \text{Solar} + \text{Crop} = \text{solein} \]

- Land Clearance and Crop Production for Animals and Humans
- Primary Production
- Food Ingredients
- Food Manufacturing
- Distribution
- Consumption
SOLEIN® IS THE WORLD’S MOST SUSTAINABLE PROTEIN

WATER SCARCITY
Litres per 1 kg protein

Solein uses 100 times less water than plant production and up to 700 times less than the production of beef.

<table>
<thead>
<tr>
<th></th>
<th>SOLEIN</th>
<th>PLANTS</th>
<th>BEEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOLEIN</td>
<td>1000</td>
<td>100000</td>
<td>up to 700000</td>
</tr>
<tr>
<td>PLANTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEEF</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EMISSIONS
kg CO₂-eq / kg protein

Solein produces five times less than plant production and 200 times less than beef production.

<table>
<thead>
<tr>
<th></th>
<th>SOLEIN</th>
<th>PLANTS</th>
<th>BEEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOLEIN</td>
<td>1</td>
<td>5</td>
<td>200</td>
</tr>
<tr>
<td>PLANTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEEF</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LAND USE
m² per 1 kg protein

Land use for Solein is 20 times more efficient than for plant production and 200 times more efficient than for beef production.

<table>
<thead>
<tr>
<th></th>
<th>SOLEIN</th>
<th>PLANTS</th>
<th>BEEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOLEIN</td>
<td>1</td>
<td>20</td>
<td>200</td>
</tr>
<tr>
<td>PLANTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEEF</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SUSTAINABLE EVERYDAY PROTEIN

PROTEIN IS THE NECESSARY BUILDING BLOCK FOR HUMANS AND THEIR KEY FUNCTIONS.

DIETARY FIBRES 10-15%

FAT 5-8%

MINERAL NUTRIENTS 3-5%

RICH IN IRON AND B-VITAMINS

PROTEIN 65-70%

EVERYDAY SOURCE OF PROTEIN

BREAKFAST
- Cereal

LUNCH/DINNER
- Noodles & pasta
- Beverages

OTHER
- Bakery
- Meat alternatives
- Snacks
SOLEIN VALUE PROPOSITION TO FOOD PRODUCERS

SUPERIOR NUTRITIONAL PROFILE
Complete protein source with vitamins that is bioavailable, non-GMO and - allergenic.

MOST ENVIRONMENT FRIENDLY
100x more efficient use of water and 20x of land than plants.

VERSATILE
Great texture and flavour attributes that can be used in variety of food products.

STABLE PRICE & CONSISTENT QUALITY
Price not dependant on outside factors.

FAST PRODUCTION TIME & COST COMPETITIVE
Flexible and reliable production technique.

LOCALLY PRODUCED
Can be produced where protein is needed.

GREAT CONSUMER DEMAND

PREDICTABLE COSTS/MARGIN
VISION: “GIGA” FACTORY IN ALL MAJOR CITIES

545 CITIES WITH OVER 1 MILLION INHABITANTS

79% OF COUNTRIES ARE NET FOOD IMPORTERS

Source: World Integrated Trade Solution
SOLAR FOODS
Liberating protein production.
APPLICATIONS OF GIS AND ARTIFICIAL INTELLIGENCE (AI) FOR CLIMATE ACTION
Applications of GIS and Artificial Intelligence (AI) for Climate Action

Use of geo-ICT for smallholders: insights from G4AW program

Ruud Grim
Manager Space for Sustainable Development

20 June, 2022
IFAD Jobs, Innovation and Rural Value Chains
Content

• G4AW Objectives
• Results
• Examples of G4AW services
• Satellite and geodata
• Lessons Learned
Objectives of G4AW

• Reach 4.5 million smallholder food producers
• Production increase
• Less use of inputs
• Secure/higher incomes

Commissioned by Netherlands Ministry of Foreign Affairs
Budget: 60 mio euro
25 partnerships in 15 countries
Achieved

- Support developing new (digital) market
- 30+ million private investment
- Digital advisory and/or financial services based on use of satellite data
- Geo-ict in strategies of Dutch ngo’s & finance institutions
- Training and coaching of extension officers
- Local employment
- Awareness & outreach for new investments
Services (Garbal):
Localization of places with vegetation & water
Market information

Channels:
Call center (Orange)

Results:
STAMP (2019):
>75k pastoralists
MODHEM (2020):
>65k pastoralists

Scaling to Niger (since June 2021)

Impact STAMP
Lower mortality rates for cows (23.9%)
Less herd loss: 160 euro (saving)
Services:
Drought insurance (localized)

Channels:
Local insurance companies
Farmers cooperatives
AIC, Planet Guarantee

Results:
Coffee & maize farmers insured: 289,000 (2021)

Impact (Insured versus Uninsured)
Less selling assets at distress before drought windows (4% / 21%)
Leaving farm for other work (4% / 15%)
Lower own consumption (16% / 35%)

SumAfrica (Uganda, Mali)
Services (bundled):
AgriCoach, Nutrition Coach, Online fertilizer and seeds savings, payment and credit, HealthCoach (Covid-19)

Channels:
G50 ‘Extension officers’ Mobile device app

Results:
~170,000 smallholder families in Burundi 2021: scaling to 400,000 (2.3 mio people)

Impact:
Farmers rating on AgriCoach
9.3 out of 10

227% increase in application of GAP's

65%
Bean productivity (double)
Services (cocoa, palm oil, maize):
- Plantation location & age
- Palm oil mill locations
- Weather information
- Pest & disease (spraying calendar)
- Loans

Channels:
- Call center & Voice messages (by Esoko)
- Village Loan and Saving AAA (VLSAs)
- Regional Support Center (RSCs)

Results:
- Loan pilot is currently running.
- Evaluation expected by 2022/Q2

Impact
- Farmers better organized
- Cooperation with mill and Touton (trader)
- Local entrepreneurs & employment
### Crops & services

<table>
<thead>
<tr>
<th>Crops</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>6</td>
</tr>
<tr>
<td>Rice</td>
<td>6</td>
</tr>
<tr>
<td>Potato</td>
<td>4</td>
</tr>
<tr>
<td>Tomato</td>
<td>3</td>
</tr>
<tr>
<td>Vegetables</td>
<td>3</td>
</tr>
<tr>
<td>Beans</td>
<td>3</td>
</tr>
<tr>
<td>Sesame</td>
<td>2</td>
</tr>
<tr>
<td>Soybeans</td>
<td>2</td>
</tr>
<tr>
<td>Coffee</td>
<td>2</td>
</tr>
<tr>
<td>Cucumber</td>
<td>2</td>
</tr>
<tr>
<td>Wheat</td>
<td>2</td>
</tr>
<tr>
<td>Chili pepper</td>
<td>2</td>
</tr>
<tr>
<td>Cocoa</td>
<td>1</td>
</tr>
<tr>
<td>Green and black gram</td>
<td>1</td>
</tr>
<tr>
<td>Groundnut</td>
<td>1</td>
</tr>
<tr>
<td>Livestock</td>
<td>1</td>
</tr>
<tr>
<td>Onion</td>
<td>1</td>
</tr>
<tr>
<td>Sorghum</td>
<td>1</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>1</td>
</tr>
</tbody>
</table>

### Type of service

<table>
<thead>
<tr>
<th>Type of service</th>
<th>Proposal</th>
<th>Realized</th>
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</thead>
<tbody>
<tr>
<td>Crop management advice</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>Weather information</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>Good agricultural practices</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>Fertiliser advice</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>Market information</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Pest and disease information/advice</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Irrigation advice</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Farmer profile information</td>
<td>4</td>
<td>10</td>
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<tr>
<td>Agricultural input loans</td>
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<td>5</td>
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<tr>
<td>Crop index insurance</td>
<td>3</td>
<td>4</td>
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<tr>
<td>Crop selection advice</td>
<td>2</td>
<td>9</td>
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<tr>
<td>Crop yield information</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Flood mitigation advice</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Location information</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Sustainable tracing systems</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>
Satellite & geodata

- Weather satellites (EUMETSAT, NOAA, ...)
- Satellite data (see right)
- Field plots (GNSS: GPS, GALILEO)
- In-situ data (GIS)
- Market information (GIS)

Supported by data platforms
Value chain benefits (jobs)

Local job creation, e.g.
- Extension services, e.g. G50 and RSCs
- Call centers
- ICT service providers
- others

More transparency along the value chain
Future developments / benefits

• Digital services are useful from BoP (more inclusive) to commercial farmers (paying clients)
• Digital services can be bundled to fit food producer needs (better)
• Digital services are beneficial for all value chain actors (also for logistics)
• New (space) innovations may emerge (IoT, SatCom in rural areas with no good connectivity) for farmers, access to finance and logistics
SAVE THE DATE

Space for Food Security

G4AW Conference, 3-6 October 2022
Location: Utrecht, NL
Thank you for your attention

Let’s stay connected!
Services (Hwtet Toe):
Weather forecasts
Crop monitoring
Good Agricultural Practices
Flood monitoring

Channels:
Call center
Extension officers
Smartphone app
Business dashboard

Results:
>700k farmers app
>200+ mio FB views
>2 mio reactions

Myvas4Agri (Myanmar)
Lessons Learned (AgTech)

- Innovation & scaling takes time
- Implement user-centered approach & digital inclusion using active M&E
- Bundling of services provide benefits (e.g. free advisory with buying inputs)
- Education & trust remain crucial success factor (e.g. farmers are more risk taking rather than to pay for insurance)
- Weather information and forecast crucial
- Better soil data needed for good fertilizer advice
- Develop service delivery to be flexible for adaptations and scaling
Geodata, a paradigm shift for inclusive finance!

- Geodata for credit scoring improves the current business process.
  - Higher production, increased repayment rate, improved prediction of non-payment, reduced processing time, and reduced operational costs.

- The number of farmer customers is increasing, but revenue generated is still relatively low. Reaching scale is a condition to break even or make a profit.
  - High upfront costs of service development
  - More investment needed to reach scale
ESA Earth Observation for Sustainable Development Initiative (EO4SD) – *Insights from the Climate Resilience activity*

Clement Albergel,
Climate Office, European Space Agency, ECSAT

*IFAD '22 Conference: APPLICATIONS OF GIS AND ARTIFICIAL INTELLIGENCE (AI) FOR CLIMATE ACTION 21st of June 2022*
Satellite Earth Observations and Climate Resilience

- **Climate Resilience**: ability to anticipate, absorb, accommodate, or recover from climate change in a timely and efficient manner

  ➡️ *Important framework for policy and programme development*

  - The Paris Agreement (PA) article 7.1: "to enhance adaptive capacity, strengthen resilience and reduce vulnerability to climate change, with a view to contribute to sustainable development and ensure an adequate adaptation response in the context of the 2°C temperature goal"

  - The PA also contains financial mechanisms to support developing countries

  - National resilience building activities need access to high quality information on environmental risks

  ➡️ *Satellite Earth Observations (EO) considerable potential to inform and facilitate climate resilient development*
Copernicus: Sentinels

250 TB of EO data disseminated daily to society
ESA EO PROGRAMS IN SUPPORT OF INTL. DEVELOPMENT

- **eoworld**: 2008-15
  Small-scale demonstrations of EO services in support of IFI projects to raise awareness

- **EO4SD**: 2016-23
  Consolidate requirements, engage stakeholders (IFI & client states) via regional demonstrations of EO

- **GDA**: 2020-25 | Space for IDA
  Mainstream & transfer EO into operational working processes & financing of ODA/development aid as ‘best-practice’ source of geo-information
OBJECTIVE OF THE EO4SD INITIATIVE

Achieve a step increase in the uptake of satellite-based environmental information in the IFIs regional and global programs.

Systematic user-driven approach in order to meet longer-term, strategic geospatial information needs in the individual developing countries, as well as international and regional development organizations.

https://eo4sd.esa.int/
Members of EO4SD Climate Cluster

The climate cluster of the ESA’s EO4SD initiative was composed of the following members:

- GMV
- Telespazio UK
- SISTEMA
- GeoVille
- ACCLIMATISE
- NOAA
Wetland and land degradation monitoring for restoration and rehabilitation plans in Lesotho

• Stakeholder: International Fund for Agricultural Development (IFAD)
• Project: Restoration of Landscapes and Livelihoods
• Objective: Lesotho suffers amongst the most severe soil erosion in the world. Land degradation as a result of soil erosion has been identified as one of the greatest environmental challenges facing Lesotho. The degradation is extended to its numerous wetlands, what is critical, as Lesotho depends on its water resources to create revenue for the country.

⇒ The objective of the EO4SD CR cluster was to analyse annual soil loss changes over the last 20 years and to evaluate degradation of wetlands due to the climate variability.

http://eo4sd-climate.gmv.com
Wetland and land degradation monitoring for restoration and rehabilitation plans in Lesotho

- **Service**: The service delivered also include the wetland identification and monthly monitoring of the wetlands extent on a national coverage. All products were aggregated at sub-catchment level to facilitate the identification of hot spots.

- **Impact/ Added Value**: The EO-based products provided evidence related to soil erosion and wetlands condition that supports the prioritization of catchment and sub-catchment areas for landscape and wetlands restoration and rehabilitation.

http://eo4sd-climate.gmv.com
Analysing climate risks faced by pastoralism in Kyrgyzstan

• Stakeholder: International Fund for Agricultural Development (IFAD)
• Project: Regional Resilient Pastoral Communities
• Objective: IFAD’s project aims to contribute to rural poverty alleviation in Kyrgyzstan through increased resilience, incomes and enhanced economic growth in rural farming communities. To identify measures for improved livestock and pasture health and productivity, and enhancement of climate resilience of pastoral communities is necessary to determine the risks posed by the climate change in the country. The EO4SD CR cluster supported the climate rationale of the project providing information about the hazards and climate changes.
Analysing climate risks faced by pastoralism in Kyrgyzstan

- **Service:** The EO4SD CR cluster provided EO-based climate indicators and natural hazard information, such as related to landslides, floods, droughts, vegetation deterioration, and land degradation to produce up-to-date multi-hazard maps that highlight pasturelands exposed to the most severe overall levels of climate-related hazard.

- **Impact/ Added Value:** This information helps to both identify key degraded areas exposed increasing hazard, and prioritise areas with the greatest potential to benefit from climate resilience investments. Results from the cluster were used by IFAD to build the case for climate resilience investment in a co-funding proposal to Adaptation Fund.
Assessing rangelands degradation due to climate change in Tajikistan

• **Stakeholder:** International Fund for Agricultural Development (IFAD)
• **Project:** Community-Based Agricultural Support
• **Objective:** IFAD’s project objective is to stimulate inclusive economic growth and poverty reduction in Tajikistan poor rural communities by improving access to productive infrastructure and services that are expected to lead to sustainable agricultural production and equitable returns. The EO4SD CR cluster collaborates with the Food and Agriculture Organization (FAO) and IFAD to jointly identify climate vulnerable pastoral communities and analyse the rangelands degradation.

[http://eo4sd-climate.gmv.com](http://eo4sd-climate.gmv.com)
Assessing rangelands degradation due to climate change in Tajikistan

- **Service:** The EO4SD CR cluster provided EO-based rangeland condition changes over the period 2000-2020 per grazing season and aggregated at district level, climate indicators over the degraded pastures to assess the climate change impact and soil erosion rates to determine land degradation over Tajikistan. In-situ information gathered by local consultants was used to localised methodologies to the country’s grazing practices.

- **Impact/ Added Value:** The rangeland and climate products supported the climate rational for IFAD to solicit co-funding from the Green Climate Fund.

http://eo4sd-climate.gmv.com
ESA EO PROGRAMS IN SUPPORT OF INTL. DEVELOPMENT

- **eoworld**: 2008-15
  Small-scale *demonstrations of EO services* in support of IFI projects to raise awareness

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https://gda.esa.int/
INNOVATION DAY
at IFAD ‘22

FROM IDEA TO IMPACT THROUGH INNOVATIVE PUBLIC-PRIVATE PARTNERSHIPS
From Idea to Impact through Innovative Public-Private Partnerships

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INDUSTRY UNIVERSITY COOPERATIVE RESEARCH CENTER (IUCRC) PROGRAM

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IUCRC – A Multilateral Partnership
(focused on advancing a sector of the economy not one company’s sole interest)

Government
NSF catalyzes partnership; other agencies can join as members or co-fund the Center

Universities
Provide technical expertise, research infrastructure, and human capital (i.e., students)

Industry
Members provide funds for research and insight into needs of the economic sector.

IUCRCs bridge the gap between academic curiosity-driven research and commercial readiness.

Early Stage Research
TECHNOLOGY READINESS
Commercial Deployment
IUCRC - Path and Timeline to Creation

1. Ideation
2. Planning Grant Proposal
3. NSF Bootcamp Training
4. Planning Grant
5. Planning Meeting
6. Center Proposal
7. New IUCRC Site/Center

Timeline:
- Merit review: 3-6 months
- Planning activities: 12 months
- Merit review: 3-6 months

Fast Track Option
NSF IUCRCs – Portfolio Snapshot and Facts

- **84** Active Centers
- **400+** Large Firms
- **300+** Small Firms
- **110+** Universities
- **20+** Government Entities

In 2021: **$47M** in non-NSF funds generated to support Center research.

~1/4 of graduating IUCRC-involved students hired by Center members.
Logos of Some IUCRC Members
IUCRC – Value Proposition for Members

**IUCRC Program Funding Benefit**

**ROI: Member**
- Each member dollar leverages ~23 additional dollars

**ROI: NSF**
- Each NSF dollar leverages ~7 or more external dollars for basic, use-inspired research

**Access to Talent**
- Members scout student talent and mentor them so they end up with desired skills for work in industry

**Reduce R&D Risk**
- Share risks of early stage research for disruptive technology

**Leverage Research Dollars**
- Get high ROI via joint project funding model

**Access to Network**
- Interact collegially with other Members/competitors/regulators

**Research Cost Avoidance**
- Save internal research dollars, access to facilities, and infrastructure, lower human capital costs

**Access to Intellectual Property**
- Royalty-free, non-exclusive licenses on IP produced in the Center
Powering Agriculture

- 24 Innovator-Grantees designed, piloted, and deployed clean energy solutions within agricultural value chains.

- Funding unlocked through milestones: new markets served, total customers served, KW clean energy produced, etc.

- The growth of innovator grantees continues beyond funding cycles: 77 business models and technologies remain active as of 2021.
Public-Private Partnerships to Improve Yield Based Crop Insurance

- Crop insurance for smallholder farmers in SSA is largely inaccessible, and the products available to farmers are inadequate.
- PPPs are piloting remote sensors to gather local data, which can improve insurance products.
- Financial interests to improve technology are aligned for nearly everyone in the value chain.