Sustainable Global Food Systems

30 March 2021, 15:30 – 16:45 CET on Zoom
ETH for Development & World Food System Center

World Food System Center

ETH4D

Welcome & Goals of the Meeting

Goals

- **Mutual Learning**
  - Learn about pressing issues for practitioners regarding sustainable food systems
  - Learn about current research at ETHZ
- **Planting the seed for future collaboration**
  - Funding opportunities with ETH4D and WFSC

Agenda

15:30: Welcome, Goals & Agenda

15:35: Pitches (max 5 min. per pitch + max 5 min. Q&A)

Dr. Akanksha Singh (Agricultural Ecology, D-USYS)

Franz Miralles/Rolando Oros (Swisscontact/PROINPA)

Prof. Jaboury Ghazoul (Ecosystems Management, D-USYS)

Emmanuel Bakirdjian (Precision Agriculture for Development)

Dr. Leonhard Späth (Sustainable Agroecosystems, D-USYS)

16:25: Questions and Discussion

16:35: Dr. Jeanne Tomaszewski/Alexandra Hees: WFSC & ETH4D Funding Opportunities

Wrap-Up

16:45: End

Dr. Akanksha Singh, Agricultural Ecology Group, ETH Zurich

Research Focus: DiverBeans

Akanksha Singh, Agricultural Ecology Group, ETH Zürich
akanksha.singh@usys.ethz.ch

- Main focus:
  - Improving organic bean production in North Macedonia by increasing diversity

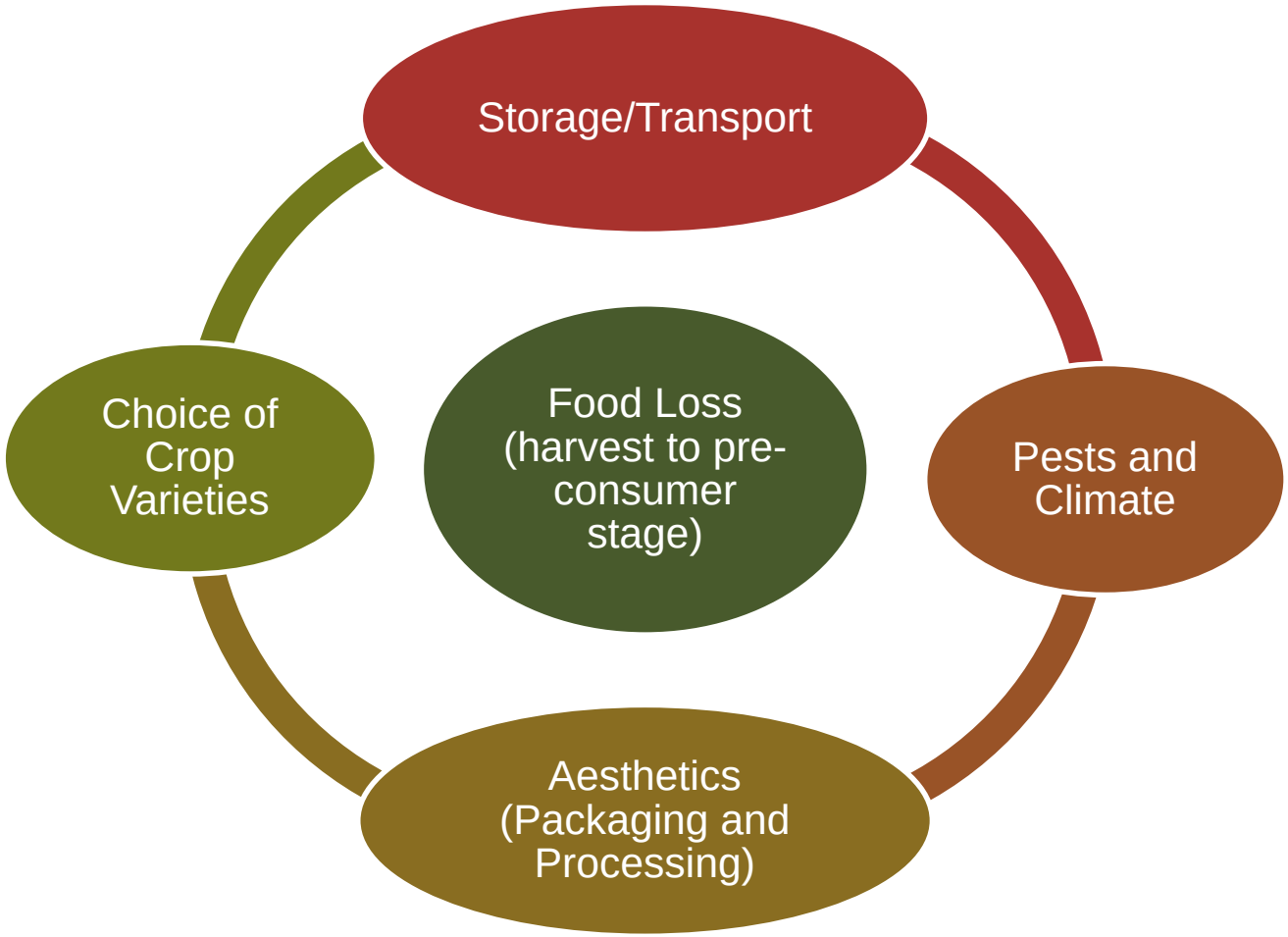
- Collaboration with non-academic partners:
  - Coop

Opportunities for Collaboration: Reducing Food Loss

Globally 14% of food lost occurs between harvest to retail level

FAO. 2019. The State of Food and Agriculture 2019. Moving forward on food loss and waste reduction

Food Loss



FAO. 2019. The State of Food and Agriculture 2019. Moving forward on food loss and waste reduction

Increasing Intraspecific Diversity on Farms

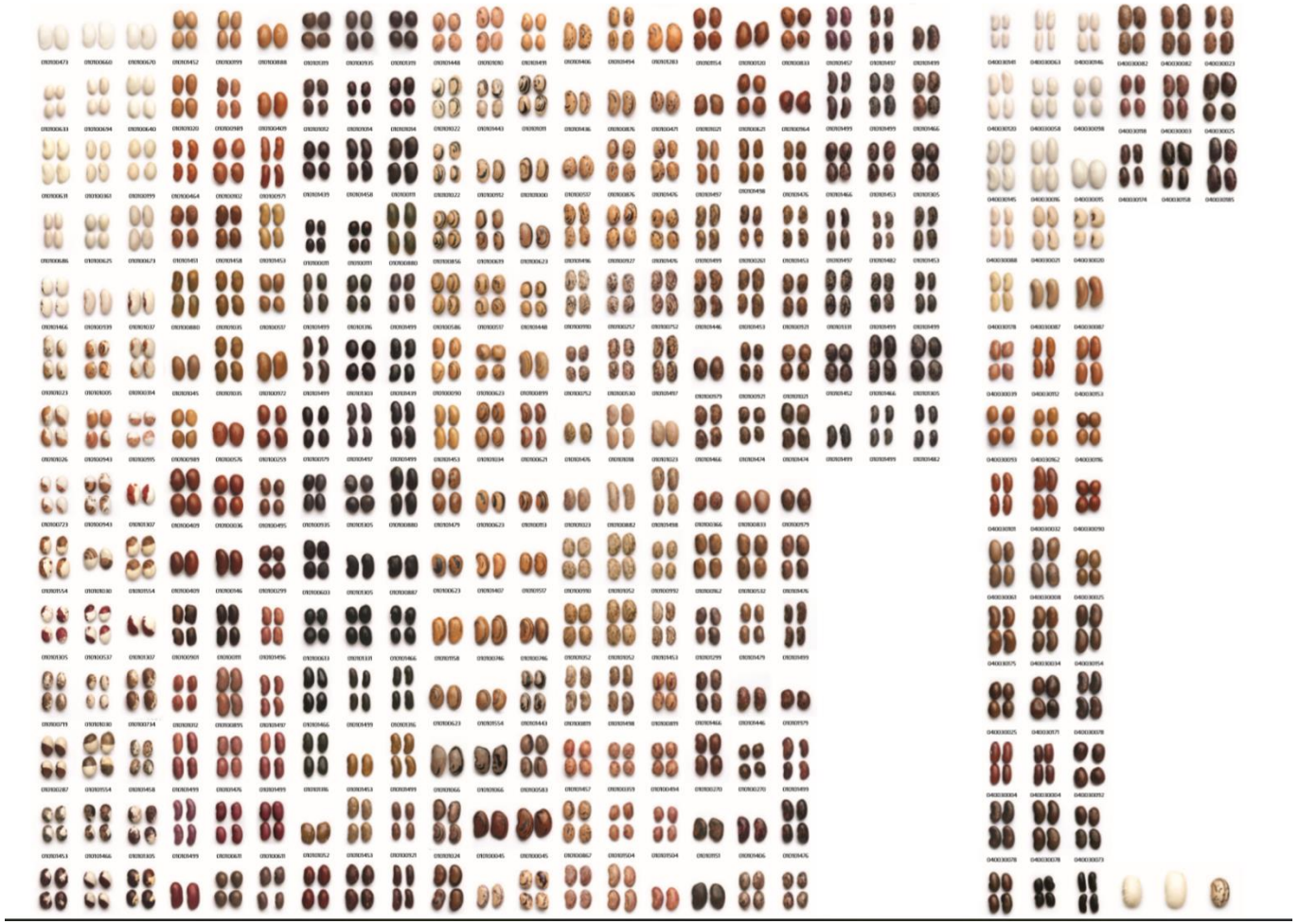
Increasing Intraspecific Diversity on Farms

Challenges for transferring farm production solutions to the market:

- Uniformity of appearance
- Aesthetics
- Variety specific labelling

Specifically problematic for farmers producing high value products- e.g. organic

Increasing Intraspecific Diversity on Farms



Collaboration Oportunities: Developing Retail Standards to Encourage Intraspecific Diversity on Farms

Specific ideas to address these challenges:

- Estimate on-farm food loss that occurs due to market standards
- Changing labels to depict nutrient content and other characteristics of the product
- Reducing aesthetic standards based on consumer surveys
- Creating value-chains for products that cannot be sold in the market

Questions for Non-Academic Partners

How data driven are such choices made by the supermarkets regarding such packaging of products?

How often is such information updated?

Thank you for listening

DiverBeans

USYS TdLab
Department of Environmental Systems Science
Transdisciplinarity Lab | Science-Society Interface

LETICA - Association for research, education and sustainable agriculture

Eko-llinden

Franz Miralles, Swisscontact / Rolando Oros, PROINPA

Swisscontact

Swiss Foundation for Technical Cooperation

We create opportunities

Who we are?

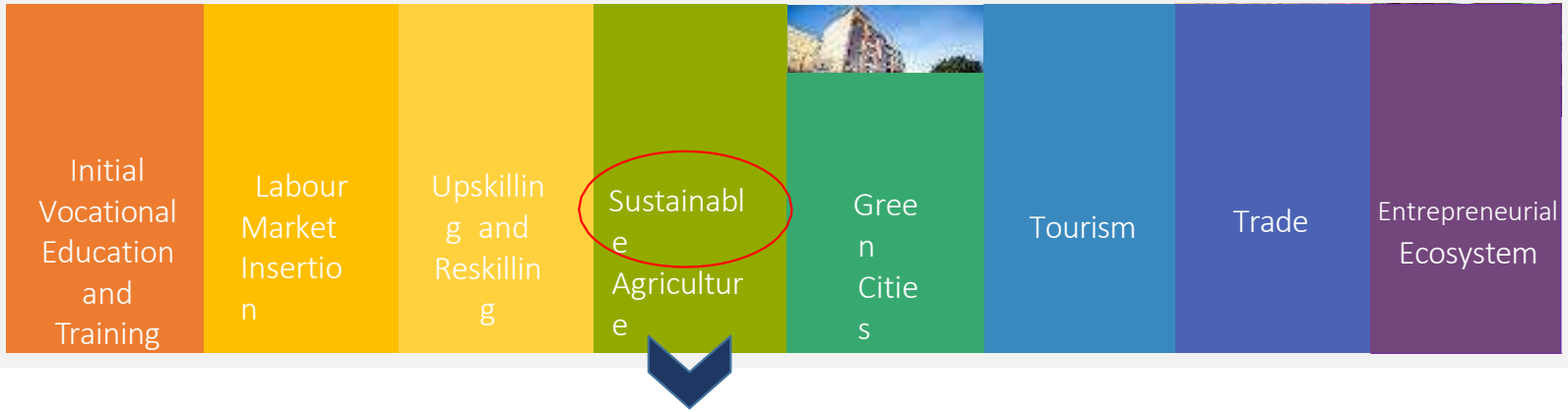
We are a leading partner organisation for the **implementation of international development projects.**

Our Mission

•We promote **inclusive economic, social and ecological development** to make an **effective contribution** towards **sustainable and widespread prosperity** in developing and emerging economies.

Working areas

We offer customised solutions in the following working areas:



We seek to contribute to **transforming the agriculture sector towards more sustainability**, by building capacities of relevant system actors and developing inclusive, resource efficient and resilient agricultural systems, which **strengthen natural processes and ecosystems**

The problem

- Royal quinoa is a crop that grows in the Bolivian Altiplano (arid, saline soils, 250 mm / year,3.800 masl).
- This agroecosystem is being degraded, due to **unsustainable management practices, expansion of the agricultural frontier and the effects of variability and climate change** (droughts, frosts , strong winds, pests, etc.).
- As a result, **the soils are in the process of desertification**, the yields of quinoa are low (<600 kg / ha) and therefore, the livelihoods of the people are in a high degree of vulnerability.
- On the other hand, **there are initiatives** that use non-cultivable native species to use them as cover crops and as intercropping with quinoa**, there is also evidence of a low population of beneficial microorganisms** that develop under these conditions;
- PROINPA Foundation in Bolivia is working with some principles of sustainable agriculture in the region (use of bioinputs, agricultural equipment and soil coverture). However, **research needs to be done in the context of the southern altiplano of Bolivia**

General Research Gaps

Research topic

The use of amendments based on biochar to recover saline soils

1. To what extent does **an increase in the population and diversity of beneficial microorganisms in the saline areas** where quinoa is cultivated **contribute to an increase in the productivity** of quinoa cultivation **and therefore its sustainability**?

2. To what extent, **the use of biochar amendments that increase water retention, can promote the increase of populations of beneficial microorganisms** in the saline rhizosphere of quinoa?

3. What **is the role of endophytic microorganisms in the current condition** of the quinoa culture and how to use them more efficiently?

4. To what extent **can the native species that grow in these areas contribute to the sustainability** of quinoa production and its arid and saline agroecosystem? Are there symbiotic processes with microorganisms present in these soils?

Opportunities for Collaboration with Researchers

- Collaborative Research Project focused in develop low cost technology for smallhoder farmers based on biochar to recover saline soils in the Andes Region (pilot in Bolivia)


We create opportunities

Prof. Jaboury Ghazoul, Ecosystems Management, ETH Zurich

Professorship of Ecosystem Management: Research Focus

- **Research mission**: Understand how ecological dynamics interact with decision making behaviours to improve social and environmental outcomes in landscape mosaics

- **Oil Palm Adaptive Landscapes** (Cameroon, Colombia, Indonesia): linking social, economic, policy and environmental aspects of oil palm landscapes within scenario development and testing frameworks to negotiate shared strategies for sustainable landscape management – *WWF, CIFOR, Companies, local NGOs, Governmental agencies*

- **Landscapes as Carbon Sinks** (Scotland): Developing models for transformative landscape change to integrate decision making at national, regional, and local scales – *Scottish Government, Nestlé, Makar Construction, Agricarbon, Tweed Forum, Galloway & Ayrshire Biosphere*

- **Resilience in Coffee Agroforestry** (India, East Africa & Colombia): Managing functional attributes of agroforests at farm and landscape scales to enhance pollination, nutrient cycling, climatic buffering, and reduce pests and diseases – *Coffee Board of India, Kodagu Model Forest Trust, CIAT*

Opportunities for Collaboration with Non-Academic Partners

Climate-proofing coffee and cocoa agriculture:

- Susceptible to drought, high temperature, heavy rainfall ... complicated by CO_2 fertilisation
- Modelling indicates productivity declines, and shifts in suitable growing regions
- Shade management is crucial, but highly complex, and context specific
- Need to link functional ecological understanding to locally specific management contexts

Requires:

- Data acquisition systems across a range of relevant variables
- Linking data systems to process modelling capabilities for data interpretation and projection
- Translation of data into accessible and interactive formats to elicit scenario testing by farmers
- (Smart contracting systems to link environmental/social outcomes to payments or certification)

Emmanuel Bakirdjian, Precision Agriculture for Development

Precision Agriculture for Development

March 2021

- PAD Overview
- Progress to Date

PAD at a glance

Global non-profit organization with operations in 9 countries in Africa and Asia

Founded in 2016 by 4 co-founders - including professors at Harvard, Chicago, and Brown - with expertise in impact evaluation, business, technology, and agricultural development

Offices in 5 developing countries, and partnerships with national and state level governments

212 employees with mix of technologists, data scientists, agronomists, researchers, and program managers

Mission We provide actionable information to the world's poorest people to empower them to improve their well-being

Vision The world’s poor benefit from the information revolution

Goal Positively impact 100 million of the world’s poor

What we do: Provide high quality agricultural advice

Farmer profile information

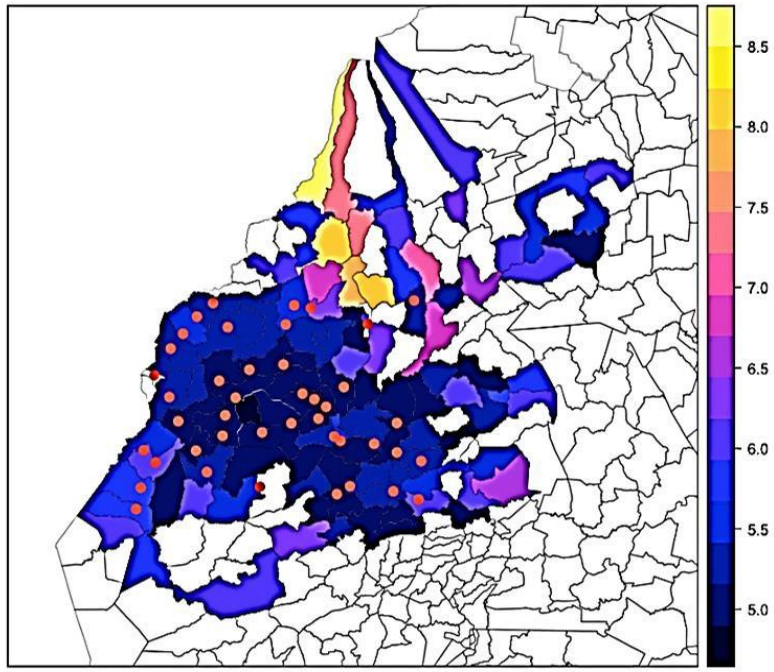
- Location
- Agro-ecological zone
- Socio-demographics
- Crop variety
- Water management

Agricultural data

- Soil type
- Rainfall
- Market prices
- Pest/disease outbreaks

Customized content

- Input recommendations
- Management advice
- Market information
- Weather-related content



How: Leverage mobile phones through multiple channels

SMS: Regular written messages timed to crop calendar

Voice: Regular push calls timed to crop calendar

IVR: Users pull content from automated menu options

Q&A Hotline: Users pose questions that are answered by agronomic experts

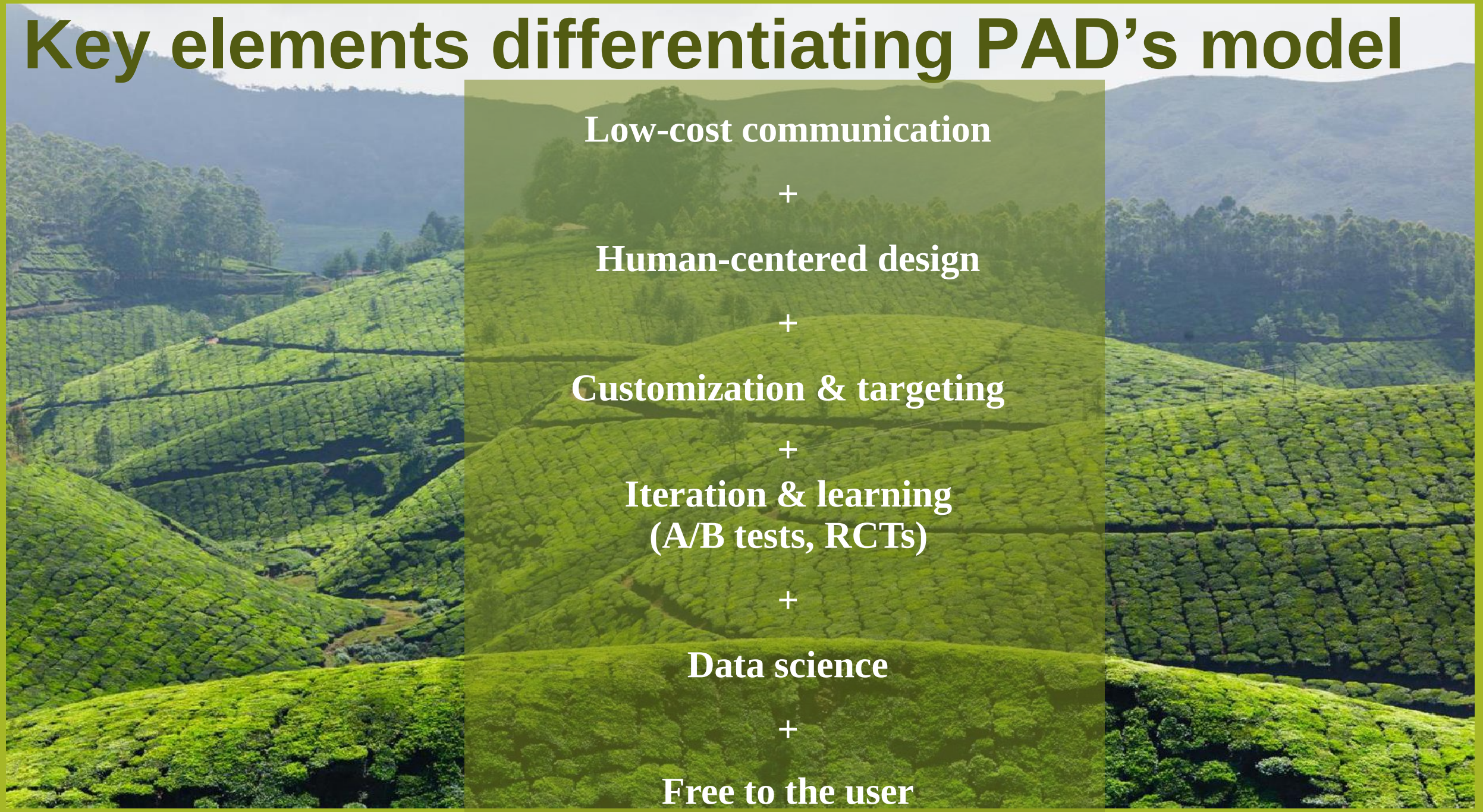
Mobile apps: More advanced content (e.g. video, photo, etc.) and apps (e.g. WhatsApp, Telegram, etc.)

Learning Platforms: Self-directed, interactive content for smartphone users

Key Features:

- Two-way communication
- Available on demand
- Customized
- Timed to crop calendar
- Cost effective

Key elements differentiating PAD's model



Low-cost communication

+

Human-centered design

+

Customization & targeting

+

Iteration & learning
(A/B tests, RCTs)

+

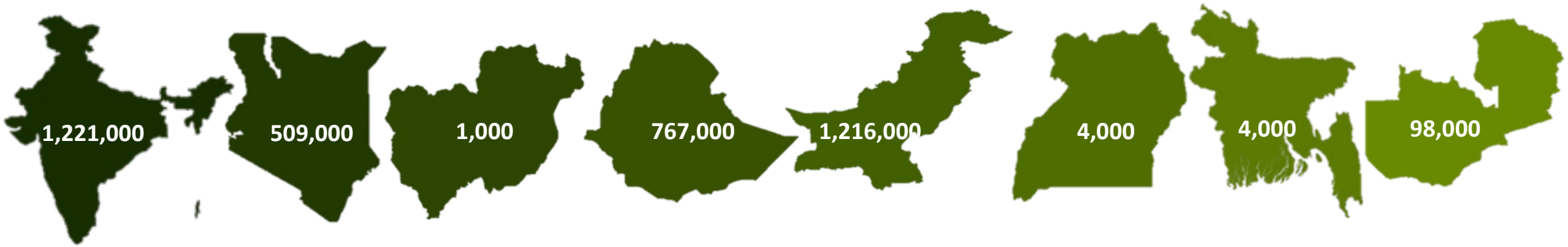
Data science

+

Free to the user

- **PAD Overview**
- **Progress to Date**

PAD is currently reaching 3.8 million farmers in 8 countries*



India	Kenya	Rwanda	Ethiopia	Pakistan	Uganda	Bangladesh	Zambia
• Gov'ts Odisha, West Bengal • International Rice Research Institute (IRRI) • Coffee Board	• One Acre Fund • Ministry of Ag • World Bank • IFAD • PRISE	• One Acre Fund • Root Capital • Rwanda Agricultural Board	• Agricultural Transformation Agency (ATA) • Digital Green • Awaaz.de	• Departments of Ag, Punjab, KPK • IFAD • HarvestPlus	• Technoserve • Hanns R. Neumann Stiftung (HRNS) • IFPRI	• mPower	• Ministry of Ag • CABI

**Farmer reach numbers as of Q4 2020.*

PAD is launching programs in three new countries in 2020-21

Nigeria
(office launched in September 2020; launched initial service in Jan 2021)

- Federal Ministry of Agriculture and Rural Development (FMARD)
- International Fund for Agricultural Development (IFAD)

Colombia

- Rare
- The Nature Conservancy (TNC)
- Ministry of Agriculture and Rural Development (MADR)
- Inter-American Institute for Cooperation on Agriculture (IIICA)

Brazil

- Ministry of Agriculture, Livestock, and Supply (MAPA)
- Inter-American Institute for Cooperation on Agriculture (IICA)

The MoA-INFO SMS platform: providing critical agronomic advice at scale

1. On behalf of the Kenya Ministry of Agriculture (MoALFI), PAD set up a **two-way SMS platform**, MoA-INFO, officially launched in July 2018
2. MoA-INFO provides critical information about **Fall Armyworm** to help farmers manage the pest in their field and adopt optimal and safe control measures
3. It is **free** and available in both English and Swahili
4. It also provides actionable and customized **farming advice** for 11 crops (maize, beans, Irish potatoes, sweet potatoes, pigeon peas, bananas, tomatoes, sorghum, green grams, bulb onions)
5. ~**550,000** users have registered on the platform since its launch

Our newest service in Africa: IVR messages in Nigeria

1. As part of a partnership with IFAD and the Ministry of Agriculture, we are providing agronomic voice messages to farmers in 7 states in Northern Nigeria
2. We have developed voice messages about 5 crops (onions, tomatoes, maize, rice and pepper)
3. The messages are in Hausa, the local language, and are accessible for free
4. We have sent the messages to a sample of ~6,000 farmers but are hoping to reach eventually 100,000 farmers later this year
5. We are developing content for additional crops (rice, soybeans, cabbage, millet, and groundnuts) which will be pushed during the wet season starting next month

Thank you

precisionag.org

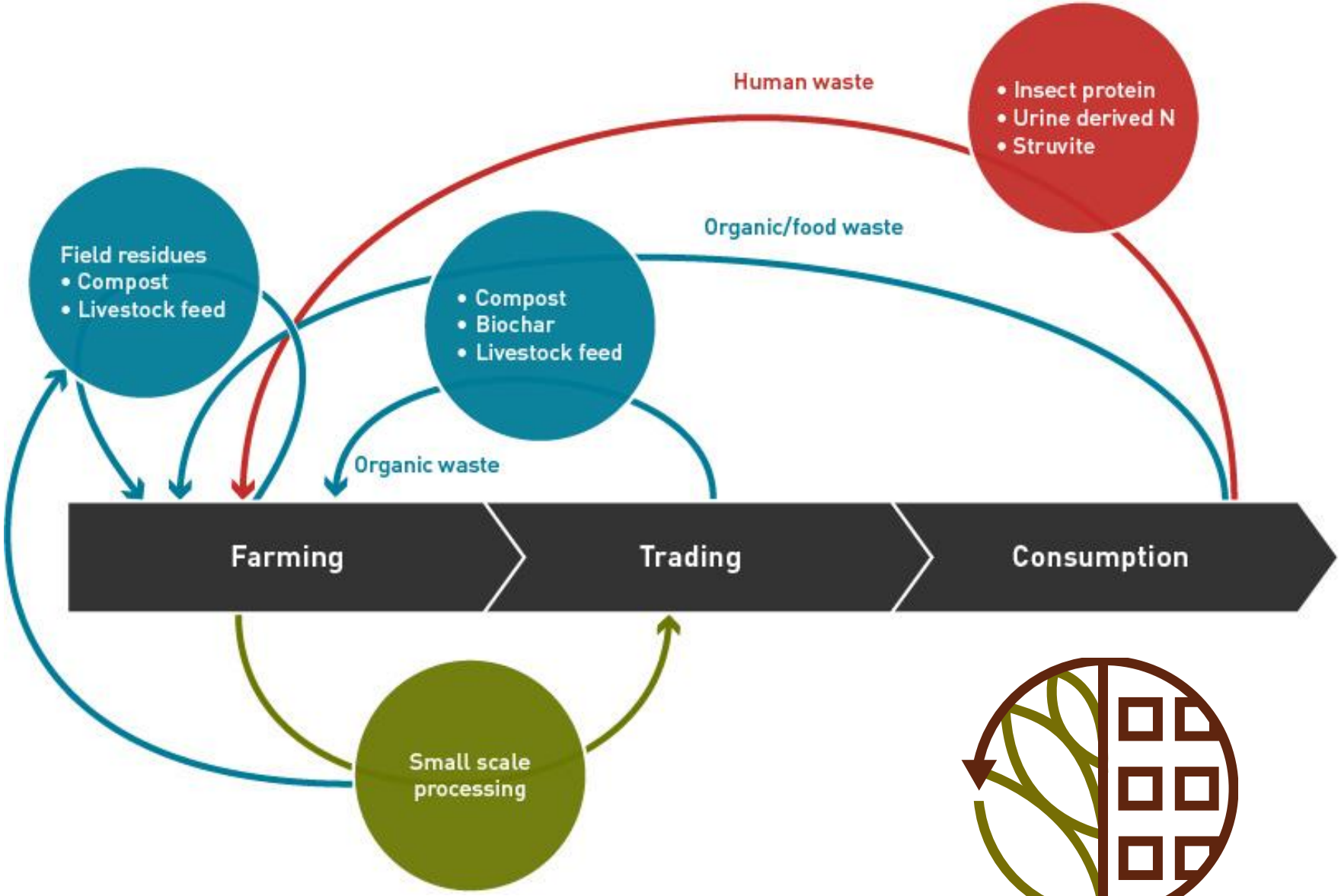
kenya@precisionag.org

Léon Späth – Sustainable Global Food Systems, ETH Zurich

Luzian Messmer

Recirculating nutrients from the city, back to the countryside: two open questions

Léon Späth – Sustainable Global Food Systems – March 30th 2021



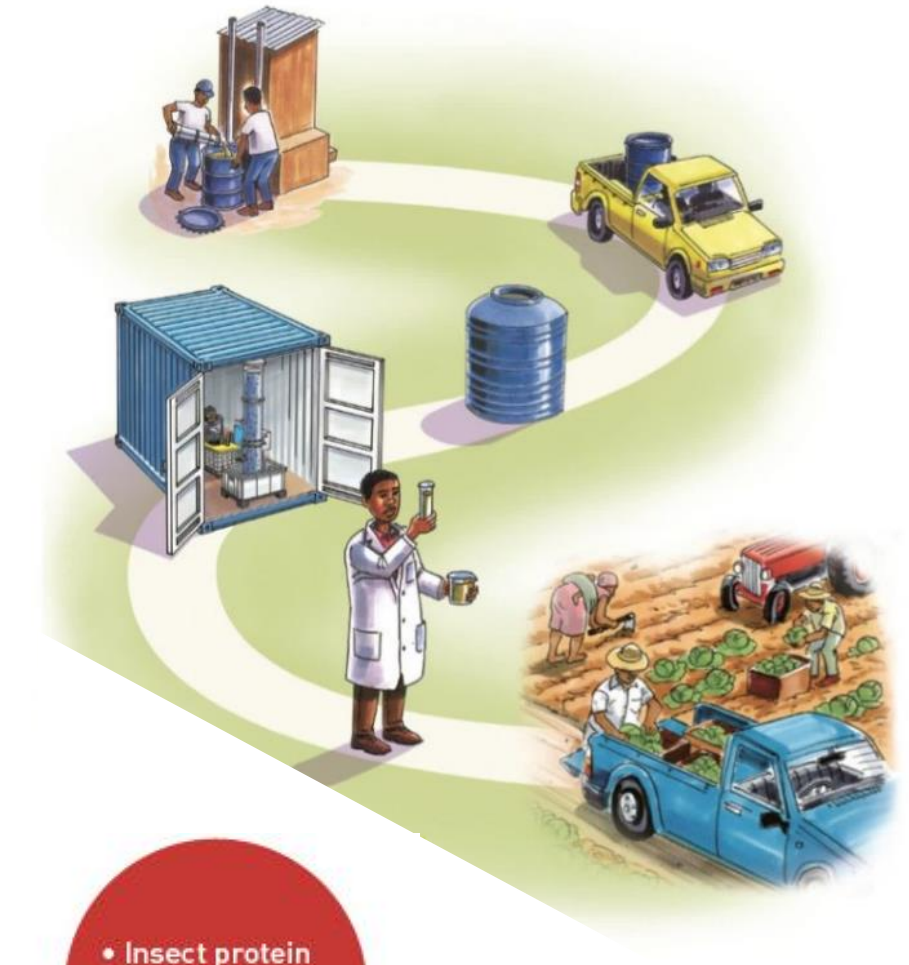
RUNRES
Nutrient Cycles – Rural Urban Linkages

Recycling human waste through co-composting

M. Kigangu

- Insect protein
- Urine derived N
- Struvite

Next step: concentrating urine



Vuna.ch

How to deploy?

Assumption: if people can earn a living out of it, then the incentives to make it sustainable are there.

"The private sector plays a central role in job creation and sustainable development. It is the economic engine that often offers a way out of poverty." (Federal Council, February 2020, B. 20.033)

SDC international cooperation strategy 2021-2024, one of the goals.

Is this assumption valid?

Thank you!

World Food System Center

Member Opportunities

Research:

- Future Food Fellowship: educating new talents- *applications due 31 March 2021*
- Flagship projects: Enhancing Resilience in Food Systems, Novel Proteins for Food and Feed, Digitalization in Agriculture- *organized in collaborative bottom-up approach*
- Nestlé Agricultural and Food System Sciences Program- *yearly applications*

«The Mercator project funding changed my whole life trajectory. It allowed me to make a contribution to the important issue of nutrient cycling and engage with work that is fulfilling and impactful in the continuation project RUNRES.»

Ben Wilde,
Mercator Research Program Alum and
RUNRES postdoctoral researcher

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Member Opportunities

Education/Outreach:

- WFS Fund: supports education and research in fields relevant to the world food system- *applications due 30 April 2021*
- Mercator Ambassador Program: support for small projects and short-term educational or professional development activities- *rolling applications*
- WFSC Outreach Services- *contact us*

«It has been very interesting for me to see that the common motivation among all alumni are the same: we want to keep in touch and keep learning and discussing about sustainable food systems. With the alumni support, we have the perfect time and space to learn and contribute.»

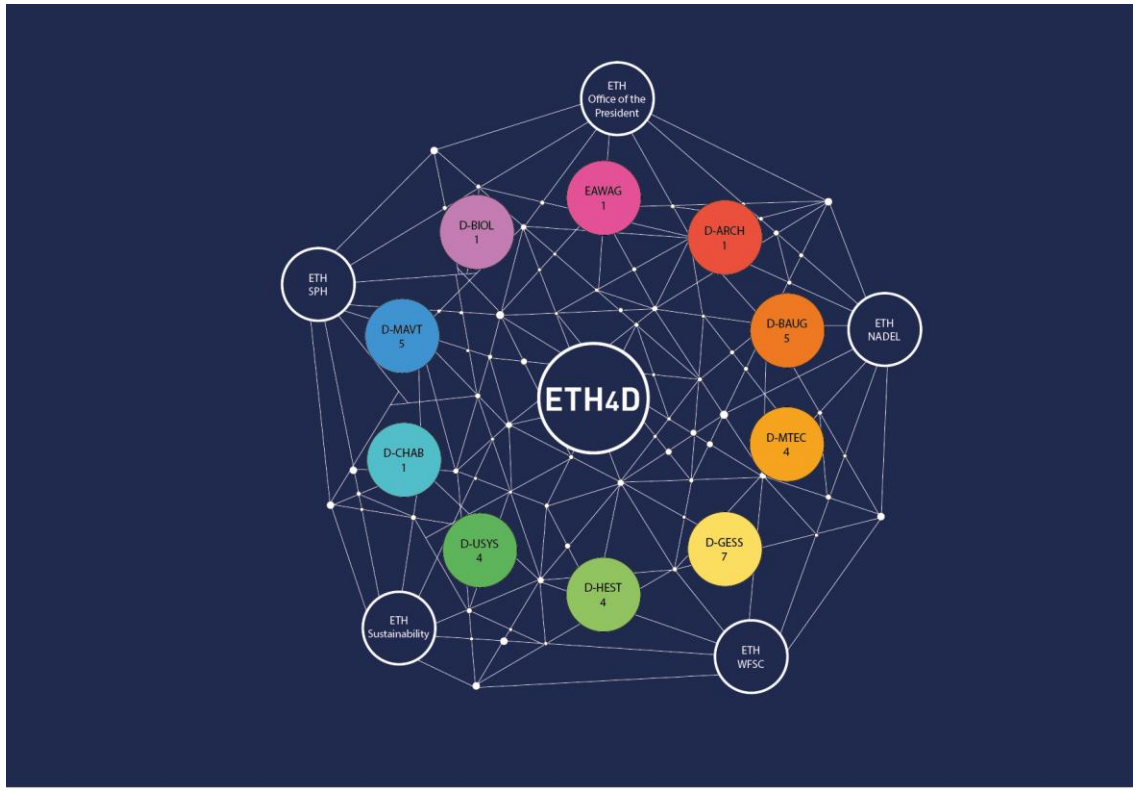
Nora Bartolomé Gutiérrez,
WFSC Alumni Network Community Coordinator
(2019-2020)

ETH for Development (ETH4D)

Research & Innovation
- Regular Matchmaking
- Research Challenges
- ...

Learning @ETH and in Sub-Saharan Africa
- ML for Global Development
- MA in Ghana
- ...

Exchange Opportunities
- Doctoral Fellowships
- Visiting Fellowships
- ...



ETH4D Research Challenges

Project-based research collaborations between ETH researchers and practitioners from NGOs, policy or industry with impact in low/lower middle-income countries (10 - 100 kCHF).

Twice per year: open on 1 July & 1 December

More information: https://eth4d.ethz.ch/funding-opportunities/eth4d-research-grants/ETH4D-Challenges.html

ETH4D Research Challenges

Climate Adaptation through Improved Storage, Kenya

Challenge: Climate change is expected to lead to higher fluctuations of yields, which adversely affects livelihoods, food security and human health.

Innovation: Affordable hermetic storage bags could allow farmers to store their produce longer and reduce losses.

Research: Testing storage bags in a real world setting and measuring to what extent they improve income and food security.

By Prof. Thomas Bernauer, Institute of Science, Technology and Policy (ISTP)

icipe

WFP

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

HELVETAS
Swiss Intercooperation