The 36 Golden Eggs for the 2021 Transfer Market Place

June 15th & 16th 2021

Basket 1, Session 3
CROP IMPROVEMENT

Basket Curator: Victor Kommerell

Current scope and maturity

Develop a worldwide field laboratory to:

- Create a knowledge-sharing and training network
- Understand how climate affects crop adaptation
- Exploit the unique G×ExM knowledge interactions to enhance crop performance

Golden Egg Challenges

- Need global agreement involving multiple research domains
- Mechanisms to facilitate translational research
- Country regulations, training for partners, open data, budgets for operation and partners, apply tools broadly, maintain network, and attract stable funding
- Co-design and co-develop new climate relevant agricultural innovations to increase rice crop adaptation.
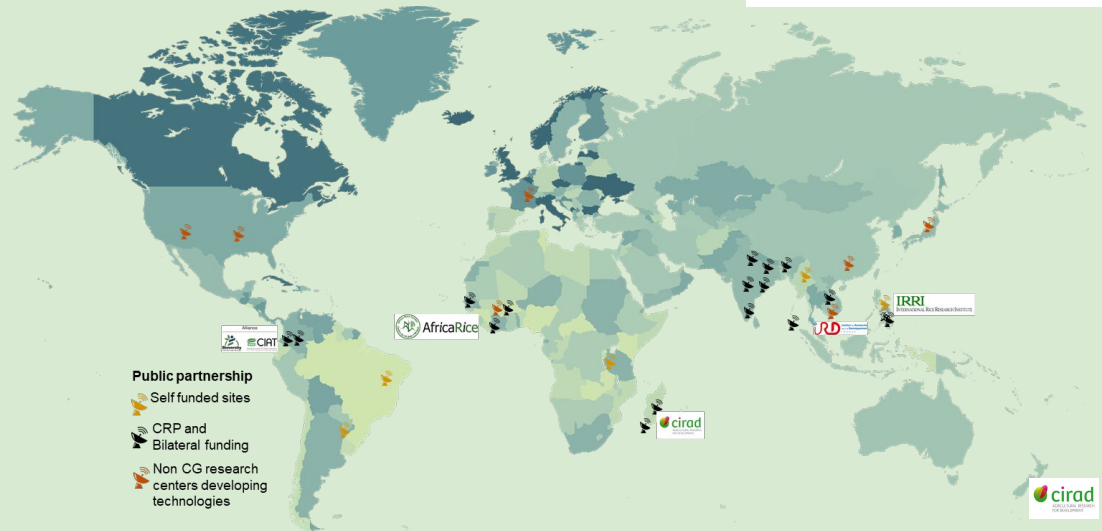
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Global Rice Array (GRA)

Research program on rice agri-food systems 'RICE'
CGIAR

Public partnership
Self funded sites
CRP and Bilateral funding
Non CG research centers developing technologies

The Global Rice Array (GRA) is a functional rice network of field laboratories where technologies are translated to 22 countries. Partners from different disciplines collectively chose tools to accelerate breeding for changing climates: germplasm, genomics, microbiome studies, epidemiological surveillance tools, phenotyping, environment sensing tools, and crop models. Through partnership with the CG, local research organizations and the private sector, innovations were implemented in Asia, Africa and Latin America. Partners connected in this network adopted technologies and have access to a data hub to assess novel GxExM options for robustness and suitability in relation to climate variability. These results shape rice research on climate change adaptation and resilience.

Outcomes to Date

- GRA sites established in Asia, Latin America and Africa and data obtained.
- Germplasm for tolerance to climate variability used in national breeding programs
- Crop, climate and soil monitoring platforms and pest and diseases diagnostic tools deployed
- Data Hub: Phenotypic, genotypic, climate, soil, pest and disease and crop management data for 22 countries , 50 varieties and 300 lines

Expected Further Outcomes

- Maintain the global network and identify new sites to translate CG and non CG research in the field
- Use the data hub connecting the network to co-design and co-develop site specific climate adaptation strategies

Next Steps

CLIMBER: Biophysical observatory to evaluate climate change technologies

Plant Health: monitoring using innovative tools (PathoTRACER, patho- and meta-genomics)

Breeding optimization: TPE, Traits, genes, plant ideotype for climate specific adaptation

BASKET: Crop Improvement

Current Scope & Maturity

The pipeline provides novel lines targeted to three main challenges:

- Heat tolerance to cope with a warmer, less predictable climate
- Drought adaptation for semi-arid systems and to reduce demand on overstretched water resources.
- Yield potential to take pressure off fragile land and to spare natural ecosystems.

Golden Egg Challenge

- Genetic resources more challenging to screen than elite lines requiring specific phenotyping innovations.
- We are learning how to stack novel combinations of traits and alleles in good genetic backgrouds.
- Discovery, development and deployment of high quality trait-linked genomic markers at scale.

Broadening wheat genepools to boost productivity and climate resilience

New challenges to crop productivity require new solutions. Our pre-breeding pipeline incorporates state of the art phenomics and genomics technologies to:

- Screen the vast, relatively untapped collections of wheat genetic resources for novel sources of adaptive and productivity traits.

- Combine traits and alleles strategically into already valuable genetic backgrounds so they can be readily used by public and private breeders globally.

- Continually improve breeding and pre-breeding methods and technologies to deliver better germplasm, faster and more efficiently.

Novel lines based on these approaches are in high demand from public and private breeders of the International Wheat Improvement Network, after pilot projects demonstrated significant genetic gains across a range of target environments.

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Outcomes

- Public & private breeders test the CGIAR nurseries at >200 international sites annually, selecting novel sources for breeding, and sharing trial data.
- Diversity of the wheat genepool broadened while adaptation and productivity are boosted.
- Optimised model translating research/advanced technology to breeding while leveraging public & private sector funding into tangible outputs.

Next Steps

- Crowd-source new technologies from academia to improve pre-breeding strategies.
- Expand our public-private partnerships to address key 'bottlenecks' to crop adaptation.
- Promote this successful wheat pre-breeding approach as a viable model for other crops

Tools for Gender-responsive breeding

https://gender-portal.rtb.cgiar.org/breeding/

Current scope and maturity

Tool development from 2017 – 2019 as a result of CGIAR wide cooperation between breeders and gender researchers

5 breeding programs applied the tools in 2020, results are informing product advancement meetings

Tools are available to practitioners and decision makers through Gender R4D Portal

Challenges addressed

- Variety development considers gender too late – in adoption /impact studies
- Released varieties have lower adoption rates by women
- Get women's preferences considered early for variety development
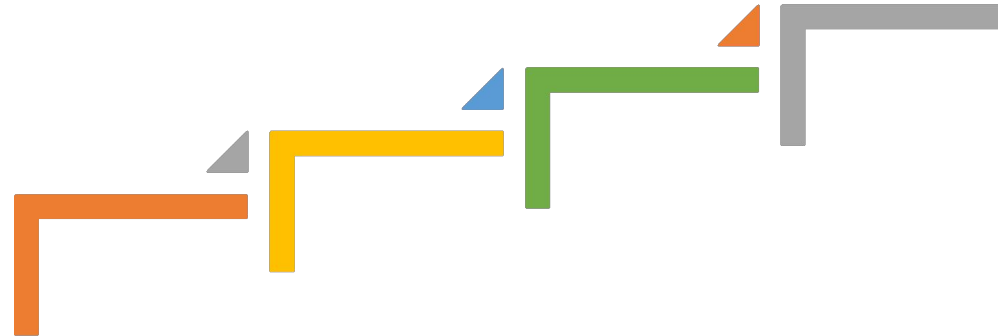- There were no practical tools to include gender systematically in breeding decisions

Learning:
- Using tools allows gender differences to be considered early in variety design

How to integrate gender in breeding decision making

Results from different pilot experiences

Crop / country	Target Population		Priority traits	
	Before tool use	Specified after tool use	Before tool use	Highlighted after tool use
Cassava in Nigeria	Smallholder farmers	Women who process more than 90% of cassava grown	• Fresh root yield • Dry matter • Plant height	• Gari/fufu yield • Food product color/browning • Early maturity • Canopy closure to suppress weeds
Beans in Zimbabwe	Smallholder farmers	Women smallholder grain producers and processor	• High yield • Drought tolerant	• No pod shattering • Fast cooking • Earliness
Sweet potato in Uganda	Smallholder farmers	Women growing for home consumption (boiled / roasted)	• Resistance to SPVD • Resistance to SPW	• Shorter cooking time • Good cooked texture

Outcomes to date

- Identification of target consumers is more precise and ensures gender is considered
- Trait prioritization considers gender differentiated preferences and needs
- Tools identify traits that have potential to increase adoption by women
- Tools are part of the GREAT training curriculum with Cornell and Makerere
- A training module on the G+ tools is under development by Technologico de Monterrey in Mexico for field breeding teams

Expected further outcomes
- New breeding products with traits important for women as well as men
- Increase varietal adoption, genetic gains and varietal turnover

Next Steps/Handoff

Tools are useful for the Genetic Innovation action area, specifically the "Market Intelligence for More Equitable and Impactful Genetic Innovation"

"Foresight and metrics to accelerate inclusive and sustainable agri-food systems transformation" to project gender differentiated demand.

Tools are useful to help design other gender-responsive technologies.

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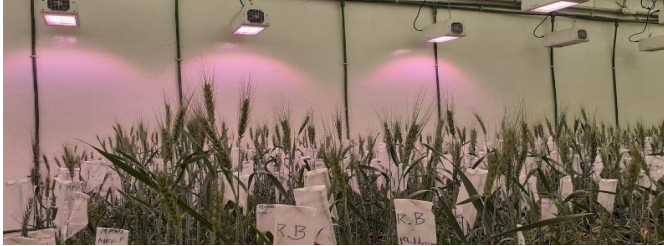
Current scope and maturity

Long-term investment in breeding continues to deliver multiple impacts:

- Food and income security to smallholder farmers through improved varieties.
- Targeting of over 75m ha sown by >50 million farmers.
- 70% of wheat varieties released in target regions are CG-derived.

Challenges and learning

- Established international partnerships for screening, breeding and testing in place.
- The "machine" is highly effective and can't be simply switched off and on again. Sustained investment is required to achieve effectiveness.
- No alternative at regional, global level available. Private sector won't do it.

Long-term investment in core breeding operations matters

CGIAR WHEAT provides improved breeding germplasm and adds-value through partnerships with national and advanced research institutions worldwide. Our aim is to share breeding germplasm for utilization as parents or release as farmers preferred varieties. This requires sustained investment to:

- Continuous delivery and dissemination of new farmer- and market-preferred varieties throughout target regions by the CGIAR's largest breeding network (the International Wheat Improvement Network; IWIN)
- A clear value proposition with current return on investment of 73:1. To date, the partnership has contributed USD 2.3-3.1 billion annually through additional wheat grain produced.
- Ensure a continued contribution to the annually increasing wheat demand of 1.5% by delivering higher rates of genetic gain through the implementation of breeding modernization.

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Outcomes:

- >50 m ha globally sown to CG derived wheat varieties; sharing germplasm and data publically
- CG derived varieties have minimal fungicide demand, contributing to resilience and mitigation of environmental damage.
- Increased annual wheat production across target regions of 2%.
- Connection to NARs programs in 100+ countries, leadership in global wheat research community.

Next Steps

- Demonstrate continual improvement in program operations and adoption of accelerated breeding strategies as a model for effective CG breeding
- Establish closer CG-NARs testing of earlier stage breeding material
- Mainstream enhancement to co-deliver food and nutrition security.

Basket 2 Session 3
CLIMATE RESILIENCE

Basket Curator: Ana Maria Loboguerrero Rodríguez

MRV Platform for Agriculture
Measuring, reporting and verifying greenhouse
gas emissions and mitigation

KNOWLEDGE PORTAL   ABOUT   QUANTIFY GHGS   CONTACT   Select Language ▼   Powered by ●●● TRANSLATE   Q

Resources and guidance for MRV of mitigation in agriculture

Current Scope & Maturity

The AgMRV platform has been operational since 2018. It includes resources for assessing GHG emissions of activities on livestock, rice, soil, agroforestry, food loss and waste, and agriculture generally. In 2019 and 2020 usability surveys were conducted and the site was enhanced. Resources are regularly added to the site and tools updated.

Golden Egg Challenge

A transition to low-emissions agriculture requires robust information on GHG emissions and practical methods for monitoring. Insufficient data exist on emissions for heterogeneous smallholder systems

AgMRV Platform for Greenhouse Gas Estimation

The AgMRV Platform is a one-stop site for resources to quantify greenhouse gas (GHG) emissions in agriculture, especially for smallholder farms.

The comprehensive, searchable site enables quick access to diverse tools, data, and other resources on the measurement, reporting and verification of agricultural emissions and their mitigation. National governments are a primary audience.

Highlights include the Mitigation in Rice Kiosk, N_2O global database, Agro-chain emissions (ACE) food loss and waste calculator, livestock Tier 2 methods, and the SAMPLES GHG data and estimation methods.

CGIAR

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Outcomes

- Brazil's private sector developed a carbon-free meat label
- Colombia used Tier 2 reporting for improved national GHG inventory
- China developed provincial Tier-2 MRV guidance for livestock
- Ethiopia adopted Tier 2 GHG inventory for cattle, sheep, and goats
- Vietnam enhanced their Nationally Determined Contribution (NDC)
- Future outcomes: expect countries to improve their mitigation strategies, NDCs and reporting.

Next Steps

Balance subsector representation (e.g. soils and nitrogen fertilizer). Add global data. Maintain updates.

Initiatives link: Net carbon sources to sinks, livestock, Asian mega-deltas, Latin America and the Caribbean

CCAFS

GLOBAL RESEARCH ALLIANCE
ON AGRICULTURAL GREENHOUSE GASES

Current Scope & Maturity

CGIAR FOCUS Climate Security recognized as critical research of 1CG and 1CG recognized as a key player in the peace and security landscape.
https://www.climatesecurity.cgiar.org

Golden Egg Challenge

Without peace, there is no end to hunger. Without food security, peace cannot last. CGIAR has a key role to play for peace and security.

CLIMATE SECURITY

CGIAR Delivering the Scientific Foundations for Peace and Security

Food, land & water systems in a climate crisis are at the heart of peace and without peace, there is no end to hunger. CGIAR's plays a critical role for peace and security. CGIAR FOCUS Climate Security has positioned CGIAR in the Humanitarian Development and Peace nexus (HDP) globally, established a broad network of partners and is leveraging CGIAR science for peace and security: **Evidence 4 Peace**, **Policies 4 Peace**, **Programming 4 Peace, Finance 4 Peace**.

FOCUS
Climate Security

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Outcomes

Continuous briefing of UN Security Council members & informing peace & security programming (WFP, ICRC, IRC); Africa Crisis Observatory

Expected further outcomes

By 2024 developed a Global Climate Crisis Observatory; informed climate & conflict sensitive policies (15), programming (10 MIO beneficiaries), investments (500 MIO USD) & CGIAR research portfolio.

Next Steps

Mainstreaming climate & conflict sensitive programming across CGIAR initiatives to support peace and security; embedding CGIAR FOCUS Climate Security in UN FSS and beyond.
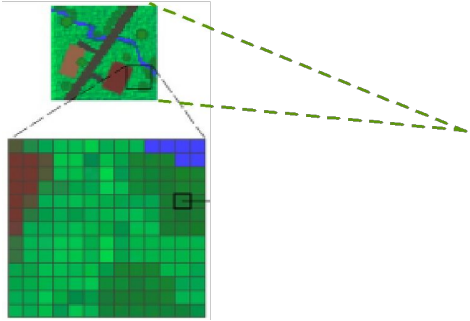
Current Scope & Maturity

CCAFS-Climate has been fully operational for over 12 years and is ready for uptake by next users

Golden Egg Challenges

- CCAFS-Climate is 7 TB, and its creation required substantial computing capability.

- Continued user engagement through projects and individual requests is important to correct errors, expand, and improve.

- Sustainability in information provision in a "projectized" world can be a challenge

CCAFS-Climate: A global high-resolution database of climate change projections

Agricultural researchers require high resolution spatial data on climate change scenarios. Yet, IPCC climate models are largely unsuitable for impact studies due to their low spatial resolution. CCAFS-climate fills this gap by providing high-resolution (1x1 km) global climate projections that agricultural scientists and practitioners can use to understand climate change impacts and devise adaptation options.

CCAFS-Climate is developed by collating and statistically downscaling Global Climate Model data for all IPCC model ensembles. We then offer the resulting high-resolution data through a web portal at www.ccafs-climate.org

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Outcomes

- Influencing funders investing in further research, NGOs and government agencies changing their programming.

- 800 individual research documents cite use of CCAFS-Climate

Expected further outcomes

- Influencing WFP programming around the globe

- Contributing data and evidence to investment decisions through Adaptation Atlas
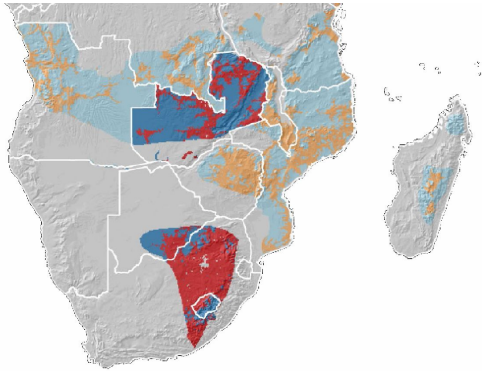
Next Steps

Offer greater temporal resolution, and offer crop-model-ready data

Aligned with ClimBer and other initiatives looking into climate adaptation.

Current Scope & Maturity

Various tools are available and being applied in different contexts. New links with ERA, see era.ccafs.cgiar.org, and the Adaptation Atlas, for example, are broadening the scope of the analyses possible in exciting and innovative ways

Golden Egg Challenge

Data access and availability can be constraints, though open source and Big Data methods are helping greatly

Benefits of co-development with users to enhance credibility and legitimacy

Spatial prioritisation and targeting tools for adaptation and mitigation planning and implementation at different scales

CCAFS and partners have developed and applied various tools for targeting and prioritising climate-smart agriculture interventions at different scales, see ccafs.cgiar.org/resources/tools. Many of these tools combine the elements of the UNFCCC's risk framework: which are the hazards faced, how are people and systems exposed, and how are populations vulnerable. Information on the resultant agricultural risks are then combined with users' objectives and contexts to target and prioritise appropriate interventions that can help small-scale value chain actors better manage their risks, increase their resilience to climate and other shocks. Identifying context-specific climate-resilient, low-emissions development pathways is crucial for achieving the SDGs and leaving no-one behind.

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Outcomes

- Influencing funders' investments in agricultural research for development

- Assisting governments and NGOs to plan and implement climate smart agriculture at scale

Expected further outcomes

- Building further on CCAFS's investment, adaptation and mitigation outcomes around the globe

Next steps

- Developing climate-resilient development pathways for small-scale food system actors

- Alignments with regional and thematic initiatives on climate adaptation and mitigation

**Basket 3 Session 3
WATER, SOIL AND LAND USE**

Basket Curator: Stefan Uhlenbrook

BASKET: Water, Soil & Land Use

Context

Improved governance is critical to improving rangeland condition, reversing degradation and building resilient livestock systems. Communities and governments benefit from well-designed tools and processes.

Current scope and maturity

- Kenya, Ethiopia, Tanzania, Tunisia
- The innovations are between stage 2 and 3 – disseminated in four countries but limited evidence of scaling.
- Evidence of success has attracted government support, donor support, and partnerships with GLF, IUCN and UNEP.

Golden Egg challenges

- Initiatives require sustained effort not served well by short funding timelines
- Stakeholders gradually recognizing the need to tailor policies and land governance systems to the unique characteristics of rangelands

Better rangeland management through inclusive processes and tools

- Approaches and tools were developed to facilitate communities in defining and articulating their land use objectives and strategies to align with or influence national policies

- The tools include guidance for community land mapping; processes for higher level recognition of community land use plans; protection of rangelands through recognized land use planning processes; and embedding local planning into national forums and dialogues.

- This work is helping bridge some of the gaps between government policy objectives and the specific needs and contexts faced by pastoral communities transitioning from traditional systems of land use.

RESEARCH PROGRAM ON
Livestock
CGIAR

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Outcomes

Key approaches and tools developed have been taken up at various country levels:

- Participatory rangeland management (PRM) toolkit and County Spatial Planning Kenya
- Joint village land use planning (JVLUP) under the Sustainable Rangeland Management project in Tanzania has led to improved natural resource management and reduced land use conflicts through formalized grazing rights for pastoral and agro-pastoral communities
- Woreda Participatory Land Use Planning (WPLUP) in pastoral and agro-pastoral areas in Ethiopia
- A new pastoral code for Tunisia to reverse degradation across the country's critical rangelands

Future steps

- Expand use of the approaches and tools across the countries
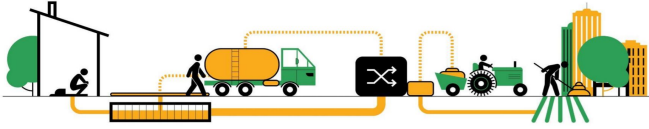- Adapt to implement in new countries with government interest and local demand

Partners

IUCN

IFAD
Investing in rural people

Including community-based organizations, NGOs

Status

- Approximately 60 business models are available for organic municipal waste, food waste, fecal sludge (see picture above), agro-industrial waste and wastewater.

- The models are based on existing empirical cases, have been tested and verified, and are in the public domain (one 800-page catalog and a series of 20 reports).

- Methodologies for multi-disciplinary feasibility studies have been developed and tested.

-Several models have been translated into training materials and curricula.

- Another (WHO and FAO approved) catalog of food safety measures 'from farm to fork' is available where untreated wastewater is used for vegetable irrigation.

Challenges and learnings

- Most partners have been outside the CGIAR which only slowly discovers the opportunities and challenges urbanization and business modeling offer.

- The CGIAR needs to be more innovative (e.g. advisory services) to keep staff with private sector background who appear crucial for our scaling ambitions.

Circular economy business models to recover nutrients, water and energy from waste for agriculture

Increasing urban food and water consumption turns (peri)urban areas into resource sinks and pollution hotspots. We offer technologies and business models to reduce landscape and wetland degradation by recovering resources from domestic and agro-industry waste for safe reuse in agriculture and aquaculture.

These models support e.g. organic fertilizer production at scale, which allows cost recovery in the waste/sanitation sector to incentivize PPP and better service delivery. Through analysing and supporting the local [enabling] environment and methodologies developed for multi-disciplinary feasibility studies, we can test the application and viability of different models in (peri)urban project locations.

RESEARCH PROGRAM ON Water, Land and Ecosystems
CGIAR

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Outcomes to date

- 4 Public-Private Partnerships (PPP) facilitated for co-composting, dry fuel production (briquette) and wastewater-fed aquaculture.
- 10 advisory services provided to authorities and development banks.
- About 20 universities interested, with 6 already using our modules.
- 5000 professionals under training in India.
- 10,000 students taught via MOOC (by SANDEC/EAWAG) using our modules.

Anticipated next steps

- Increasing emphasis on the analysis of sustainable finance, monetizing positive externalities, and the regulatory and fiscal environment to support circular model start-ups and scaling.
- Offering of advisory services and feasibility studies to national partners, projects and funding agencies.

cewas
international centre for water management services

eawag
aquatic research ooo

RESOURCE RECOVERY FROM WASTE
Business Models for Energy, Nutrient and Water Reuse in Low- and Middle-income Countries

Current scope and maturity

Quantify long-term effects of agronomic management on system's resilience, agronomic productivity, soil health, resource use efficiency and GHG emissions in a global long-term experiment (LTE) network, initiated in 1990s and 2000s across a diversity of farming systems and agro-ecologies, providing the backbone for modelling, impact assessment and scaling.

Golden Egg challenges addressed and learning

- Reduced production risks under increasingly variable climates and socio-economic constraints,
- Improved resource use efficiency and reduced soil- and land degradation,
- GHG mitigation and reduced air pollution,
- Long-term, reliable data that supports modelling, impact assessment and scaling.

The treasure of agronomic long-term trials: Capitalizing on past investments for science-based scaling

Our network of 17 LTEs on conservation agriculture across three continents (Latin America, Africa and Asia) in major cereal–based cropping systems was designed to address the grand production challenges in the global south. The LTEs generate hard evidence on sustainability and adaptability and additionally serve as a platform for capacity building with a new generation of researchers and for demonstration of agronomic effects to farmers, farm advisors and policy makers. Main users of outputs and outcomes are science and policy leaders, development practitioners and private sector agents to develop research priorities, investment decisions and business development around resource management and climate resilient production systems, contributing to key SDGs.

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Outcomes to date

- LT effect of agronomic practices documented in 118 international publications,
- Capacity development (62 thesis students, 500+ researchers, 1000+ extension agents, 3500+ visitors/year),
- Input for evidence-based policies,
- Farmer-adoption of sustainable practices at scale (Mexico, India, Malawi)

2. Expected further outcomes

- Scenario-based targeting and guidance for climate financing,
- Evidence for SDG tracking,
- Data for global climate modelling,
- KPI integration as base for policy making,
- Capacity development hubs

Next Steps

- Continuity is key for LTEs;
- Connection to a dozen Initiatives (RII and Global)
- LTE-CoPs, data harmonization, modelling and field validation for future challenges

Partners

- Research partners: NARES (54 institutions have co-authored publications);
- Scaling partners: local and regional NGOs and private sector partners.

BASKET: Water, Soil & Land Use

Current scope and maturity

Wide range of tools developed at different levels of maturity:

- For some prototypes developed but need scaling: managed aquifer recharge, agrobiodiversity index

- Others need more R&D: e-flows, integrated water storage options, flow regulating functions of ecosystems

Golden Egg challenges and learning

- Co-development of decision-support tools and processes with stakeholders is critical

- Balance between integrating relevant components in on-going initiatives and pushing the frontiers as 'holistic' package

- Iterative learning process to strengthen and tailor the evidence, narrative and pitch

WLE 1 - Toolbox of Nature-Based Solutions (NBS) for people and planet

Inspired by the processes and functioning of nature, NBS are increasingly promoted as critical components in the management of land, water and food systems. However, there is an enormous disparity between scientific research and the policy discourse. The lack of an evidence-base is one reason why investments in NBS remain low.

WLE has conducted research to understand the role that NBS can play in development. This has resulted in a number of tools that can be used to better understand how NBS can be integrated in landscape management and function in tandem with traditional engineered infrastructure; not simply mitigating damage but actively seeking synergies and enhancing a broad range of benefits for building resilience and sustainability.

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Outcomes

- Incorporation of WLE e-flows method into SDG 6.4.2

- Managed Aquifer Recharge for flood mitigation and irrigation

- Colombo wetlands incorporated into city flood control strategy

- Innovative Food System Solution Portal

- Agrobiodiversity Index Nature Food

- CBD papers, statements and country interactions

2. Expected further outcomes

- Greater uptake of NBS in water and land planning and investments

Next steps

- Further development and scaling of tools

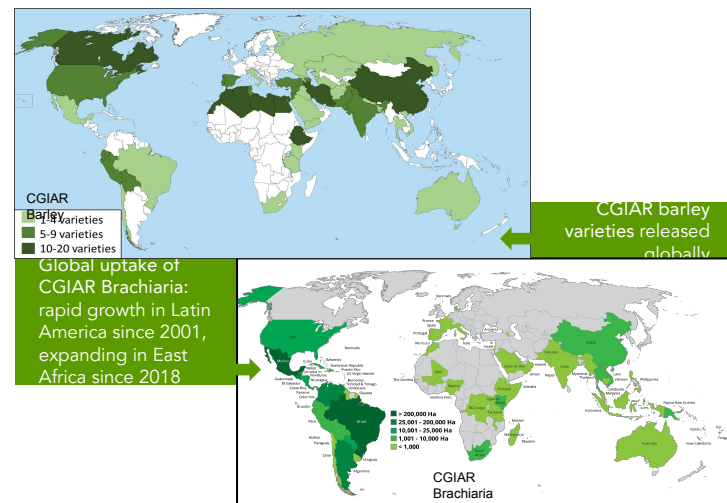- Targeted communications and promotion to increase awareness and update

**Basket 4 Session 5
LIVESTOCK AND FISH**

Basket Curator: Tom Randolph

BASKET: Livestock and Fish

Current Scope & Maturity

Portfolio of existing forage varieties and various tools for delivery are available, e.g. seed system development, extension and technical assistance

CGIAR barley varieties released globally

CGIAR
Barley
1-4 varieties
5-9 varieties
10-20 varieties

Global uptake of CGIAR Brachiaria: rapid growth in Latin America since 2001, expanding in East Africa since 2018

> 200,000 Ha
25,000 - 200,000 Ha
10,001 - 25,000 Ha
1,001 - 10,000 Ha
< 1,000

CGIAR Brachiaria

Golden Egg Challenge

- A toolbox for assessing options to make best-use of existing resources and new solutions
- Reproduction modes and dissemination modes e.g. PPP and finished/pre-breeding options
- Forage and food-feed crop options for different agro-ecologies and farming systems
- Current/future biotic and abiotic factors
- Demand for environment services

Forage and food-feed crops to realize livelihood and environmental benefits at scale

Improved forages and food-feed crops are increasingly adopted globally, designed to adapt to diverse ecologies and production systems and specific needs of smallholders

Forage and Food-Feed crops are critical to maximize systems performance to achieve synergies between social, economic and environmental aspects ('Win-Win-Win')

We develop and deliver solutions customized to specific contexts and systems through formal and informal channels, with special emphasis on smallholders.

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Outcomes

- Increased productivity, sustainability and resilience of livestock components in farms
- More and better meat and dairy products that benefit value chain actors and consumers.
- Tools for institutions (i.e. private sector) to increase breeding efficiency
- Functional pipelines for a set of forages and food-feed crops across CGIAR centres

Next Steps

Improving/expanding existing pipelines
Bringing forages and food-feed crops to scale further (e.g., through development of seed systems, extension systems, credit systems)

Initiative fit

Included in: ASPIRE; Syst. Inten. systems; SAPLING; ANIMALS; Nature positive Agric.; Plant health; all Genetic Innovation, Genebanks

Relevant to: Regional Initiatives; S2C: Nexus gains; Transform. Agroecology; Excellence Agronomy; Foresight/Impact

Including NARS, NGOs, development partners, universities and civil society

(left) Trial in the animal respiration chamber at ILRI's Mazingira Centre (photo ILRI/ S. Marquardt); (right) A farmer in West Bengal, India, ploughs his field (photo ILRI/S. Mann).

Current scope and maturity

- CLEANED (Comprehensive Livestock Environmental Assessment for Improved Nutrition, a Secured Environment and Sustainable Development along Livestock Value Chains)ex ante has proven uptake and application
- Established protocols for greenhouse gas (GHG) emissions baselining & intervention testing for livestock systems in Africa

Golden Egg Challenge

- General livestock sustainability narrative overly negative and based on insufficiently nuanced/grounded information for developing countries
- Environmental sustainability of livestock production needs to be managed
- Site-specific data essential for identifying opportunities and solutions

Tools to measure the environmental footprint of livestock systems

Aim: To show that the environmental footprint of livestock is multi-dimensional and that solutions to reduce this footprint exist while ensuring sustainable intensification of livestock productivity.

Methods: creation of localized data to develop targeted solutions that can be upscaled to different livestock systems & agro-ecological zones in developing countries.

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Outcomes

These approaches and tools have been taken up at various levels:

- CLEANED users trained in >10 countries, assessments carried out in > 10 countries
- Published GHG emission baselines for cattle and manure in Kenyan highlands
- Emissions baseline data included in IPCC's Guidelines for National GHG inventories: 2019 Refinement of the 2006 Guidelines.

Expected further outcomes

- Emission baselines for all ruminants in 7 systems in East & West Africa until 2022
- Intervention testing to reduce emission intensities (GHGs per product)
- Upscaling of emissions by system and agro-ecological zones for Africa

Next Steps

Training and technical back-stopping of next-users, dissemination of assessment results

Support for national GHG emission inventories

Expand empirical work to other environmental dimensions (water, soils, landscape, diseases, etc.)

BASKET: Livestock and Fish

Community conversations in Doyogena District, Ethiopia (photo ILRI/G Smith)

Current Scope & Maturity

- Pilot tested, scaling stage
- Implementation rollout by partners
- Extension guidelines and master training course created

Golden Egg Challenge

- Conventional mindset, limited engagement and partnering capacity of partners
- Influencing through action and social learning processes
- Nudging veterinary services to uptake/adopt technology
- Facilitating integrated implementation and scaling

Photo ILRI/ B. Wieland

Digital farmer-support systems and 'community conversations' that promote an integrated herd health approach to managing livestock health as a service business model

Veterinary research and service in LMICs have generally focused on control of individual diseases.

Community-based approaches enable livestock keepers to manage better the overall health of their herd, including appropriate use of antimicrobials to reduce risk of antimicrobial resistance developing.

Community conversation is inclusive, stimulates collaborative learning, engagement, partnering capacity and enhances uptake of integrated health interventions. It is found effective in less commercially oriented production systems.

Digital platforms provide value by making information accessible (e.g., interactive veterinary care services) and increasing community conversations through the integration of appropriate ICT tools for two-way sharing critical herd health information.

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CGIAR | RESEARCH PROGRAM ON Livestock

Outcomes

- Change in mindsets and practices regarding gender roles, access to and control over resources, decision-making, handling livestock, and food consumption.
- Partner capacity strengthened for uptake of integrated herd health interventions

Expected further outcomes

- Community voices inform integrated herd health interventions.
- Improved communication and engagement capacity of animal health service providers

Next Steps

Integrate approach as inclusive, integrated implementation method

Community conversations informs to content development for digital farmer-support systems

Partners
In Ethiopia: Ethiopian Institute of Agricultural Research (EIAR) is a national partner; Ministry of Agriculture (MoA)
In Uganda: Makerere University; district local Governments

Current Scope & Maturity

Innovations that integrate fish and aquatic foods into farms, landscapes and water system, currently at different levels of maturity:

- Community fish refuges (CFRs) in multifunctional rice and wetland landscapes (Cambodia) at maturity level 3.
- Water management approaches to better integrate fish and aquatic foods into irrigation planning, construction, operation and management (Mekong region) at maturity level 2.
- Decision support tool for scaling integrated fish-rice production systems combining biophysical and socio-economic data including climate vulnerability and risk (Myanmar) at maturity level 1.

Golden Egg Challenge

Integrating fish within agroecological practices at farm and landscape levels builds resilience and improves availability of healthy and nutritious foods and livelihood outcomes.

Successful integration of fisheries in irrigation and water management and governance secures nutrition and income, but dependent not only on technical solutions but also improved institutional and governance arrangements.

Securing the benefits of fish and aquatic foods for poor and marginal households requires an integrated approach, beyond technical fixes, to include food, land and water system management and governance.

Integration of fish and aquatic foods within multi-functional landscapes

FISH has focused on the Mekong region and South Asia to develop management and governance innovations that integrate fish within larger agro-ecosystems and land and waterscapes including water infrastructure.

Research has shown that multiple benefits arise from integrating fish and aquatic foods into the planning, design, construction, operation and management of irrigation systems, large scale water infrastructure, and agricultural landscapes. Results indicate increased fisheries production, nutrition and resilience outcomes. Rice and fish production are often integrated within the same biophysical, temporal, and social spaces - social, technical and institutional innovations have been shown to increase productivity, biodiversity with flow on impacts to food and water security, and resilience to climate change.

FISH has developed decision support tools (models, institutional mechanisms, maps and guidelines) to support management and governance of fish and aquatic foods within landscapes hand water systems, contributing to securing the substantial potential to support such "nature-based" innovations in agriculturally modified landscapes.

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RESEARCH PROGRAM ON Fish
CGIAR
Led by WorldFish

Outcomes

In the adoption of rice-fish systems in Myanmar, early modeling suggests that if 10% of the potential area for rice-fish systems was used that an additional 100,000 mt of fish and $100 million USD could be generated for households and the rural economy.

Well-managed CFRs can significantly improve fish productivity of the rice field environment within one year after the intervention (e.g., fish caught increased by 30 percent, and the proportion of young children under five eating small fish increased by 50%).

With well over 300 million hectares of irrigation globally and huge investments, the "fish friendly" irrigation guidelines have the potential to be very influential.

Next steps

A targeted awareness campaign to support uptake of the guidelines and investments for roll out in 2 countries in Asia.

An investment plan for Rice-Fish Systems (RFS) based on forecasting and robust cost benefit analyses in Africa and Asia.

Key Partners:

USAID FROM THE AMERICAN PEOPLE
Food and Agriculture Organization of the United Nations
IRRI International Rice Research Institute
IWMI International Water Management Institute
WorldFish

Basket 5 Session 5
GENDER AND SOCIAL INCLUSION

Basket Curator: Nicoline de Haan

Current Scope & Maturity

The tools were developed in the South Asia context and are being revised to allow customization for regional variation.

The hotspot tool has been tested in two countries (India and Nepal). The GEI-CSV tool has been tested in India and is in the process of being tested and revised across 4 regions.

Golden Egg Challenge

- Limited action to ensure gender integration in adaptation programs
- Limited evidence on the gender-responsiveness of the programs that do integrate gender.

Gender and social inclusion tools for CSA prioritization and monitoring: GEI-CSVs and Gender, agriculture and climate hotspots

- Formed to ensure that gender equality is easily integrated and measured across climate change adaptation programs.
- A one-stop-shop for planning, monitoring and evaluation needed for interventions addressing gender outcomes of climate change adaptation and food security.
- Enables investors and policymakers to reroute action towards regions where gender-responsive climate action is most necessary.
- A two-tier approach for mainstreaming gender into climate change adaptation and mitigation:

  1. A gender, climate and agriculture hotspot mapping method – identifies "hotspots" where women experience high levels of climate risk including drought, excess rainfall and high temperatures.

  2. The Gender Empowerment Index for Climate Smart Villages (GEI-CSV) measures empowerment for women and men from CSA adoption in different contexts.

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Outcomes

1. Outcomes to date

- Adopted by an IDRC funded project of the CGIAR GENDER Platform and integrated into AICCRA;

2. Expected further outcomes

- Ready for adoption by stakeholders to measure results of CSA activities and to prioritize next step gender-responsive climate action.

Next Steps

Revision of tools to apply to different contexts.

Partners: CCAFS Regional Programs in Latin America, East Africa, West Africa, South Asia and Southeast Asia

Current scope and maturity

GENNOVATE methodology applied in over 26 countries and 137 communities.

Extensively tested across regional contexts, the methodology is mature and ready to be scaled, readily adapted to serve multiple purposes.

Challenges addressed and learning

- The need to engage with gender norms to unlock innovation
- Fragmentation of gender research
- The need to increase capacities in CGIAR/partners across regional contexts to work on gender norms and agency

GENNOVATE

Food system innovations that fail to account for gender differences and inequalities are more limited in their impact and may exacerbate gender inequalities.

The global comparative research initiative **GENNOVATE** addressed this challenge by surfacing the gender-based barriers and underlying norms as well as the agency that influence the capacities of men, women, and youth to innovate in agriculture and environmental management.

Key pieces of GENNOVATE such as its methodology, conceptual framework, qualitative database, as well as tools (17), reports (16), theses (8), and peer-reviewed publications (>30) based on findings can inform the design of nearly all Initiatives and form a basis for gender transformative innovations.

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CGIAR

Outcomes

- GENNOVATE put gender norms on the CGIAR and AR4D agenda, laying the ground for gender transformative programs.
- Methodology taken up in studies and trainings across CGIAR and academia and used to inform programming by FAO, WFP, IFAD.
- Referenced as good practice by international institutions (e.g. FAO, IFAD, the EC, ACIAR, USAID Feed the Future).

Next Steps

The GENNOVATE methodology is available online and gender researchers across CGIAR and partners across regions have capacities in using and adapting it.

A suite of tools and resources can be used to inform the design of Initiatives.

GENNOVATE data are accessible upon request, subject to use regulation

A GENNOVATE 2.0 initiative is under development.

BASKET: Gender and Social Inclusion

Current State & Maturity
Stage 4;
Uptake by next user, Scaling.

Challenges Addressed & Learning Opportunities

Adaptation to different countries and projects: Mixed methods and validation in multiple countries to develop all WEAI versions

Going beyond production to market inclusion: Pro-WEAI+MI developed to include other nodes of the value chain beyond production

Streamlining the questionnaire: Psychometric validation used to shorten item sets

Scaling up via national statistical systems: Working with WB-LSMS and the 50 x 2030 Initiative to develop and scale up Women's Empowerment Metric for National Statistical Systems (WMENS)

The Women's Empowerment in Agriculture Index: a suite of methods for measuring empowerment and gender equality

WEAI and A-WEAI for population-based monitoring
We developed WEAI and related measures to measure women's empowerment and gender equality for population-based monitoring and impact assessment of gender-sensitive agricultural development projects. Original WEAI (co-developed with USAID and OPHI) was based on pilots in Bangladesh, Guatemala, and Uganda. An abbreviated version with six indicators was also developed (A-WEAI), used by USAID in monitoring its programs.

Pro-WEAI & adaptations for projects
Pro-WEAI was co-developed with 13 agricultural development projects in nine countries in Africa and South Asia, including adaptations for livestock, health and nutrition, and market inclusion projects. Such indicators are important to know whether projects Reach, Benefit, or Empower women.

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Outcomes to date
- WEAI and adaptations used by 113 organizations in 56 countries
- WEAI used to design and scale up ANGeL nationwide in Bangladesh
- Pro-WEAI used in more than 40 projects, leveraging US$2.4 billion and reaching 10.5 million people

Expected further outcomes
- Expanded use by NGOs and projects for impact assessment and M&E
- Expanded use by national statistical systems to monitor progress toward SDG 5

Next Steps
- WEAI users trained using a distance learning platform
- WEAI/nutrition measures integrated in CGIAR projects via GENDER Platform
- Development and scale up of WEMNS with WB-LSMS, Emory, and 50 x 2030 Initiative

Partners
BMGF, USAID, IFAD, OPHI, Emory, Oxford, WB-LSMS, 50 x 2030 Initiative, Government of Bangladesh, Malawi National Statistics Office, BRAC, HKI, Grameen Foundation, PRADAN, among others

BASKET: Gender and Social Inclusion

thrive
the future of our food, water and environment

Current Scope & Maturity

Reflective experiential learning framework being piloted on WLE projects with varying degrees of focus on gender and inclusion, enabling interdisciplinary researchers to reflect on their understanding of gender, and the relevance, added value of gender-responsive projects.

Golden Egg Challenges

Disciplinary Science Silos within the CGIAR

Although a crosscutting issue, gender is considered the responsibility of specific groups of researchers, and is unevenly applied across emerging innovations.

Compelling discussion, commentary, stories on agriculture

Learning by reflection: knowing and doing gender equality and inclusion

WLE presents a narrative enquiry framework designed to build gender capacity on the go. The objective is to enable disciplinary scientists and research project teams - reflect on the relevance, added value and ways to know and do gender, building on their individual, experiential knowledge.

This methodological approach enables researchers with varying levels of gender knowledge reflect on "what is gender; why and how to do it", as a means to arrive at practical, actionable pathways to gender-responsive research. This is key to achieving the 1CGIAR's goal of sustainable and *inclusive food system transformations*.

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RESEARCH PROGRAM ON
Water, Land and Ecosystems
CGIAR

Outcomes to date

Conceptual Framework: learning by reflection and experiential knowledge

Tools and approaches that allow self reflection on gaps between intent, outputs and outcomes developed and being tested

Expected further outcomes

GENDER Platform adopts the approach as the Institutional Change Initiative framework for operationalizing gender responsive research.

Anticipated Next Steps

Framework aligned to the CGIAR GENDER Platform Institutional Change Initiative

Partners

KIT, Netherlands (current)

GenderatWork (planned)

KIT Royal Tropical Institute

**Basket 6 Session 5
SCALING, PARTNERSHIPS AND TRADE-OFFS**
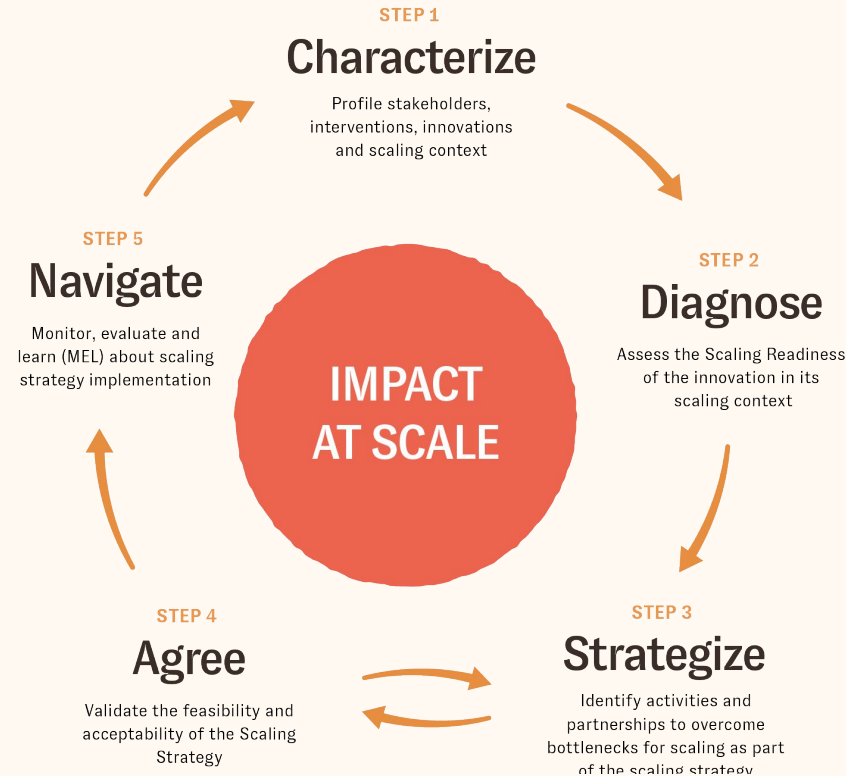
Basket Curator: Graham Thiele

What it does for you:

- Characterize Innovations and Innovation Packages

- Diagnose bottlenecks for innovation and scaling

- Strategy design using evidence

- Capacity Development, MEL and Innovation Portfolio Management

Scaling Readiness: Assessing and accelerating the scaling of innovations

STEP 1
Characterize
Profile stakeholders, interventions, innovations and scaling context

STEP 5
Navigate
Monitor, evaluate and learn (MEL) about scaling strategy implementation

IMPACT AT SCALE

STEP 2
Diagnose
Assess the Scaling Readiness of the innovation in its scaling context

STEP 4
Agree
Validate the feasibility and acceptability of the Scaling Strategy

STEP 3
Strategize
Identify activities and partnerships to overcome bottlenecks for scaling as part of the scaling strategy

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Outcomes

- 25 diverse use-cases across the world

- Embraced by One CGIAR as key mechanism to implement its Research and Innovation Strategy

- Key criteria in One CGIAR stage-gating

- Growing Community of Practice and Professionals

NOVEMBER 2020

SCALING READINESS REPORT AND SCALING PLAN

for training and certification approach for small scale pig feed producers in Uganda
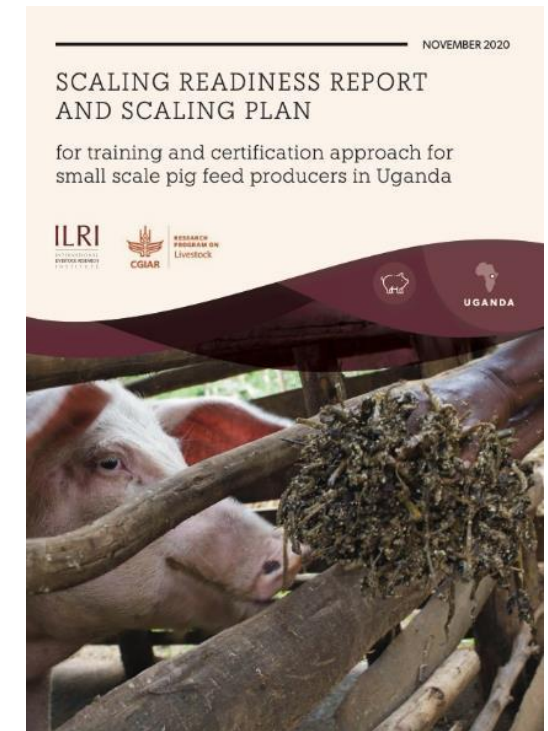
Current scope and maturity

A pan-CGIAR digital innovation grant process leveraging the global footprint and food security expertise of CGIAR, now in its fourth cycle.

A growing, recognized brand for CGIAR-led digital innovation in agrifood.

Challenges and learning

- Developing a unified, pan-CGIAR digital innovation function and practice linked to the portfolio

- Building new digital partnerships in a systematic way to make the digital revolution central to our way of conducting and delivering research.

Inspire Challenge Digital Innovation Grant Process

The Inspire Challenge set out to be CGIAR's signature digital innovation process, leveraging the global footprint and deep food security subject matter expertise of CGIAR researchers with expert industry partners to build new digital impact pathways for our research.

Now in its fourth cycle, the Challenge has 21 active projects, a recognized brand, and interest in new or continued funding from BMGF, USAID, ADB, IADB, World Bank and the impact investing fund IDH.

The Challenge represents a mature process, ready brand, and growing networks of partners and interested funders that could add value to the new portfolio from day one—making the digital revolution central to our way of working.

Platform for Big Data in Agriculture

CGIAR

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Outcomes to date

Teams comprised of CGIAR researchers and external partners submitted 546 applications over 4 years;

21 active projects with evolving impact stories, partnerships and new funder relationships.

$1,000,000 in new bilateral funding, including from USAID and BMGF, sparking new co-design of challenge categories with funders.

An external evaluation found that the Challenge was an effective intermediary for fostering new digital innovation linking public, private, and non-profit actors.

Expected further outcomes

Digital "Innovation as a service" offerings to our major funders and regional stakeholders.

Building more scaling partnerships according to innovation type, e.g. impact investment funds.

Next steps

Promote Inspire Challenge learnings and process as a way to build a cross-cutting digital innovation practice supporting the new portfolio.
Aligned with all initiatives that will be using, developing or leveraging digital tools and technologies.

Current scope & Maturity

This research partnership between IARC, NARS and private sector harnesses the power of crop improvement to generate 'bankable'' research products that catalyse private and public investments and generate multiple benefits along the value chains of two GLDC crops: Pearl millet and Beans.

Pearl millet: Through Pearl Millet Hybrid Parents Research Consortium (PMHPRC) network, ICRISAT-bred materials find a fast delivery vehicle to reach farmers, which leads to rapid adoption of diverse range of hybrids on farm.

Common Beans: The Pan-Africa Bean Research Alliance (PABRA), brings together researchers from 31 NARS across sub-Saharan Africa, universities, the Alliance and other 540 actors (private and producers' organizations) from 31 countries grouped in nine cross country bean corridors to jointly coordinate research implementation and achieve synergy in outcomes.

Golden Egg challenges addressed and learning

Pearl millet: The public and private sector institutions involved in pearl millet improvement continuously require new diverse productive germplasm with biotic and abiotic stress tolerances to develop improved cultivars, and PMHPRC platform meet their requirements.

Common Beans: The increased demand of dry bean products requires increased bean production and productivity, inclusive and profitable value chain.

Anticipated Next Steps

Catalyze more private and public investments along the value chains in existing and new ecologies

Research partnerships and farmer engagement models

Pearl Millet: ICRISAT recognized Private Sector (PS) seed companies as a valuable research partner for research on hybrid cultivar development and seed production. This led to the conceptualization and formation of Pearl Millet Hybrid Parents Research Consortia (PMHPRC) during 2000 with involvement of both public and private sector partners. The consortia funds augment ICRISAT's research on pearl millet though the products resulting from this partnership are still in the public domain as IPGs.

Common Beans: Following demand led research, PABRA researchers develop climate smart, farmer and consumer preferred varieties to achieve an inclusive economic growth. The partnership generates research products such as farmer preferred and market demanded varieties, complementary technologies and information and knowledge. It also accelerates inclusive access and wider use these products

Alliance

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Outcomes

Pearl Millet: Hybrids developed under PMHPRC provided at least 20% higher grain and fodder than the varieties/other hybrids they replace. Promising cultivars released in Brazil, and some African countries

Common Beans: More than 538 improved farmer preferred, and consumer demanded bean varieties, 45 of them bio-fortified rich -Iron and Zinc, have been released 21.5 M (including 58.1% women) farmers accessed improved varieties between 2015-2020. Bean productivity doubled in Uganda and Ethiopia from 0.8 tons/ha in 2008 to 1.6 tons/ha in 2018
Various bean-based product developed and commercialized by 250 SMEs.

Expected further outcomes

Pearl millet: Increase in mainstreaming of biofortification traits in private sector breeding programs.
Better climate resilient cultivars to cope with the challenges of climate change.
Common Beans: Improved productivity of beans at the farm level across several countries with wider and sustainable access to quality seed.
Improved consumption of highly nutritious and convenient bean-based products

Partners

Pearl Millet: ICRISAT; Indian Council of Agricultural Research centers and State Agricultural Universities of India; about 30 private sector seed companies in India and abroad.
Common Bean: Alliance of Bioversity International and CIAT; Pan-Africa Bean Research Alliance; 31 NARS across 31 countries in sub-Saharan Africa; 540 private & public actors and producers' organizations.
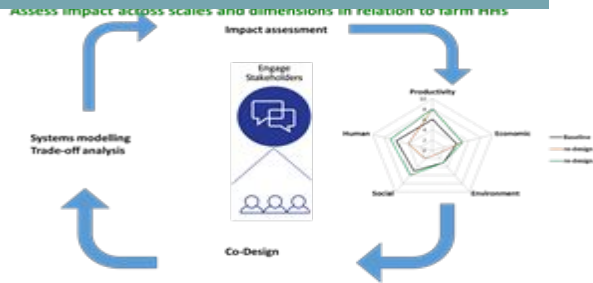
Current scope and maturity

- Tested at a small scale in India and Niger
- Further testing and adaptation needed before widespread scaling
- Support co-design of interventions for enhancing the sustainability of smallholder farming systems, particularly in vulnerable communities
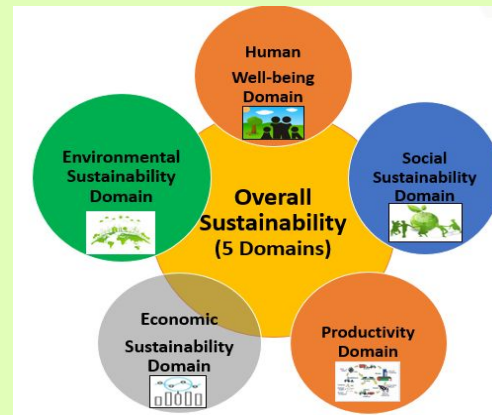
Golden Egg challenges addressed and learning

It fills a key gap in the form of easy to use and a comprehensive tool enabling R&D stakeholders to design holistic & effective solutions considering multidimensional challenges to improve wellbeing of smallholders and sustainability of farming systems.

The tool includes indicators that are easy to measure and cover relevant dimensions of the farming systems.

Multidimensional Sustainability Assessment Tool for Smallholder Farming Systems

User friendly tool and automated dashboard:

- Assessing farming systems sustainability and trade-offs between sustainability domains
- Stakeholder-driven identification among 115 indicators categorized in themes.
- Evaluation of identified trade-offs using farm systems modelling
- Co-design of context-specific systemic solutions for smallholder farm and food systems

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Outcomes to date

- User-friendliness: improvement over existing frameworks.
- Validated with stakeholders and implemented in the field.
- Flexibility to adjust as per the context and priority of the users.

Expected further outcomes

The decision support tool is expected to be used widely by national, regional and international development agencies. To achieve this, it needs to be further tested and adapted across regions.

Next Steps

- Sustainable intensification of mixed crops-tree-livestock systems
- Building Systemic resilience to climate extremes
- Food systems Transformation

Partners

Wageningen University & Research (WUR)

Basket 7 Session 9
HEALTHY DIETS

Basket Curator: John McDermott

Current scope and maturity

The biofortified cultivars of sorghum, pearl millet, lentils, beans and groundnut are commercialized are in the process of scaling up. Public and private sector partners can access them for seed supply and/or develop value chains.

Golden Egg challenges addressed and learning

- The need to mainstream biofortification in crop breeding programs to harness the potential of GLDC crops for food and nutrition security.
- Scaling up program can reap the benefits of biofortified cultivars.
- Policy guidelines provide an enabling environment for release of biofortified cultivars.

Biofortification for nutrition security and market demand

GLDC crops are **crops of the future** - climate-resilient, high in nutrition and yield. The goal is to make available more nutritious food to needy groups (women, children and marginalized populations) while increasing incomes of dryland farmers. The key contribution is towards SDGs 2 and 3 (No hunger and Good health and wellbeing) with equal impact on SDGs 1 and 8 (No poverty and Decent work and economic growth), promoting policies that address 'hidden hunger'.

Growing market demand for crops that promise better nutrition and health for all. Iron and zinc biofortified pearl millet, sorghum and lentils, iron-rich beans and groundnuts with heart-healthy high-oleic acid cater to needs of millennials.

RESEARCH PROGRAM ON Grain Legumes and Dryland Cereals
CGIAR

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Outcomes

1. Outcomes to date
- Release of seven biofortified hybrids of pearl millet in India and >50 beans varieties in 15 countries in Africa.
- One million farmers in Bangladesh grow biofortified lentil.

2. Expected further outcomes
Nutrition outcomes; new value chains, area expansion of biofortified GLDC crops; development and deployment of the standards

Next Steps
Mainstream biofortification in GLDC crop breeding Studies on bio-availability
Develop context-specific seed system
Consumer awareness

Partners: ICAR-Directorate of Groundnut Research; NMOOP of DoA-Govt of India; All India Coordinated Research Project on Pearl Millet (AICRP-PM); Vasantrao Naik Marathwada Krishi Vishwavidyapeeth (VNMKV), Parbhani, Maharashtra; ICAR-Indian Institute of Millets Research; Private sector seed companies; Harvest Plus; Rwanda Agriculture Board; CORAF; ASARECA; CCARDESA, NARS; Universities

ICRISAT
INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS

CGIAR
ICRISAT is a CGIAR research center

Maturity: Ready for uptake

Challenges and Opportunities

What can Agriculture do for Nutrition?
- Shifted understanding of how agriculture can contribute to nutrition.
- Agriculture programs with explicit nutrition goals and actions:
  - Can improve diets
  - When specifically designed to, may reduce micronutrient deficiencies and obesity
  - Shouldn't expect impacts on stunting

Understanding Intersectionality of Equity:
- To make progress on equity, research must uncover the drivers of inequity and how they intersect in specific contexts
- Additional research and data are needed on less-studied aspects of equity, their origins, contexts, and interactions

Partners: IDS, WFP, HKI, Save the Children, USAID, DFAT-D, BMGF, Government of Bangladesh, Government of Malawi, among others

Achieving Equitable Nutrition and Health Impacts through Agricultural Programs and Policies

Nutrition and Health Impacts from Agriculture Programs
Through our approach to program-research partnerships and using rigorous, comprehensive evaluations, we aimed to improve nutrition and health outcomes across different program platforms. Within agriculture programs, we sought to understand what agriculture could do for nutrition and what to measure to document impact on nutrition – essential for program and evaluation designs, investments and policy development.

A Framework for Equity
To determine what the research priorities in equity should be in the context of ANH, we conducted a scoping review, commissioned a conceptual framework on youth and food systems, and conducted regional consultations with implementation and research partners. Through this process, we developed a Reach-Benefit-Empower framework with application to other equity dimensions beyond gender.

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Outcomes to date
- Evidence-based guidance for gender- and nutrition-sensitive programming
- Redesigned programs for improved nutrition and empowerment impacts
- Brief on assessing diet and nutrition outcomes to document success of agriculture investments

Expected further outcomes
- Investment in evidence-based agricultural programs/policies for improved nutrition and health outcomes
- Expanded use of program impact pathway approach for program and evaluation design and assessment
- Use of frameworks to inform context-specific intersectionality and address inequities
- Evidence gaps filled using our evaluation and partnership approach

Next Steps
- Tools, approaches and evidence made available to inform the Nutrition and Health Platform and relevant initiatives
- Direct support to initiatives targeting vulnerable groups and aiming to improve equity and nutrition outcomes

Current scope and maturity

The research program started in 2017 and has worked in four countries (Bangladesh, Ethiopia, Nigeria, Viet Nam). Approach to and tools for analysis have been developed; more time and engagement necessary to affect change in the food systems transformation.

Golden Egg challenges addressed and learning

- Major challenge in deciding how to define and measure food system and food system innovations and identifying appropriate metrics.

- Diets are inherently individual while other factors (that can be affected) are often not

- Key is developing partnerships and capacity in focus countries to anchor change

- Policy changes may be the best way to affect change in diets, navigating between health, economic and sustainability outcomes

Food Systems for Healthier Diets

Increasing numbers of people eat too little, too much or the wrong type of food leading to outcomes including undernutrition, micronutrient malnutrition, and rising overweight and obesity rates. Food systems are undergoing dramatic changes driven by urbanization, longer supply chains, and new methods of processing and purchasing foods, failing to deliver healthy choices to consumers.

By focusing on consumer food choices, this research programme studies ways to influence consumer behaviour and the food environment through transformation of food systems towards healthier diets. The program has developed metrics and tools for analysis of food systems transformation from a diet perspective.

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Outcomes

1. Outcomes to date
- Developed methods, metrics, and tools for analyzing diet-food system linkages
- Completed analysis of food system for healthier diets in all four focus countries
- Anchored food systems thinking into key partners, stakeholders, and institutions within four focus countries
- Established Food Systems Resource Center, and Food System Idea Exchange

2. Expected further outcomes
- Release of food based dietary guidelines in Ethiopia
- Analysis of evidence base on food systems innovations in four focus countries
- Release of IFAD's 2021 Rural Development Report focused on food systems for sustainable, healthy diets

Next Steps

- Extend food systems approach to further countries; deepen engagement in four focus countries from A4NH
- Develop further tools for analysis of food systems tradeoffs (diet quality, sustainability, inclusivity)

Key Partners

Ethiopia Public Health Institute; National Institute of Nutrition, Viet Nam; University of Ibadan, Nigeria; Global Alliance for Improved Nutrition

Current scope and maturity

The Evidence Clearinghouse (ECH) for Digital Food System Innovation examines emerging digital innovations at the intersection of the food systems.

Challenges and learning

- At every point along the food system, digital innovations are changing the way we produce, process, distribute, consume and dispose food.

- Evidence on innovations remains scant and scattered, and stakeholders struggle to remain abreast the fast rate of change.

- The ECH uses the food systems framework and commonly accepted impact indicators as a way to rapidly characterize data on digital innovations in a rapidly digitizing economies and societies.

Evidence Clearinghouse (ECH) for Digital Food System Innovation

The **ECH** enables tracking of digital innovations and their impact as they intersect with food system components, profiling innovation hotpots and generating sector intelligence.

Rapid capture and evaluation of evidence will be critical for identifying and scaling-deep technologies evolving on the innovation frontier.
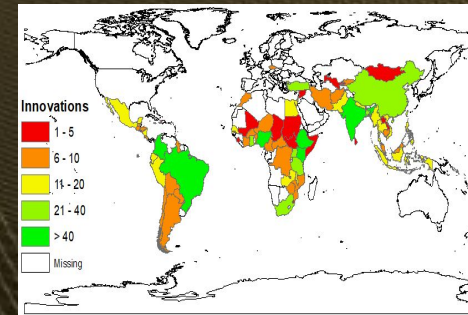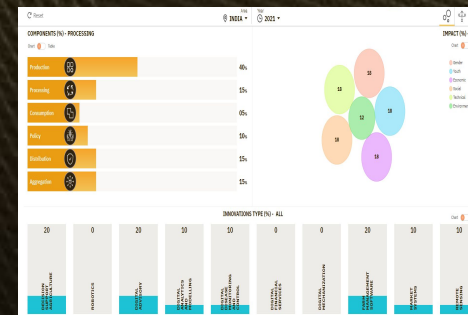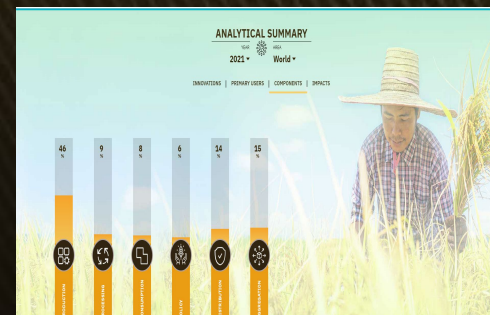
Capture | Aggregate | Analyze | Evidence

Framework

Geographic spread

Upstream domain

India country profile

Outcomes

Global observatory of digital innovation in food systems

- Interactive analytics dashboard for tracking even very high-volume data on digital interventions in food systems, and their impact.

- Meta-analysis of digital innovations guides decision support to re-orient investments and incentives for food systems transformation.

- Upstream food system domain has high concentration of innovations compared to mid- and downstream domains.

Expected further outcomes

- The ECH provides a ready tool and framework to help our partners put innovation strategies into context.

Next steps and outlook

Integrating one CGIAR digital innovations targeting genetic, aquatic, land, and water systems into the tool will help guide innovation strategy and management.

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Basket 8 Session 9
DIGITAL TOOLS, DATA AND MODELS

Basket Curator: Mike Phillips

Current scope and maturity

RIAPA and IMPACT are well-established and widely used models. Regular updates and improvements address the changing needs of governments and development partners. When used together, the models capture the full range of climate, environmental, and socioeconomic drivers of agri-food system transformation, and track outcomes in all five of the One CGIAR impact areas.

Challenges addressed and learning

• Developed new data and modeling capabilities, including linking RIAPA and IMPACT, to capture the expanding interests of decision makers, including more agri-food system drivers (e.g., climate change) and outcomes (e.g., jobs, women's inclusion, diets, resilience)

• Tested new online tools (e.g., AIDA and Investment impacts) and modalities of engagement to promote decision-makers' use of models for understanding trends and identifying priorities in global and national food systems.

Advanced modeling and data systems for prioritizing policies and investments across the agri-food system and assessing long-term agriculture and food system futures

The Rural Investment and Policy Analysis (RIAPA) model captures the entire agri-food system and supports governments in designing strategies and investment plans by measuring the economywide costs and impacts of different policies and investment options on a range of outcomes (from agri-food GDP and employment to poverty, diets, and women's inclusion).

The IMPACT model and its linked crop, livestock, fish, and resource modules provide governments and development partners with foresight analysis of the effects of climate change, water and land constraints, and other drivers on agriculture and food systems at regional and global scales.

RIAPA and IMPACT can be linked together to better capture land, water and food systems and report on both environmental and socioeconomic outcomes.

IMPACT: **Keith Wiebe** (k.wiebe@cgiar.org)
RIAPA: **James Thurlow** (j.thurlow@cgiar.org)

Outcomes

• **To date**: RIAPA and IMPACT have directly informed policies and investment plans of national governments (e.g., Kenya, Malawi, Rwanda) and global and regional development partners (e.g., AfDB, ADB, BMGF, FAO, IADB, USAID, World Bank)

• **Expected**: Linking RIAPA and IMPACT has expanded their usefulness for analyzing trends across spatial/temporal scales and identifying policy/investment priorities under climate uncertainty, leading to even greater demand from national government and development partners.

Next Steps

Developing a Foresight Initiative that reflects One CGIAR's broader mandate/interests and responds to the needs of regional and other initiatives.

Partners

CGIAR foresight team, AgMIP, BFAP, CSIRO, FAO, IIASA, JRC, Oxford, PIK, Wageningen, BMGF, IFAD, USAID, et al.

BASKET: Digital Tools, Data and Models

Strategic Research Priority Assessment Toolkit

Which problems should scientists address first, and which solutions are more likely to have a positive impact on food security and livelihoods?

Step-wise RTB priority assessment approach

Selected results

Top ranked research options by crop	Adoption (million ha)	Beneficiaries (million HH)	Net Present Value (US$ million)	Internal rate of return (%)	Poverty Reduction (million persons)
Banana					
BXW management: cultural practices	0.64	3.22	1,982	72	1.61
Recovery from banana bunchy top virus (BBTV)	0.40	2.02	1,337	61	0.64
Cassava					
High-quality planting material production and distribution systems for improved varieties	3.38	6.73	7,585	416	2.10
Sustainable crop and soil fertility management	3.27	6.43	8,284	210	2.66
Potato					
Late Blight resistance	0.77	2.11	2,303	68	0.35
Virus-resistant varieties	0.36	0.87	1,909	82	0.31
Sweetpotato					
Orange-flesh sweetpotato (OFSP)*	0.67	3.00	563	35	0.48
Weevil-resistant varieties	0.72	2.94	363	41	0.36
Yam					
Clean planting materials & agronomic practices	0.68	2.39	570	37	0.18
Improved varieties with complementary ICM	0.43	1.58	2,026	60	0.66

* Health benefits from adoption of OFSP (DALY method) increases benefits: NPV: US$1,298 million, IRR: 51% (lower adoption scenario).

Scope and Maturity

- Approach & tools developed & available online
- 37 research interventions assessed for 5 RTB crops
- High projected benefits
- Publications: 10 RTB Working Papers, 4 peer-reviewed journal papers

Approach can help direct limited funds to research areas with greatest payoff and increase efficiency and transparency of resource allocation.

Challenges and learning

Strategic & decision-making
Develop 'Theory of Change' and uptake pathways with key stakeholders/users

Methodology
Mixed-methods approaches for additional impacts (environmental sustainability, gender equity)
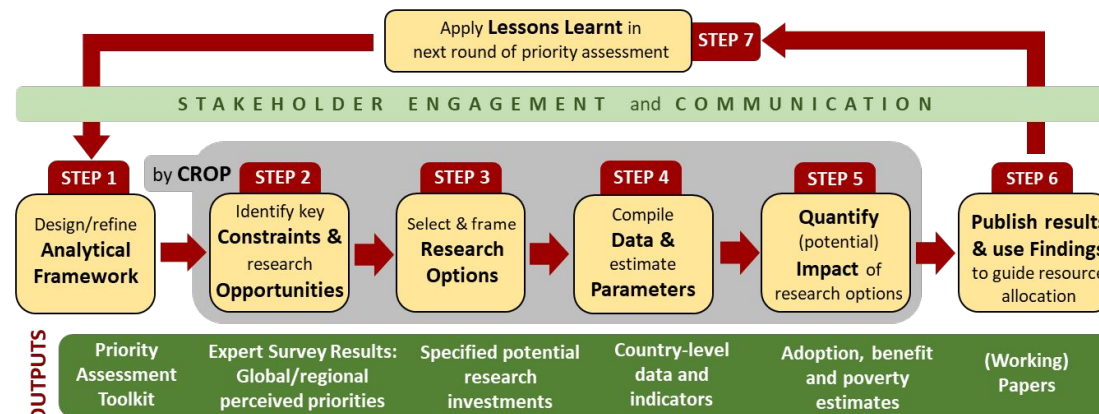
Operation
Data accuracy; consistency of assumptions; stakeholder engagement

Outcomes

- Results have informed RTB research portfolio decisions
- Subsequent assessments by RTB Centers
- Approach and results published and cited

Expected further outcomes

- Demand from EiB, EiA platforms
- Contribution to priority setting methods and culture in One CGIAR
- Use by One CGIAR Initiatives and national partners to inform research priority decisions

Next Steps

Documentation and sharing of all compiled information, data and tools

Interdisciplinary cooperation to broaden approach and methods; enabling quicker, lower cost studies

Fine-tuning: Integrate *ex ante* and *ex post*

Collaborate with *"Foresight and Metrics"* Initiative on methods development; with other Initiatives as potential users

T. Abdoulaye, A. Alene, G. Hareau, U. Kleinwechter, R. Labarta, D. Pemsl, C. Staver, and G. Thiele

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CGIAR RESEARCH PROGRAM ON Roots, Tubers and Bananas

Current scope and maturity

The Big Data Platform created an approach to develop a Digital Strategy to support implementation of CGIAR Research and Innovation.

Challenges and learning

- There currently is no coherent digital strategy in place for the CGIAR

- Sometimes it is unclear what role the CGIAR should be playing in the global digital ecosystem

- CGIAR is a complex system, and digital technologies fit in many places – developing a strategy is not a straightforward process

Digital Strategy Research and Workflow

The Big Data Platform conducted wide-ranging stakeholder consultation for the development of a CGIAR Digital Strategy to support implementation of the 2030 CGIAR Research and Innovation Strategy. This work identified

- **digital trends** poised to affect global food security over the next decade,

- **the roles** CGIAR should play in leveraging and shaping these trends,

- and the **internal digital capabilities** CGIAR must have in order to make the digital revolution central to our way of working.

The research workflow is IRB approved, supported by data capture forms and orientation videos to enable deeper-dive assessment of the digital ecosystem in regions or sectors of interest for the new portfolio.

Platform for Big Data in Agriculture
CGIAR

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Outcomes to date

Wide-ranging consultative research on a oneCGIAR Digital Strategy : https://hdl.handle.net/10568/113555

Expected further outcomes

Multiple deeper-dive assessments of the digital ecosystem in regions or sectors of interest for the new portfolio.

Next steps

Approach to be applied at country, region, or program level to help surface specific contributions CGIAR can make towards building an innovation ecosystem.

Aligned with all initiatives that will be using, developing or leveraging digital tools and technologies.

Scope and maturity

Scope and maturity: A bundle of digital "aqua-tech" innovations for application across fish agri-food systems:

- **Digital performance assessment tools**: 1. "Aquaculture farm performance" (Global); and 2."Small-Scale Fishery management" (Timor-Leste, Malaysia and Kenya)
- **Extension and financial service apps**: 1. Smartphone apps for aquaculture extension (Myanmar); and 2. Digital finance services and marketing apps (Bangladesh)
- **Data monitoring, policies and decision-making tools**:
  1. Fishery digital governance tool (PeskAAS – BIgData Winner - Timor-Leste); 2. Fish disease and diagnostic tool (Global); 3. GIS based MIS in Odisha (India); and 'FishNutrient' digital profiles available for 5500 fish species on FishBase (Global)

Challenges and learning

Challenges and learning: FISH digital packages address several fish agri-food systems challenges:

- Improving production efficiency and managing risks through supporting informed decision on key production parameters in the farm environment, such as water quality, feed usage and the overall health indicators.
- Enhancing inclusion through connectivity and access of farmers and fishers to inputs, markets and services.
- Providing greater data availability to inform farmers, extension services, researchers, and policymakers to improve management, investment and decision making

Digital tools, data and approaches for decision making and investment in fish agri-food systems

A bundle of digital innovations, tools, data sets and platforms developed by FISH to enhance the capacity for management and governance of sustainable aquaculture and small-scale fisheries within food, land and water systems. Digital solutions developed and applied through FISH integrate common practices with modern information technology (big data, artificial intelligence, 5G networks, cloud computing, and robot technologies) to support inclusion, development and transformation by providing multiple users with new digital products and services across the fish agri-food system, including production, operation, management, risk management, policy and financial services. As a result, households, fishers, fish farms, enterprises, public sector and investors have tools and knowledge to anticipate, manage and respond to changes at all levels of the agri-food systems.

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RESEARCH PROGRAM ON Fish
Led by WorldFish
CGIAR

Outcomes (past and future)

Outcomes (past and future)

Increasing uptake of digital extension and service tools across key FISH countries: Bangladesh (12,000 users) and Myanmar (220,000 users)

India: Odisha government adopt GIS based Management Information Systems (MIS) and real-time information to support management functions and facilitate decision-making

Timor-Leste: 15,690 km^2 of coastline under improved fishery management; Government direct investment in PesKAAS

Global: digital tools support the production on benchmarkind data for aquaculture in Bangladesh, Egypt, Nigeria, Myanmar and India; Fish Base continues to receive several million users per year

Next steps

These "aquatech" tools, data and approaches for aquaculture and fisheries could be integrated with CGIAR regional initiatives and specialist global initiatives, particularly the Resilient Aquatic Foods Initiative to enable:

- **Scaling:** Increasing adoption with partners across current geographies
- **Expansion** to new geographies
- **Sustainability** through catalyzing private and public sector investment
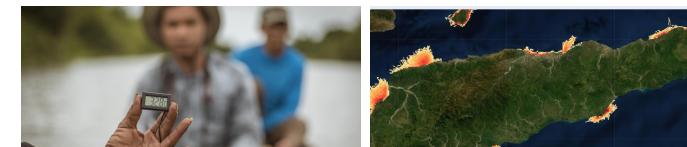
Basket 9 Session 9
PARTICIPATORY METHODS AND PLATFORMS

Basket Curator: Frank Place

Current Scope & Maturity

Rice sector sustainability is critical to future global food security and a sustainable good system.

Wide-scale adoption of globally-recognized, science-based standards and indicators is vital to enable this transformation.

Golden Eggs Challenge

SRP Standard: offers a normative framework that can serve as a basis for supporting claims to sustainability performance in rice supply chains.
SRP Performance Indicators: a set of 12 quantitative indicators used to monitor the impacts of adopting climate-smart best practices and other field interventions.
'SRP-Verified' Assurance Scheme: defines rules for actors engaged in measuring compliance or demonstrating improvements, providing demonstrable evidence of compliance with the SRP Standard and the use of SRP trademarks upon achieving assurance.
SRP Authorized training: ensures the delivery of high-quality information and services in line with SRP Members' needs, and to maintain credibility of SRP instruments and claims.
SRP Brand Manual: sets out principles and policies to uphold brand value and provides branding guidance for use of the SRP Organizational logo and SRP-Verified Label.

Sustainable Rice Platform (SRP)

A multi-stakeholder alliance with over 100 institutional members from public, private, research, civil society and the financial sector.

SRP promotes resource-efficient and sustainable production of rice, at farm to landscape levels.

SRP aims to harness innovation to encourage farmers to adopt climate-smart, sustainable best practice, while enhancing smallholder livelihoods and protecting the environment.

RICE CRP provides the scientific underpinning for the world's first rice sustainability standard and performance indicators, recognized across the stakeholder spectrum.

SRP members support the SRP's vision, mission, goal, objectives and activities in various ways and mainstream sustainable rice throughout value chains and via government agencies.

CGIAR | Research program on rice agri-food systems 'RICE'

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Outcomes

1. Outcomes by 2021

- SRP partners are active in 25 countries.
- SRP partners engaged with 500K farmers.

2. Expected further outcomes

- One million farmers adopt climate-smart, sustainable practices by 2023.
- Synergies and tradeoffs among sustainability performance indicators, and impact of best practice adoption quantified across diverse production contexts.
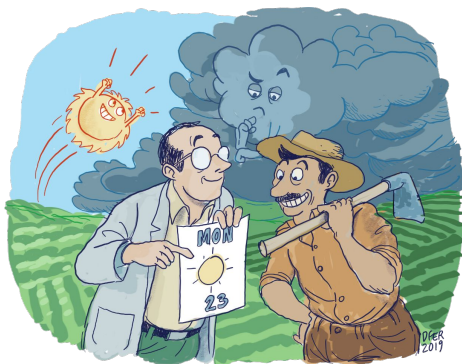
Next Steps

SRP 5-Year Strategic plan (2021-2025)

Strengthen sustainable value chains

Create partnerships and incentives for scale

Serve as a knowledge hub

Sustainable Rice Platform
SRP

Current scope and maturity

PICSA and LTACs are fully developed, implemented in over 20 countries, and at the stage of uptake by next users.

Golden Egg Challenge

To date, lots of information supply, but limited understanding or use by farmers

Thus: develop a participatory approach that empowers farmers to make informed decisions and can be scaled to large numbers

Learning:
Supporting local institutions, and farmers to make their own decisions using information and decision-making tools is effective and sustainable

Participatory methods in climate information services to empower farmers – PICSA and LTACs

PICSA is a novel climate services and agricultural extension approach. It empowers farmers by facilitating locally specific, evidence-based planning and decision-making for their individual and household contexts.

PICSA is used by small scale farmers, facilitated by trained extension workers / community volunteers and with support from National Meteorological Services.
LTACs are dialogue processes among local scientists, technicians, representatives from the public and private sectors, and farmers. Through consensus, LTACs assess climate forecasts, likely impacts on crops for specific conditions in time and space, and recommendations around decision making for each productive sector, disseminated to local technicians and producers through Local Agroclimatic Bulletins.

PICSA and LTACs have been impactful relative to traditional extension approaches and supply driven climate services. Both are ready for further uptake with relevant guidance and support.

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Outcomes

- 1.5 million farmers receiving agro-climatic information across 20 countries.
- 70% to 98% of farmers trained in PICSA have made changes in agricultural and other livelihood enterprises that have improved their income and food security.
- More than 140 documented institutional and policy changes

Expected further outcomes:

- Continued growth of both approaches, reaching 5m farmers by 2030 globally.

Next Steps

- Develop scaling strategy, including integration with digital services
- Aligned with any initiative seeking to reduce climate-related risks for small-scale producers

PICSA developed and supported by University of Reading

https://research.reading.ac.uk/picsa/

Current scope & maturity (Stage 3-4)

- Tools for managing landscapes inclusively adapted and applied in Peru, Indonesia (4 languages)

- Multi-actor platform (MAP) design guide tested, scaling in India

- Rulal board game applied to land use planning in Laos; adapted for wetland in Myanmar

- Conflict management tool applied to fisheries in Cambodia, Uganda, Zambia; adapted for resilience in Guatemala

Golden Egg Challenge

- Challenges addressed: unequal power relations, levels of voice for marginalized groups in MSPs

- Learning: tools foster self-monitoring and evaluation for adaptive mgmt

- Adapting to new purposes, contexts: hire facilitator who is familiar with tool for engaged adaptation

Tools for strengthening social inclusion in multistakeholder forums and processes (MSPs)

Reaching the CGIAR's ultimate goals means bringing together multiple stakeholders to agree on common goals, negotiate tradeoffs and define solutions. Natural resource governance, value chains, food security, poverty and climate solutions require processes that build mutual understanding across actors for solutions that are both sustainable and equitable.

Inviting people to the table is not enough. Unequal power relations and resources mean that not all have equal voice – e.g. women, indigenous peoples, smallholders, pastoralists, fishers. These tools, developed through participatory processes at landscape scale, provide structured ways to address inequalities.

These tools help organizers and participants of MSPs:
-     Improve   voice   for   marginalized   groups
- Build trust by helping actors understand others' perspectives and   the   value   of   collaboration
-     Support   conflict   resolution,   and
- Foster social learning through self-assessment and reflection.

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Outcomes

Como vamos? adopted for annual use in 76 protected areas covering 15% of Peru

MAP tool adopted in 8 Indian states under Promise of Commons initiative

Expected further outcomes

Two more adaptation requests from government and Indigenous orgs in Peru (including for private sector)

Rural board game in use by universities, training programs

Next Steps

July PIM webinar presenting tools for managing landscapes inclusively

Manuals, training videos online, and used in NGO training units

Tools to be adapted to specific needs of Initiatives, esp. value chains

Partners
ONAMIAP, SERNANP, DDPI, CoRe, Foundation for Ecological Security, Karen Environmental and Social Action Network (KESAN), Myanmar, Lao Ministry of Natural Resources and Environment, Ubon Ratchathani University, Wageningen University and Research Center

Drought susceptible   Drought tolerant

Current Scope and Maturity

- CGIAR's maize breeding program has significant impacts, built on over four decades of breeding for stress resilience, extensive germplasm testing networks, and strong partnerships in sub-Saharan Africa (SSA), Asia and Latin America.
- Area-weighted average age of CGIAR-related maize varieties in SSA reduced from 14 years in 2014 to 10.2 years in 2020 (Krishna eta al., 2021).

Challenges & Learning

- Increasing genetic gains in stress-prone tropical environments
- Meeting partners' expectations of improved maize germplasm with emergence of new threats (e.g., MLN; Fall Armyworm)

Climate-resilient maize for the tropics developed and deployed through novel public-private partnerships

OVERVIEW

- CGIAR MAIZE established strong tropical breeding pipelines delivering elite climate-resilient /multiple stress-tolerant improved maize inbred lines, and farmer-preferred improved hybrids and synthetic varieties in SSA, Asia and Latin America

- Novel public-partnership models – e.g., International Maize Improvement Consortia (IMIC); regional collaborative breeding and seed systems networks – have been serving as powerful platforms for developing and delivering improved germplasm plus cutting-edge breeding technologies to partners, while significantly expanding collaborative testing.

- ~50% of improved maize varieties in SSA are CGIAR-related. The aggregate benefits of new CGIAR-related maize varieties was estimated as US$ 0.8-1.3 billion annually across 18 countries in sub-Saharan Africa (Krishna et al., 2021).

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Outcomes

1. CGIAR-related stress-tolerant maize varieties cultivated on an estimated **5.5 million hectares** by over **9 million smallholders** in **13 countries across SSA;** food and livelihood security protected from devastating abiotic and biotic stresses.
2. **Expected outcome by 2030**: Scaling-up adoption of climate-resilient maize varieties in the tropics of SSA, Asia and Latin America, reaching at least **20 million smallholders by 2030**.

Next Steps

- Continuous improvement of breeding program for increasing genetic gains (at least 1.5%).
- Accelerated turnover of obsolete cultivars with climate-resilient & nutritious maize varieties.
- Further strengthening CGIAR-NARS-Private Sector partnerships for greater impacts.

Partners

NARS and seed company partners in **13 countries in SSA** (Ethiopia, Kenya, Uganda, Tanzania, Malawi, Mozambique, South Africa, Benin, Ghana, Nigeria, Mali) & **6 countries in South & SE Asia** (Bangladesh, Bhutan, India, Nepal, Pakistan, Myanmar)