Transforming AgriFood Systems in West and Central Africa (TAFS-WCA)

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Proposal

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A list of acronyms used in this Proposal can be found here

Summary table

Initiative name	**Transforming Agrifood Systems in West and Central Africa (TAFS-WCA)**
Primary Action Area	Resilient Agrifood Systems
Geographic scope	Regional (West and Central Africa – WCA) GH-Ghana, NG-Nigeria, CI-Cote d'Ivoire, CD-The Democratic Republic of Congo, RW-Rwanda and BI-Burundi
Budget	US$30 million

1. General information

Initiative name: Transforming AgriFood Systems in West and Central Africa (TAFS-WCA)
Primary CGIAR Action Area: Resilient Agrifood Systems (RAFS)
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2. Context

2.1 Challenge statement

552 million people live in West and Central Africa (WCA), the majority in rural areas, but with some of the highest growth rates of urbanization in the world (>4% annually). Economic activity in 2020 contracted by 2.1%, due to a weaker external environment and measures to contain the COVID-19 pandemic and the climate crisis resulting in, high unemployment rates[1].

Agriculture contributes 30–50% to GDP and provides income and livelihoods to 70–80% of the population. Out of the 65% of the labor force in the rural areas, 42% of the women practice smallholder farming[2]. The sector has not been able to live up to its huge potential to feed the growing population[3] due to disruptive forces of climate change, including rapid land degradation and increasing incidences of invasive pests and diseases. Many consumers often resort to imported and ultra-processed foods increasing the triple burden of malnutrition[4]. Reduced biodiversity affects soils health and crop reproduction[5], while degraded landscapes are no longer One Health-sensitive[6]. Markets and value chains are at best fragmented due to huge post-harvest losses, a dilapidated infrastructure, and a non-supportive policy environment. Capacities remain few for youth and women in transforming food systems, while increasing conflicts often result in bad governance further curtailing any potential in the region[7,8].

By focusing primarily on food and nutrion security and making agrifood systems more climate adapted, the Initiative will make contributions to the five Impact Areas of the One CGIAR. Access to quality, nutrient-dense seed and climate-smart good agricultural practices (GAP) and reduced post harvest losses will have a positive impact on food and nutrition and health security. The matching of digital supply – demand services, will increase productivity and improve adaptation to Climate Change. It wil have positive impact on poverty reduction, livelihoods and job creation by providing opportunities and tools for women and youth to engage in the labour market and by increasing their access to finance. Through a gender transformative approach and derisking agriculture production, youth and women will be empowered, reducing existing gender gaps and increasing business opportunities. Through citizen science, landlessness and disputes among resource users would be mitigated while issues of poor environental health and biodiversity loss would be addressed through good governance of natural resources. By supporting regulatory and policy environments, the Initiative will contribute to creating a socially inclusive platform for public and private partnerships (PPPs).

The Initiative aligns with country priorities in the region. Relevant country sector development strategies such as the Poverty Reduction Strategy Papers have identified priority interventions in the agricultural sector.[9] These are spelt out in the CAADP 2015–2025 Results Framework[10]; ECOWAS Common Agricultural Policy[11] and CORAF objectives[12]. The Initiative also aligns to priorities of the African Development Bank (AfDB) (https://www.afdb.org), World Bank, the Rome-based agencies (FAO, WFP and IFAD) and the United Nations through the UNFSS[13] country comitments. The Initiative builds on the Consortium for Improving Agriculture-based Livelihoods in Central Africa (CIALCA) funded by the Belgian Government thus creating a CGIAR-strategic long-term progammatic and financing platform for Central Africa[14].

2.2 Measurable 3-year (end-of-Initiative) outcomes

The Initiative will be transformative, aiming at nutritious, climate-adapted and market-driven food systems. It will do so through development and scaling of novel and inclusive production and post-harvest technologies, participatory decision-making and planning, informed governance and the strengthening of gender and youth transformative business hubs. The following outcomes will be realized by the end of the Initiative:

I. At least 80,000 smallholder households (HH) will have access to climate resilient nutrient-dense crop varieties; with at least 16,000 of them using five climate resilient, nutrient-dense crop varieties and six good agricultural practices.
II. At least 30% increase in household dietary diversity scores will be attained.
III. Three million farmers, 30 value chain actors, and three governments will be using timely climate information and early warning systems for improved decision making.
IV. At least four governments will use inclusive approaches towards landscape management and informed and inclusive land and water management plans will have been developed by 100 rural communities that will diversify income from agriculture and increase production that will create jobs and stability
V. At least 20,000 youth and 15,000 women will be engaged in value-added activities related to agriculture and at least 50% of these will have access to credit. At least a 20% increase in Women Empowerment in Agriculture Index (WEAI) will be attained.
VI. At least 10 key partners in the next phase implementation plans (US$25 million investment) consistently using three validated scaling tools.

These metrics will include changes in area under cultivation of target crops and GAP, an uptake of nutritious crops and diet diversification.

2.3 Learning from prior evaluations and impact assessments (IA)

The design of the Initiative benefitted from several lessons and strategies drawn from evaluations of major projects and programs and assessments of technologies, among others:

(i) Independent reviews in 2020 of each of the 12 CGIAR Research Programs that was coordinated by CGIAR Advisory Services Secretariat[15].
(ii) A working paper on CIALCA Initiative in the Great Lakes region that provided six lessons for development of Initiatives for the One CGIAR[16].
(iii) Selected studies on the impact from adoption of technologies: rice varieties[17], yam research[18], cassava research[19], cassava varieties[20], maize varieties and climate adaptation[21].
(iv) A review on *Understanding Innovation: The development and scaling of orange-fleshed sweet potato in major African food systems*[22].
(v) A review on *Using Agriculture to Improve Child Health: Promoting Orange Sweet Potatoes Reduces Diarrhea*[23].
(vi) Impact of home garden interventions in EA: Results of three randomized controlled trials[24]
(vii) Multinational – CGIAR – Support to Agricultural Research for Development of Strategic Crops in Africa Project (SARD-SC) – PCR[25].
(viii) A study on the Strengthening Agricultural Water Management to Feed Africa (AWM)[26]
(ix) An evaluation report on the *Strengthening Agricultural Value Chains to Feed Africa: Cluster Evaluation* report[27]; and
(x) Evaluation reports from the African Development Bank – Technologies for African Agriculture Technologies; TAAT1 Review[28]

2.4 Priority-setting

Methods used
The Initiative used a participatory approach to set the priorities with the engagement of Innovation and Scaling partners and a validation process with demand partners. As the lead scaling partner, the West and Central African Council for Agricultural Research and Development (CORAF) with the Initiative Design Team (IDT) spearheaded the priority setting which resulted in an assessment of country needs and identification of low-hanging fruits with potential for impact at scale[29,30].

Priority science
The priority science aims to build nutritious and climate-adapted food production systems in WCA. The entry point is to investigate the factors that incite consumer demand for biofortified and other nutritious foods and how smallholder farming systems could be made more productive and adaptive to climate change, by bundling innovations at landscape level. The Initiative would assess how participatory water and land resources decision support systems (WRDSS) strengthen resilience and assess how innovations can be bundled to be One Health-sensitive and to what extent digitalized information could enforce this process. The Initiative would analyze pervasive social barriers with a view of building gender and generational equality of women and youth doing business in value chains and markets and to analyze the institutional mechanisms including policy options to address social constraints. In support to these science areas, the Initiative would assess how existing Scaling Readiness (SR) frameworks could be validated in different contexts and used as a planning, scaling and impact platform and what the requisite coordination mechanism would be to make lasting contributions to Impact.

Innovations and activities
The Initiative proposes a basket of innovations[31] as sets of Core and Complementary technologies that, when validated for their SR will contribute to impact at scale. They will be validated by stakeholders under specific contexts, using participatory approaches at inception. Innovations deal with crop varieties including nutritious vegetables and genetically improved farmed tilapia (GIFT), seed systems, climate-adapted GAPs including post-harvest technologies, digital advisory services, agri-businesses, food processing and safety.

Geographies, systems, and crops
The Initiative will focus on the humid and transition zones of WCA and aims to expand to the Sahel in subsequent phases. Initially the focus will be on root and tuber crop, humid lowland tree crop, mixed cereal-root-crop farming systems including vegetables and GIFT and Highland Perennial systems. The Initiative will have activities in GH-Ghana, NG-Nigeria, CI-Cote d'Ivoire, RW-Rwanda, BI-Burundi and CD-The Democratic Republic of Congo[32]. Some activities on digitalized services are foreseen in CM-Cameroon and in LR-Liberia.

Other choices relevant to the Initiative
The Initiative will provide a long-term investment platform for R4D and for coordinated action with other global thematic Initiatives within the CGIAR. It seeks to establish partnerships with ongoing projects (AfDB-supported TAAT) and anticipates financial support from Belgium for activities in Central Africa. It will provide phased impact pathways with a focus on scaling readiness and transformation. It will also provide opportunities for co-design and a cost-effective operational platform embedding CGIAR better in national – regional systems. Lastly, it will provide a coordinated vehicle for (PPPs and make youth and women empowerment its core.

The Initiative created a senior policy and partnership specialist position that will focus on deepening our understanding on the effectiveness/efficiencies of the partners in taking

innovations to scale. This position would be nested within the Initiative Management Hub (IMH). It would imply an important role in advocacy to ensure government and other partners appreciate the importance of and the need for investing in innovation readiness and scaling and in deepening and widening coordinated partnerships.

2.5 Comparative advantage

The CGIAR is uniquely placed to provide a cost-effective set of results when compared to other partnerships/service providers in WCA for the following reasons:

(i) The Alliance of CGIAR Centers that bundles its competencies for building resilient agrifood systems:
- IITA and AfricaRice – sustainable production intensification and access to climate resilient varieties of grain, legumes and clonal crops.
- IWMI – bundling these innovations at landscape level and applying citizen science for healthy environments and mitigating conflicts.
- CIP for its competencies in biofortified food staples (2016 WFP laureates)[33].
- The Alliance of Bioversity and CIAT in Climate Smart Agriculture through the CCAFS.
- WorldFish for diversified and healthy production systems (2021 WFP Laureates)[34].
- ILRI for support to mixed crop livestock production systems in the region.

(ii) Understanding the concept of scaling readiness and the measurement of its success:
- CGIAR is uniquely positioned to use science and evidence-based approaches to the design, implementation and monitoring of the innovation and scaling strategies[35].
- It has available scaling-validated Innovation options that can be bundled.
- It has experience in advanced geospatial and ex-post impact assessments to assess the sustainability of agricultural technologies.

(iii) The CGIAR has a dedicated team of "gender in agriculture" researchers to provide strategic guidance and assist in gender specific research and analysis.

(iv) Strategic partnership with CORAF, ECOWAS regional R4D organization bringing together 23 NARS for capacity building, innovation and scaling.

(v) Strategic partnerships and leveraging potential:
- The alliance through the Initiative has the potential to leverage and build on development partners quests for transformation at scale.
- The Initiative can leverage the institutional partnerships with private sector agents to spur economic development for women and youth.

2.6 Participatory design process

The Initiative was designed with the involvement of all stakeholders at country and regional levels, who determined the set of innovations. The design process is narrated below:

<u>Consultation with CORAF</u>
- In 2020 a multi-stakeholder engagement addressed emerging gaps in agriculture and food security. This was followed by region-wide priority setting consultations that fed into the Initiative. A synthesis document was prepared with a focus on key and emerging innovations in WCA, providing the long list of innovations[36].

- In May 2021, the IDT conducted a consultation survey which led to the shortlist of Innovations[37].
- On September 1, 2021, CORAF facilitated a virtual IDT-led stakeholder consultation and engagement meeting to test the IDT's understanding of current critical demands of some of the Innovations in the region and to offer concrete opportunities to address some of the demands through a collaborative platform[38,39].
- The IDT, CORAF and other stakeholders will continue stakeholder consultations to agree on specific Innovations with high demand from the short list. These will be assessed for their scaling readiness and potential for impact and further rationalized and prioritized through stakeholder participatory approaches at the validation of the theory of change (TOC) and the results framework (RF) at the inception phase.

Consultations with CIALCA

The Government of Belgium has been supporting the Consortium for Improving Agriculture-based Livelihoods in Central Africa (CIALCA) for more than 10 years. CIALCA is a social inclusive R4D platform on Innovation and Scaling, Capacity Development and Partnerships[40]. On innovation and scaling, the Initiative will validate the SR Framework in Central Africa and prioritize a few selected highly demanded innovations for further scaling. The Initiative will work with CIALCA partners in RW-Rwanda, BI-Burundi and CD-The Democratic Republic of Congo on participatory research on effective scaling to ensure past investments in the region can be institutionalized and built upon.

Consultations with AfDB

TAAT1 – an AfDB-funded program, resulted in several technologies and innovations demanded by the stakeholders at national and regional levels[41].

- Both initiatives provide the institutional knowledge to create transformative impact at scale by promoting/scaling low-hanging fruits in the region.
- An alignment between the two initiatives will ensure stakeholder demand, readiness for use of Innovations at stakeholder level and impact at scale.

AfricaRice/IITA/IWMI/CIP/ICIPE/WorldVeg

The Initiative builds on years of sustainable intensification work by CGIAR, ICIPE and WorldVeg promoting climate-resilient and nutritious varieties of grain, clonal crops, vegetables and GIFT for increased and stable on-farm productivity and production in the targeted agro-ecologies and improving access to markets and developing policy options to meet the daily food and nutrition requirements and the demands of the key value chains. Results from the stakeholder consultation survey provided the requisite information on their demands. Further rationalization and prioritization will take place through participatory stakeholder approaches at inception of the Initiative.

2.7 Projection of benefits

The Initiative will build on existing and new partnerships to co-develop, adapt, and bring innovations to scale, the adoption of which will bring significant benefits to men, women, and youth in smallholder households. It will use available and new technologies, including those that will be delivered by other Initiatives such as: biofortified and other nutritious crop varieties from Accelerated Breeding; tools and approaches for improvement of the seed sector from SeEdQUAL, improved agronomy from Excellence in Agronomy, and improved anticipation and management of bio risks from the Plant Health Initiative. References have been made in the sections on the five Impact Areas below to past achievements (adoption and impacts of

technologies) and lessons learnt from several past and ongoing projects in the target countries. Building on these, we expect more efficient and effective paths to scaling by this Initiative based on the proposed use of new tools (including digital and GIS tools, and advisory services) and participatory approaches, and the planned cooperation and advocacy with sub-regional organizations towards more favorable policy environments. Adoption of the innovations that this Initiative will bring to scale will lead to significant benefits for millions of smallholder households in the target areas in the selected countries, with spillover benefits in other areas (socio-agroecological homologues) in the same and neighboring countries.

The projections below transparently estimate reasonable orders of magnitude for impacts as a result of the impact pathways set out in the Initiative's theories of change. Initiatives contribute to these impact pathways, along with other partners and stakeholders.

For each Impact Area, projections consider breadth (numbers reached), depth (expected intensity of effect per unit) and probability (a qualitative judgement reflecting the overall degree of certainty or uncertainty that the impact pathway will lead to the projected order of magnitude of impact).

Projections will be updated during delivery to help inform iterative, evidence-driven, dynamic management by Initiatives as they maximize their potential contribution to impact. Projected benefits are not delivery targets, as impact lies beyond CGIAR's sphere of control or influence.

The projected benefits are shown in the table below. Details of the methods and calculations are available through the following links:
https://docs.google.com/spreadsheets/d/1xHsteDI5jsVtsq6FAU-cY0n5kVZzsNwG/edit?usp=sharing&ouid=110668620919215804430&rtpof=true&sd=true
and
https://docs.google.com/document/d/1Q0RtFJzWUFbRV_dBZWJ8fcaxBSo9lK7T/edit?usp=sharing&ouid=110668620919215804430&rtpof=true&sd=true

Projected impact-level benefits disaggregated by breadth, depth and probability of success

Impact Areas	Indicator	Breadth: Cumulative by 2030	Depth	Probability
Nutrition, health, & food security	# people benefiting from relevant CGIAR innovations	1.76 million households (or 8.82 million people)	Significant: 10% permanent impact on income	High certainty: 50%–80% expectation of achieving these impacts by 2030, at this point
Poverty reduction, livelihoods, & jobs	# people benefiting from relevant CGIAR innovations	1.76 million households (or 8.82 million people)	Significant: 10% permanent impact on income	High certainty: 50%–80% expectation of achieving these impacts by 2030, at this point
Gender, youth, & social inclusion	# women benefiting from relevant CGIAR innovations	2.00 million women	Transformative: Constraining gender norms and dynamics are shifted and reduced, and norms and dynamics which support gender equality are strengthened,	Medium certainty: 30%–50% expectation of achieving these impacts by 2030, at this point

			leading to greater gender equality	
	# youth benefiting from relevant CGIAR innovations	1.28 million youth	Significant: 10% permanent impact on income	Medium certainty: 30%–50% expectation of achieving these impacts by 2030, at this point
Climate adaptation & mitigation	# people benefiting from climate-adapted innovations	0.88 million households (or 4.41 million people)	Significant: 10% permanent impact on income	High certainty: 50%–80% expectation of achieving these impacts by 2030, at this point
Environmental health & biodiversity	# ha under improved management	3.93 million ha	Substantial: Where improved management delivers two of the following three benefits: improvements in soil health and fertility, delivers biodiversity gains, and provides additional ecosystem service improvements	Medium certainty: 30%–50% expectation of achieving these impacts by 2030, at this point

1. Nutrition, health and food security - # People benefiting from relevant CGIAR innovations

Experiences from past projects on the impact of innovations on food and nutrition security[42,43,44,45,46] show the potential of our proposed innovations to contribute to nutrition, health, and food security. We estimated that adoption of these innovations will benefit **1.76 million households (or 8.82 million people)** by using the logistic function to project the adoption rate of CGIAR innovations to 2030 and multiplying it by the number of smallholder farmers in the target areas. The benefits will be **significant** (corresponding to 10% permanent impact on income) with **high certainty** (i.e., 50%-80% expectation of achievement). We expect the impacts mainly through the crop productivity and income pathway, as demonstrated in previous work, e.g., CIALCA project[47], rice varieties[48], yam research[49], cassava research[50], cassava varieties[51], maize varieties[52], orange-fleshed sweet potato[53], health impacts of biofortified staples[54], and nutritious vegetables[55]. Achievement will be facilitated by linkages with other Initiatives (e.g., Accelerated Breeding, SeEdQUAL, and Excellence in Agronomy).

2. Poverty reduction, livelihoods, and jobs – # People benefiting from relevant CGIAR innovations

Productivity gain and income increase are the main pathways for realizing projected impacts. Interventions and associated partnerships in all Work Packages, institutional capacity strengthening, improved market access, gender-transformative agri-businesses, improved postharvest technologies, and advocacy for relevant policy support, will contribute to success in achieving the impacts. By enabling smallholder households to achieve higher yields as a critical step towards achieving more viable incomes, the adoption of relevant CGIAR innovations is expected to benefit **1.76 million households (or 8.82 million people)** by 2030 in the target countries[56,57,58]. Given the high yield and income increases associated with the adoption of improved technologies[59,60,61,62,63,64,65,66,67] the Initiative is expected to generate **significant** benefits (i.e., equivalent to 10% permanent impact on income) and this will be achieved with **high certainty** (i.e., 50%–80% expectation of achieving these impacts by 2030) considering previous achievements[68,69,70,71,72,73].

3.1 Gender, youth, and social inclusion – # Women benefiting from relevant CGIAR innovations

It is projected that the RII-WCA Initiative will benefit at least **2.0 million** women in target countries by delivering gender-responsive and demand-driven innovations to smallholder farmers in the target countries. This number was estimated based on the share of women in the total rural populations in the target countries (i.e., between 49.3% and 50.8% depending on the country). They are generally into farming as their occupation and the Initiative will ensure that at least 15,000 women are engaged in value-added activities related to agriculture by 2024 and at least 50% have access to credit. The Initiative will have a **transformative** impact (i.e., constraining gender norms and dynamics are shifted and reduced, and norms and dynamics which support gender equality are strengthened, leading to greater gender equality). The Initiative will study and address the underlying causes of gender inequalities[74] through combining gender transformative approaches[75] with the development and scaling of novel and inclusive production and post-harvest technologies, participatory decision-making and planning, and informed governance systems. We have **medium certainty** (i.e., 30%–50% expectation of achieving these impacts by 2030) of achievement based on experiences from previous work[76,77]. This will also be influenced by dynamics of the socio-political environments in the target countries.

3.2 Gender, youth, social inclusion – # Youth benefiting from relevant CGIAR innovations

Relevant innovations promoted by the Initiative are projected to benefit about **1.28 million** youth. The benefits are expected to be **significant** (i.e., equivalent to 10% permanent impact on income) and with **medium certainty** (i.e., 30%–50% expectation of achieving these impacts by 2030). The number of beneficiaries was computed considering the share of youth in the target countries[78] and the total projected beneficiaries of the Initiative. They comprise direct beneficiaries as providers of digital services, particularly in extension and digital support tools, thereby creating job and income-generating activities; youth that will be supported to engage in agribusiness[79]; and indirect beneficiaries who are members of the households that will adopt technologies promoted by the Initiative as supported by past experiences[80,81,82,83]. The medium certainty of achievement is due to less certainty about whether, and to what extent, the youth will benefit indirectly as members of households adopting improved agronomic practices.

4. Climate adaptation and mitigation – # People benefiting from climate-adapted innovations

The number of people benefiting from climate adapted innovations was derived from the number of farmers to be reached through the promotion of more resilient and climate-smart agriculture practices based on the projected adoption rate. Given that at least half the solutions to be promoted by our Initiative are climate-smart, the number of people benefiting from climate-adapted innovations is projected to be **0.88 million households (or 4.41 million people**). The benefits from climate-adapted innovations will be **significant** (i.e., equivalent to 10% permanent impact on income) and will be achieved with **high certainty** (i.e., 50%–80% expectation of achievement) based on past successes especially in delivery of stress-tolerant crop varieties[84,85,86]; and understanding of differential impacts on gender categories[87]. Ramirez-Villegas et al (2021)[88] also projected that the CGIAR's work on climate adaptation will benefit 18.1 million rural people (3.6 million rural households) in WCA. This implies benefits to 4.07 million rural people (0.81 rural households) from this Initiative (similar to our projection), assuming that it will contribute 30% of the One CGIAR's benefits targeting 75% of the area. Adoption of CSA practices, climate-adapted varieties, and climate related advisory services will increase productivity and reduce interannual yield variability.

5. Environmental health and biodiversity - # Ha under improved management

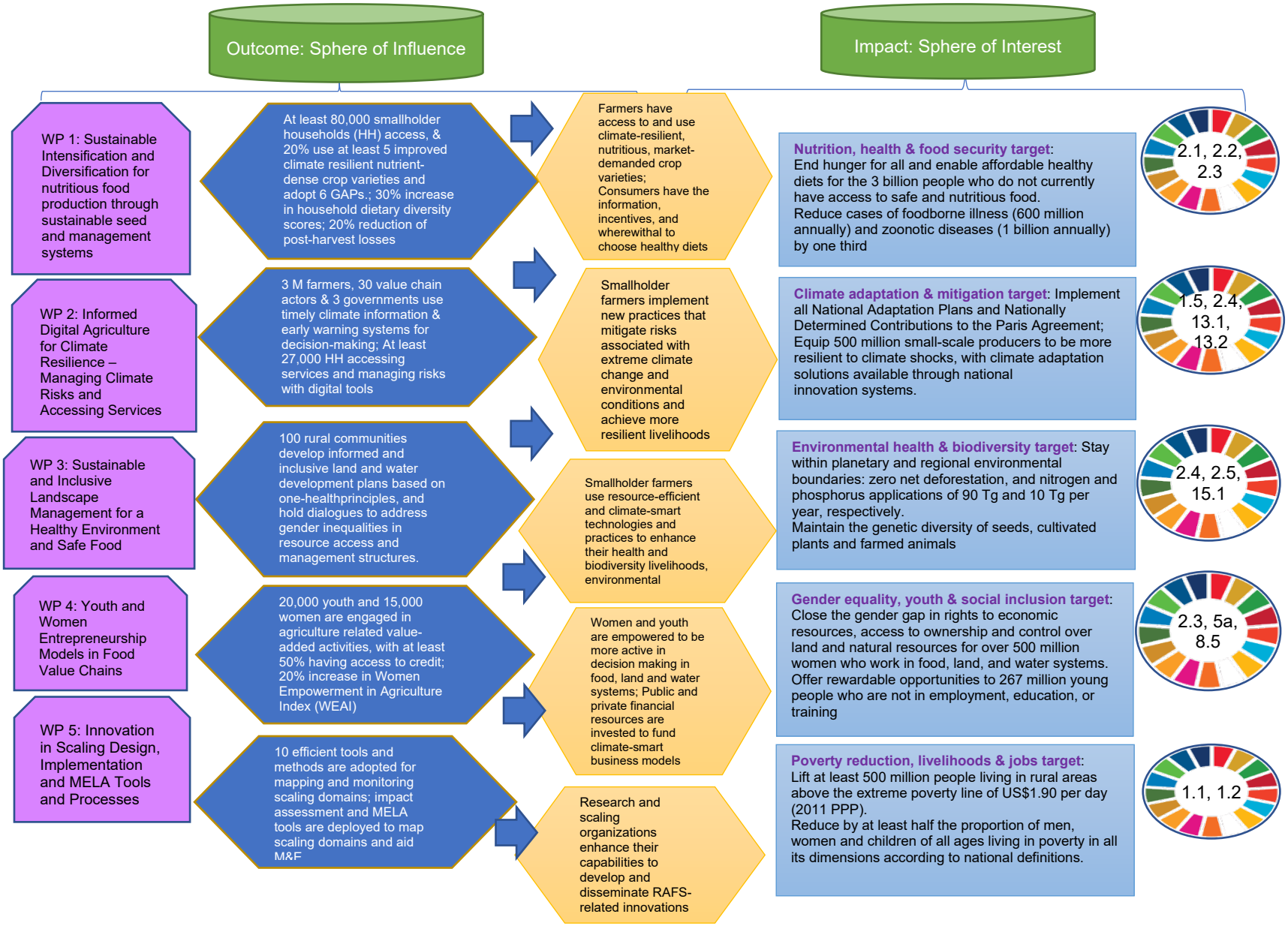
To project the number of hectares under improved management, we focused on the priority countries and farming systems of the Initiative, taking into consideration the report on Climate-informed priorities for the One CGIAR Regional Integrated Initiatives[89]. Based on this, and the estimated adoption rates of the Initiative's proposed technologies using the logistic adoption

function, it is projected that about **3.93 million hectares** of cropland will be under improved management by 2030. This will be a **substantial impact** (i.e., where improved management delivers two of the following three benefits: improvements in soil health and fertility, delivers biodiversity gains, and One Health-sensitive ecosystem services). We have **medium certainty** (i.e., 30%–50% expectation of achieving these impacts by 2030) of success based on experiences from work on water governance[90], use of water and fertilizers[91,92], circular bioeconomy[93], and land management[94]; substituting synthetic pesticides with biopesticides[95] and anticipated synergies with other Initiatives such as Excellence in Agronomy and the Initiative on Sustainable Intensification. To avoid double counting of beneficiaries between Initiatives, we have not assumed additional impact from these collaborations in this set of projections. We will further develop the synergies and factor in the outcomes of these during the inception period.

3. Research plans and associated theories of change (TOC)

3.1 Full Initiative TOC

3.1.1 Full Initiative – TOC diagram



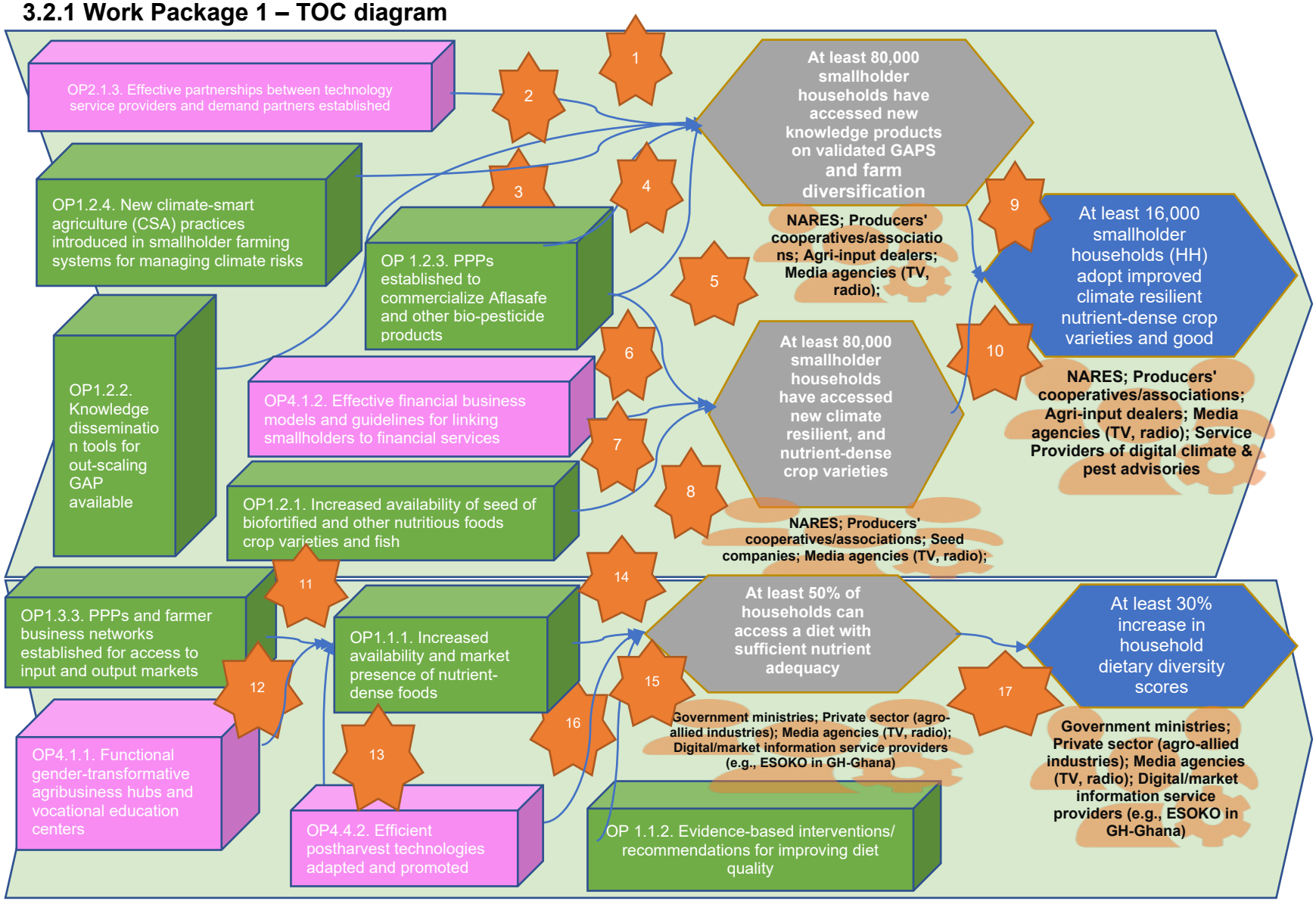
3.1.2 Full Initiative TOC narrative

The Initiative aims to improve nutrition and food security within the context of climate change by stimulating and matching demand for biofortified and other nutritious crops and GIFT, based on climate-adapted, healthier and safer food production systems and by analyzing the processes and relevant institutions that would determine increased interest in and demand for nutritious foods (WP1). It will build capacity of stakeholders (women and youth farmers; entrepreneurs, government and private sector agents) to improve their adaptation to climate change by offering climate specific information – thus serving as a matchmaker between information service providers, on the one hand, and information users, on the other (WP2). The Initiative will use participatory tools and citizen-science processes to bundle these climate-smart land, water, and agronomic Innovations (WP1) and use digital information systems (WP2) to co-develop and implement inclusive landscape management plans towards health-sensitive and productive environments (WP3). By preparing youth and women for agri-entrepreneurship and stimulating the uptake of gender-transformative innovations including digital advisory information (WP2), the Initiative will strengthen value chain processes, address post-harvest losses, stimulate volumes of sale and improve market efficiencies (WP4). Digital tools will provide market information that will increase access to input and output markets while youth and women will be linked to credit and insurance services (WP4). Through WP5, the Initiative will enhance the enabling environment for effective development, scaling, and adoption of innovations. It will create effective PPPs and increase private sector-led market opportunities for smallholder farmers – especially youth and women as pull factors for innovation, adoption, and impact creation. Market demand and participatory gender-differentiated needs and opportunity assessments will underpin the co-design of gender-transformative innovations with beneficiaries considering local conditions and expertise (WP4). The Alliance of CGIAR Centers is uniquely placed to build on innovation scaling processes with a proven track record in the region. Innovations will be out scaled using tools like demand creation campaigns, field demonstrations, spatial and climate analyses, machine learning, and citizen science for mapping out scaling domains to guide the policy environment and investments towards increased success rates (WP5). Multi-stakeholder platforms will also provide feedback and adjustments and inclusive agrifood business models that will enable beneficiaries to adopt improved practices and access to markets that will increase their income and livelihoods. The Initiative has made the requisite provisions as part of its MELIA studies to assess the effectiveness of these multi-stakeholder platforms.

In this TOC, it is assumed that regulatory agencies and other actors in the food system promote the consumption of nutritious foods that will be shared among all household members and that policies are conducive to increase production locally. It is assumed that private sector agents and government partners at local levels are interested in supporting the promoted innovations as these with digitalized information systems would be more efficient in driving food systems transformation and innovation at scale. Lastly, it is assumed that local leaders, women and their spouses are interested in participating in community gender dialogues and capacity building.

3.2 Work Package TOCs

3.2.1 Work Package 1 – TOC diagram



Key assumptions:

Causal linkage #	Assumptions
1–10	New products do not have major trade-offs among indicators related to productivity, resilience, nutrition, and the environment in farmers' fields and will therefore elicit farmer enthusiasm. The increased productivity and other benefits that farmers observe will provide good financial incentives for adoption. Our monitoring systems will detect any gender differentiation in access and make timely adjustments if required.
	Farming communities will avail land because they are interested in participatory assessments of innovation bundles that will provide new crop varieties in the target production systems and specific traits desired by men, women and youth are present in varieties offered.
6	There is good cooperation between the national regulatory agencies and the private sector associated with the seed sector that will have a financial/business incentive to reduce transaction costs, ensure consistent availability of good quality seeds of recommended varieties.
4 and 11	Private sector and government partners are interested in commercializing promoted technologies because of increased returns in the medium to long term and both female, youth and male farmers have found varieties which have performed well over several seasons increasing their food security status.
12–17	Regulatory agencies and other actors in the food industry promote the consumption of nutritious foods and there is sharing of nutritious foods among household members that would reduce the importation bills and increase foreign exchange. Improved nutritional awareness means that nutrient adequacy will be achieved through combined own production and food purchase.

3.2.2 Work Package 1 research plans and TOCs

Work Package title	**Sustainable Intensification and Diversification for Nutritious and Resilient Food Production through Sustainable Seed and Management System**
Work Package main focus and prioritization	WP1 will pursue demand-creation to promote nutritious foods derived from roots and tubers, cereals and pulses, vegetables and fish breeds; co-design cost-effective, diverse and sustainable food production systems to assure food and nutrition security; promote good agricultural practices to address climate change and eroding soil fertility and improve seed systems. With support from CORAF and the WP5 team, WP1 will test, validate and take to scale gender-transformative approaches to create sustainable impact. In Central Africa specifically, WP5 will assist WP1 in the validation of the scaling readiness of existing Innovations that were generated under the Belgian-funded CIALCA.
Work Package geographic scope (Global/Region/Country)	Region: Humid zones of West and Central Africa Countries: NG-Nigeria, GH-Ghana, CI-Cote d'Ivoire, CD-The Democratic Republic of Congo, RW-Rwanda, BI-Burundi

The science:

1. The research questions proposed below will provide knowledge on the potential to raise production and productivity and increase demand for biofortified and other nutritious food crops and fish, to significantly address nutrition and food security challenges in WCA.

RQ1.1: What are the critical factors that incite consumer demand for biofortified and other nutritious foods (such as traditional African vegetables varieties and fish)?	
Associated scientific methods	**Key outputs**
• Organizing shows/fairs, community rallies, radio programming and market-based campaigns with nutrition messaging. • Testing options of interventions for improving diet quality at scale. • Tracking behavioral change in demand for nutritious foods in urban and rural areas.	OP1.1.1. Increased availability and market presence of nutrient-dense foods. OP1.1.2. Evidence-based interventions/ recommendations for improving diet quality.

RQ1.2: How can smallholder farming systems be made more productive and adaptive to climate change	
• Proof-of-concept stage: Multi-locational trials in farmers' fields for Genotype x Environment x Management interactions to assess potential impact of the interventions. • Pilot stage: Farmer participatory and randomized Control Trials (RCT). • Scaling stage: Dissemination of tools, partner engagement, and panel studies/ex-post impact assessment. • Peer-to-peer discovery learning through training of lead farmers with subsequent step-down training of other farmers at the community level. • Participatory Research and Extension Approaches (PREA) and Farmer Field Schools/Fora (FFS) for IPM technologies. • RCT to test the potential effect of innovation and diffusion strategies. • Development of Aflasafe product (for Côte d'Ivoire) and other biopesticides, and making them scale-ready through PPP.	OP1.2.1. Increased availability of seed of biofortified and other nutritious crop varieties and fish. OP1.2.2. Knowledge dissemination tools for out-scaling GAPs available. OP1.2.3. PPPs established to commercialize Aflasafe and other bio-pesticide products. OP1.2.4. New climate-smart agriculture (CSA) practices introduced in smallholder farming systems for managing climate risks.
RQ1.3: Which institutional and capacity support mechanisms will enhance smallholder farmers' access to markets	
• Using the seed tracker tool to monitor and improve linkages within seed systems. • Assessment of "willingness-to-pay" for access to seed and knowledge. • Capacity building of farmers, seed producers and staff of private and regulatory bodies. • Assessments of market demand and how market agents could influence smallholder producers for standardization and quality maintenance. • Establishment of PPPs and farmer business networks, coupled with digital and other tools, to increase access to input and output markets.	OP1.3.1. The seed tracker tool validated in additional countries. OP1.3.2. Capacity of farmers and regulatory staff in standardization and quality maintenance of produce built. OP1.3.3. PPPs and farmer business networks established for access to input and output markets.

***The theory of change**:*

2. The causal processes

<u>At least 16,000 HH adopt improved climate resilient nutrient-dense varieties and GAPs</u>*.*

IF capacities are built of stakeholders from public and private sectors in Participatory Research and Extension Approaches such as peer to peer discovery learning and Farmers Field Schools and **IF** women and youth farmers are presented a basket of Innovation options and the tools to identify and select key core and supplementary Innovations including Climate Adapted GAPs and farm diversification options and **IF** they gain access to relevant input markets through public-private partnerships and commodity markets through value chain related agri-businesses, **THEN** thousands of farming HHs are ready to adopt improved climate resilient nutrient-dense crop varieties and GAPs.

<u>At least 30% increase in household dietary diversity scores:</u>

IF availability and affordability of diverse nutrient-dense foods are improved through increased production and reduced postharvest losses and **IF** access to markets are improved through a better distribution of sales outlets and building of social capital around markets and **IF** advocacy for government fiscal measures influencing food prices are in favor of healthy and nutritious food options combined with effective promotion to educate and influence consumer behaviors, **THEN** more households will be able to access diets with sufficient nutrient adequacy and will have better household dietary diversity.

3. Key demand, innovation and scaling partners

Demand partners	Innovation partners	Scaling partners
Government ministries, producers' and traders' cooperatives/associations, private enterprises	NARES, producers' and traders' cooperatives/associations, government regulatory agencies, private enterprises, development investors, NGOs, CORAF	CORAF, public and private agricultural extension services digital/market information service providers, producers' and traders' cooperatives/associations, financial institutions, development investors, NGOs

4. Key risks are covered in Section 7.3

5. Interdependencies and synergies with other Work Packages

Digital tools from WP2 and readiness and scaling insights generated from WP5 will determine scaling readiness and facilitate scaling in WP1. WP3 & WP1 will work on landscape management planning and dialogues on use of natural resources as they relate to bundling of GAPs in WP1. Increasing production from nutrient-dense crops in WP1 is important to the delivering of healthier foods from crops in WP4. WP1 will collaborate with: Excellence in Agronomy (EiA), Sustainable Mixed Systems Intensification, Plant Health and Rapid Response, Resilient Aquatic Food Systems, Accelerated Breeding, SeEdQual, and Resilient Cities and Rethinking Markets.

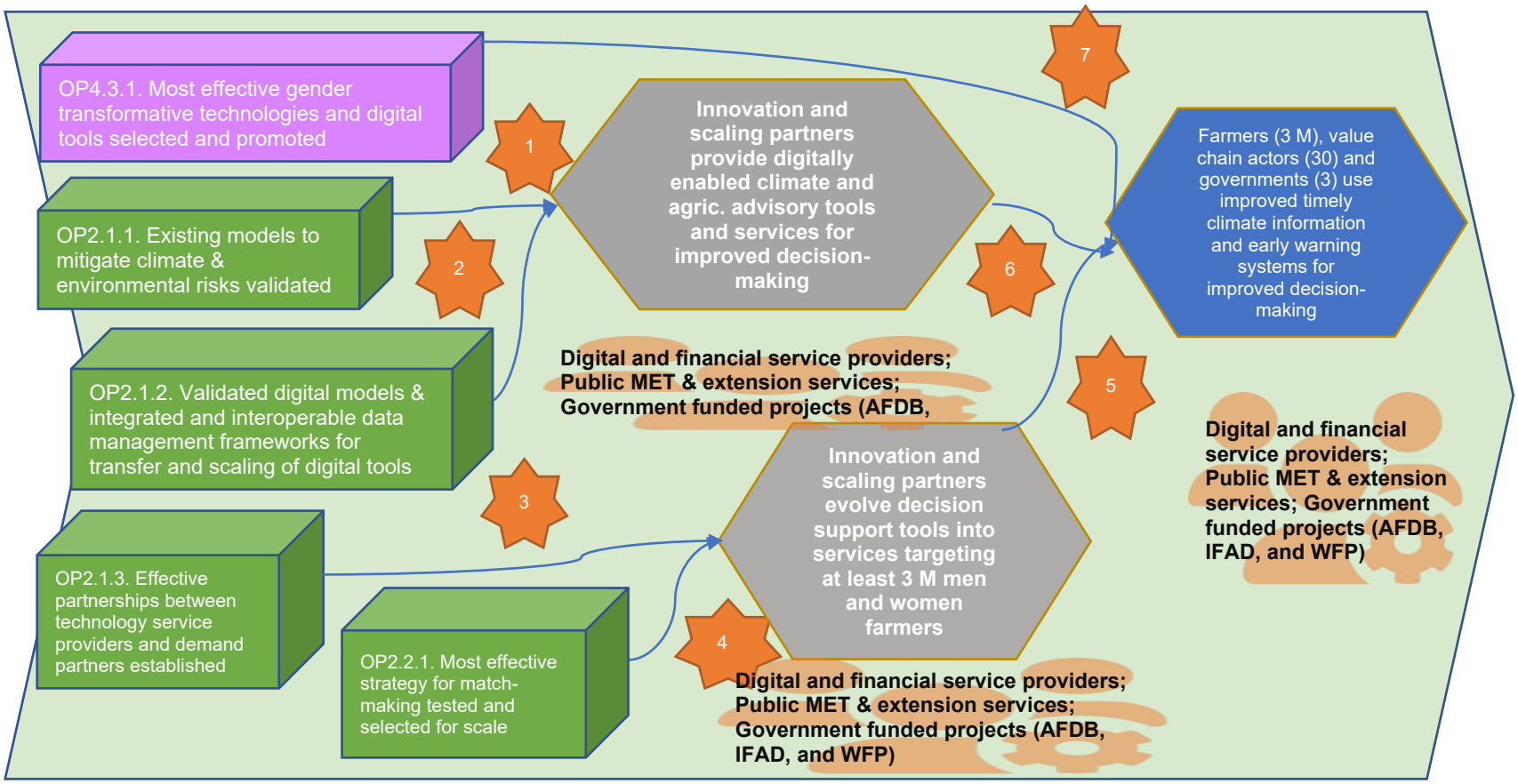
6. Links to Innovation Package and Scaling Readiness Plan

Climate-adapted and nutritious crop varieties, fish breeds and GAPs constitute the core innovation 'packages' that will be validated for their readiness for use and impact at scale in WCA. Other innovations will include the golden eggs from the CRPs such as the rice-based platform, the RTB seed system toolbox and the Healthy Diets and Nutrition. The innovations will be complemented by the relevant scaling approaches that aim to improve seed systems, public-private-partnerships, and good business models.

Measuring and managing performance and results

The baseline survey will be conducted at the Initiative level and serve as reference for monitoring and evaluation (using digital and automated M&E tools) and impact assessment (ex-ante and ex-post). The learning-based framework of M&E will be used to feedback from the monitoring to improve the performance of the project. The Initiative will strive to work with other Initiatives for common MELIA approaches (EiA, ESA UU's Initiative).

3.2.3 Work Package 2 - TOC



Assumption for causal linkage # 1–7: There is good cooperation with national regulatory agencies and private sector companies that will have business incentive to engage in the promotion of digital information systems as they will see long-term financial benefits through digital information induced rapid food systems transformation.

3.2.4 Work Package 2 Research plans and TOCs

Work Package title	**Informed digital agriculture for climate resilience – Managing climate risks and accessing services**
Work Package main focus	WP2 will, jointly with existing providers, create new or improve, contextualize, and complement existing digital services for small-scale farmers, value chain actors and governments for informed decision-making through data harmonization, governance, analysis, and tailored advisory. Specifically, it will provide climate and agronomic advice, early-warning systems for pest and disease management, relevant commodity price data, data on access to finance and near real-time deforestation monitoring data. By design, scaling-ready innovations from across other One CGIAR Initiatives will be selected by users (e.g., service providers, value chain actors) through a matchmaking process creating demand-responsive solutions contextualized and adapted for regional needs in WCA.
Work Package geographic scope (global/region/country)	Region: Humid zones of West and Central Africa Countries: GH-Ghana, NG-Nigeria, RW-Rwanda, CD-The Democratic Republic of Congo, BI-Burundi and CI-Cote d'Ivoire; CM-Cameroon and LR-Liberia.

The science:

1. The proposed research questions will contribute to knowledge on factors limiting access to and use of digital tools and climate advisory services by smallholder farmers in WCA.

RQ 2.1: How will demand-led digital services and GAP at land scape level lead to more climate adaptive production systems?	
Associated scientific methods	**Key outputs**
• Assess and take stock of user demand and One CGIAR supply of innovations. • In collaboration with other One CGIAR Initiatives, enhance approaches to contextualize climate and agronomic digital advisory and services, and improve robustness and accuracy based on ground-truth data. • Leverage machine learning and advanced statistical techniques to enhance use of 'big data' for climate and environmental risks.	OP2.1.1. Existing models to mitigate climate & environmental risks validated OP2.1.2. Validated digital models, & integrated and interoperable data management frameworks for transfer and scaling of digital tools. OP2.1.3. Effective partnerships between technology service providers and demand partners established
RQ 2.2: What are key determinants for farmers and agricultural actors to seek for and adopt digital based knowledge information systems	
• Social-behavioral change and human centered design research capacity will be strengthened to build evidence on and address the determinants and incentives of adoption of digital services and resilient practices, gender-neutral and/or women empowering adoption.	OP2.2.1. Most effective strategy for matchmaking tested and selected for scale.

The theory of change*:*

2. The causal processes

Farmers (3 million), value chain actors (30) and governments (3) use improved timely climate information and early warning systems for improved decision making.

IF public sector actors such as NARES and national meteorology services know the information needs by farmers to improve their productivity and access to markets and **IF** the farmers and other value chain actors work with public and private sectors on the digital platform and information requirements and **IF** the digital agronomic and climate advisories become readily available and affordable to female and male farmers and youth and other value chain actors to

take informed decisions, **THEN** millions of farmers – including women and youth – and other value chain actors would use digital agronomic and climate advisories to adapt to climate change, improve sustainable production and improve livelihoods.

3. Key demand, innovation and scaling partners

Demand Partners	Innovation Partners	Scaling Partners
Farmers, producer groups, value chain actors, private sector and governments.	Matchmakers such as AGRF Deal Room, Seedstars, UK FCDO Agri-Tech Catalyst and WFP Accelerator	Esoko, mAgro, Farmerline, 2605-Babban Gona, WorldCover and EcoBank, and public actors such as national MET and extension services

4. Key risks are covered in Section 7.3

5. Interdependencies and synergies with other Work Packages

WP2 is central to the TOC of the WCA Initiative and to scale digital innovations within the RII WCA and across Initiatives:

- Link to WPs: Focus on crops and GIFT and seed systems prioritized in WP1 and to landscape approaches and climate-smart agriculture to WP3; alignment with sustainable finance, gender, and youth in gender-transformative SMEs in WP4 and with the readiness approach in WP5.

- Link to other Initiatives: Fully aligned with Climate Services, Sustainable Finance and Climate Security WP in *ClimBeR (Building Systemic Resilience Against Climate Variability and Extremes)*. Close collaboration on digital advisory development with *Harnessing Digital Technologies for Timely Decision-Making Across Food, Land, and Water Systems*. Advisory systems will build on recommendations of *EiA: Solutions for Agricultural Transformation* and *Plant Health and Rapid Response to Protect Food and Livelihood Security Initiatives*.

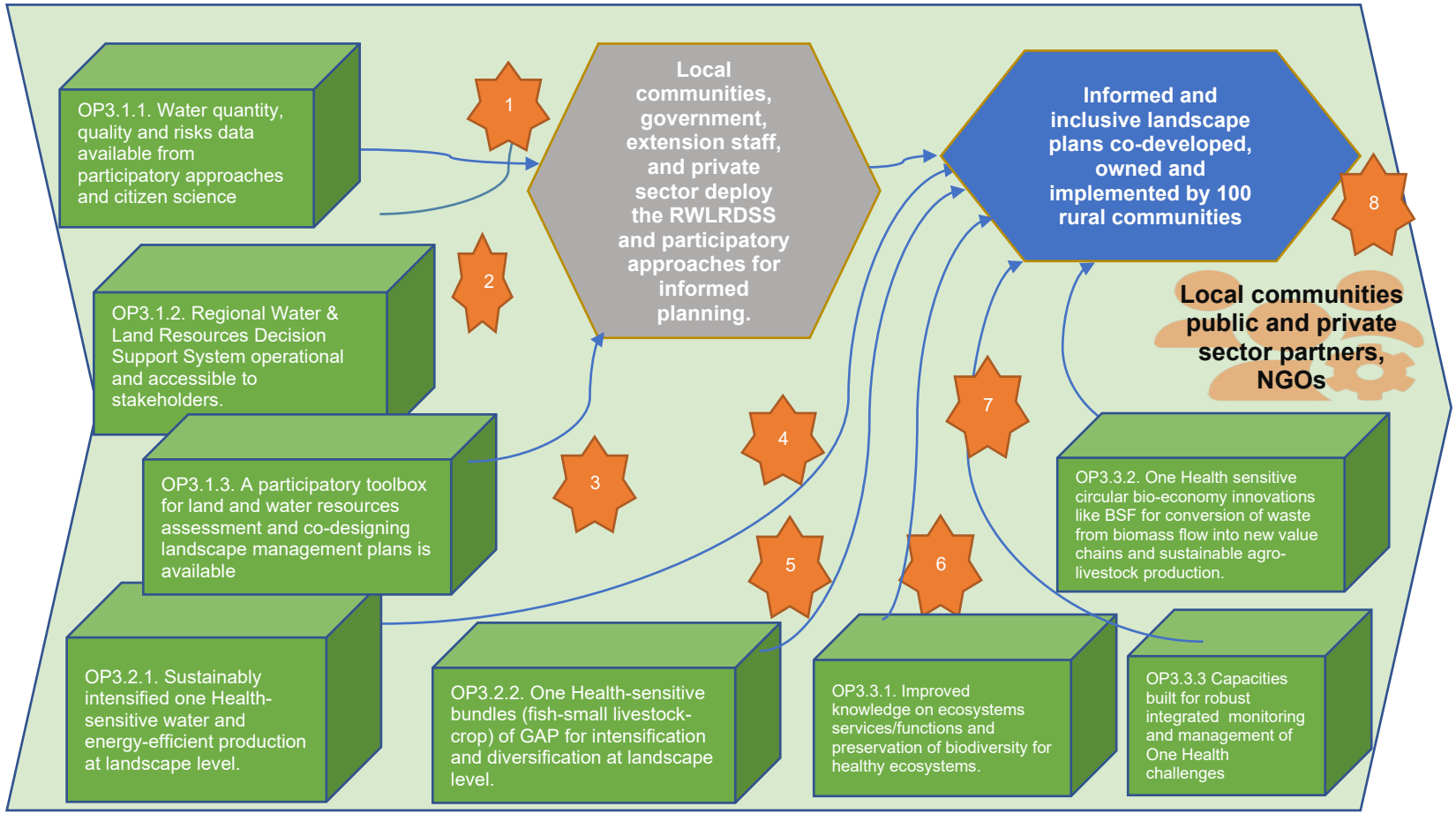
6. Links to Innovation Package and Scaling Readiness Plan

WP2 adopts a phased approach, firstly focusing on innovations and golden eggs with significant scaling potential, such as *BigData Inspire*, *Climate Information Services (CIS)* and digital plant health advisory golden eggs and innovations. In parallel, advisories for ongoing services around near-real time land use change monitoring will be strengthened and emerging promising advisories for nutrition and market information built up.

Measuring and managing performance and results

The baseline survey that will be conducted at the Initiative level will serve as reference for monitoring and evaluation (using digital and automated M&E tools) and impact assessment (ex-ante and ex-post). The learning-based framework of M&E will be used to feedback from the monitoring to improve the performance of the program.

3.2.5 Work Package 3 – TOC diagram



Assumptions for causal linkages 1-6: Farming communities make land available and are interested in participating in assessments of innovation bundles as they will improve their production potential and increase access to markets and minimize conflicts over the good governance of the landscape resources. WP3 also assumes that there is good cooperation with regulatory agencies that will see an incentive for public and private sector agents to drive together the development of healthy landscapes, contributing to meeting the overarching goal of inclusivity, a One Health-sensitive environment, and improved livelihoods.

3.2.6 Work Package 3 research plans and TOCs

Work Package title	**Inclusive landscape management: pathways for scaling land and water innovations for resilient agrifood systems**
Work Package	Equal access to, and proper use of land and water resources is a prerequisite to building a healthy, productive and One Health sensitive environment for resilient agrifood systems and livelihoods. WP3 will combine participatory tools and citizen science to co-develop, and implement inclusive landscape, owned by the communities, that enable sustainable scaling of bundled land, water, aquaculture and climate-smart agronomic and digital innovations. WP3 proposes to (i) co-establish the status and progress of landscape management for sustainable intensification; (ii) design adaptive socio-ecological landscape management plans that are One Health-sensitive and embedded in local and national governance systems; (iii) develop near real-time water resources decision support system (WRDSS) to strengthen landscape resilience planning and investment; (iv) deploy context-specific integrated land, water, fish, crop and agronomic innovations at scale and (v) deploy market-driven circular bio-economy innovations to reduce pressure on water and land resources while mainstreaming one-health approaches in planned innovations.
geographic scope (global/region/country)	Region: Humid zones of West and Central Africa Countries: NG-Nigeria, GH-Ghana, CI-Cote d'Ivoire, RW-Rwanda, BI-Burundi and CD-The Democratic Republic of Congo

The science

1. The main research question to be addressed is how inclusive landscape management and water resources can be applied to enhance use and scaling of innovations towards a One Health sensitive environment, improved productivity and livelihoods in WCA? Specific research questions and associated scientific methods and outputs are presented in the table below.

RQ 3.1 How can participatory water and land resources decision support system (WRDSS) strengthen landscape resilience planning for enhanced production of nutrient rich crops and fish	
In at least two ecozones: Forest-savannah transition zone and inland valley in Central Africa highlands: • Co-development and implementation of WRDSS on water quantity/quality, water risk/scarcity, water security & water policies and institutions from region to local scale to guide investment decisions to enhance resilience • Use citizen science, remote sensing and particiapory mapping, modelling and scenarios development to assess water availability, quality and risks to inform landscape management plans and create ownership at community and local governance level	OP3.1.1. Water quantity, quality and risks data available from participatory approaches and citizen science OP3.1.2. Regional Water & Land Resources Decision Support System operational and accessible to stakeholders OP3.1.3 A participatory toolbox for land and water resources assessment and co-designing landscape management plans is available
RQ 3.2: How can innovations be One Health-sensitive and scaled to contribute to healthy and productive environment for livelihood improvement	
• Scaling context-specific bundled (integrated) land, water, fish, crop and agronomic climate-smart innovations, technologies and practices • Market-driven multiple cropping supported by small scale solar-powered irrigation for vegetables. • Irrigation scheduling for the rehabilitation of old cocoa plantations • Integrated crop-GIFT-livestock production and practices	OP3.2.1. Sustainably intensified One Health-sensitive water and energy-efficient production at landscape level OP3.2.2. One Health-sensitive bundles (fish-small livestock-crop) of GAP for intensification and diversification at landscape level
RQ 3.3: How can ecosystem services/functions and biodiversity be sustained, management of water, soil and biomass flow improved, and resilient agrifood systems supported, for improved communities' livelihoods?	
• Improve knowledge on ecosystem functions and services in selected ecologies • Pilot/scale known One Health-based technologies derived from acquired knowledge on ecosystem services	OP3.3.1. Improved knowledge on ecosystems services/functions and preservation of biodiversity for healthy ecosystems

• Establish public private partnership (PPP) in selected countries for scaling production of organic fertilisers and insect protein feeds from recycling of agro-livestock waste using black soldier flies (BSF) based circular bioeconomy approaches • Explore new ecosystem functions/services and develop One Health sensitive technologies for healthy ecosystems and better livelihoods • Build capacities on multisectoral(MS), system thinking (ST) and One Health approaches for addressing environmental, human and animal health challenges	OP3.3.2. One Health sensitive circular bio-economy innovations like black soldier fly (BSF) for conversion of waste from biomass flow into new value chains and sustainable agro-livestock production OP3.3.3. Capacities built for robust integrated monitoring and management of One Health challenges

The theory of change

2. The causal processes

- **IF** policy makers, practitioners and other stakeholders are informed with objective and location-specific information on water availability, quality and risks and make use of our socially inclusive participatory tools and models for landscape management **THEN** local communities would use land and water resources more sustainably for multiple purposes, while minimizing resource-based conflicts and limiting impact on the other ecosystems services including biodiversity.

- **IF** socially inclusive landscape management plans, incorporated with climate-smart innovations for agriculture and aquaculture are implemented, controlled and accounted for by rural communities, **THEN** smallholder farmers will have equal access to land and water and adopt climate-smart technologies and approaches that enable them to sustainably intensify water-efficient crop, livestock and fish production and contribute to diverse and healthy diets and regional food security.

- **IF** smallholder farmers adopt our bundled One Health sensitive climate-smart solutions for agriculture, livestock and aquaculture productions **THEN** rural communities will increase the health of their ecosystems, preserve the biodiversity while sustainably intensifying their agro-livestock-aquaculture productions. In addition, the application of circular bio-economic approaches for converting waste from biomass flow into high value chains will create new job opportunities and new sources of income for improved communities' livelihood

3. Key demand, innovation and scaling partners

Demand partners	Innovation partners	Scaling partners
Government ministries; FBO, NGOs, private sector individuals and enterprises	NARES, government regulatory agencies; private sector individuals and enterprises NGOs, CBOs and farmer organizations	Public and private agricultural extension services; private sector entities; development investors; NGOs, CBOs and farmer organizations

4. The key risks are covered in Section 7.3

5. Interdependencies and synergies with other Work Packages

- The development and roll-out of the WRDSS that provides information on water availability, quality, water risk/scarcity, water security as well as water policies and institutions from region to local scale to guide investment decisions that would enhance farmers' resilience is linked to WP2 and will enable sustainable and equitable scaling of the innovations proposed by WP1 and WP4.

- WP3 will link up and collaborate with relevant global IDTs, especially on agroecology, policy and strategies, Climber, Aquatic systems, Plant Health Innovation and Nature-positive agriculture.

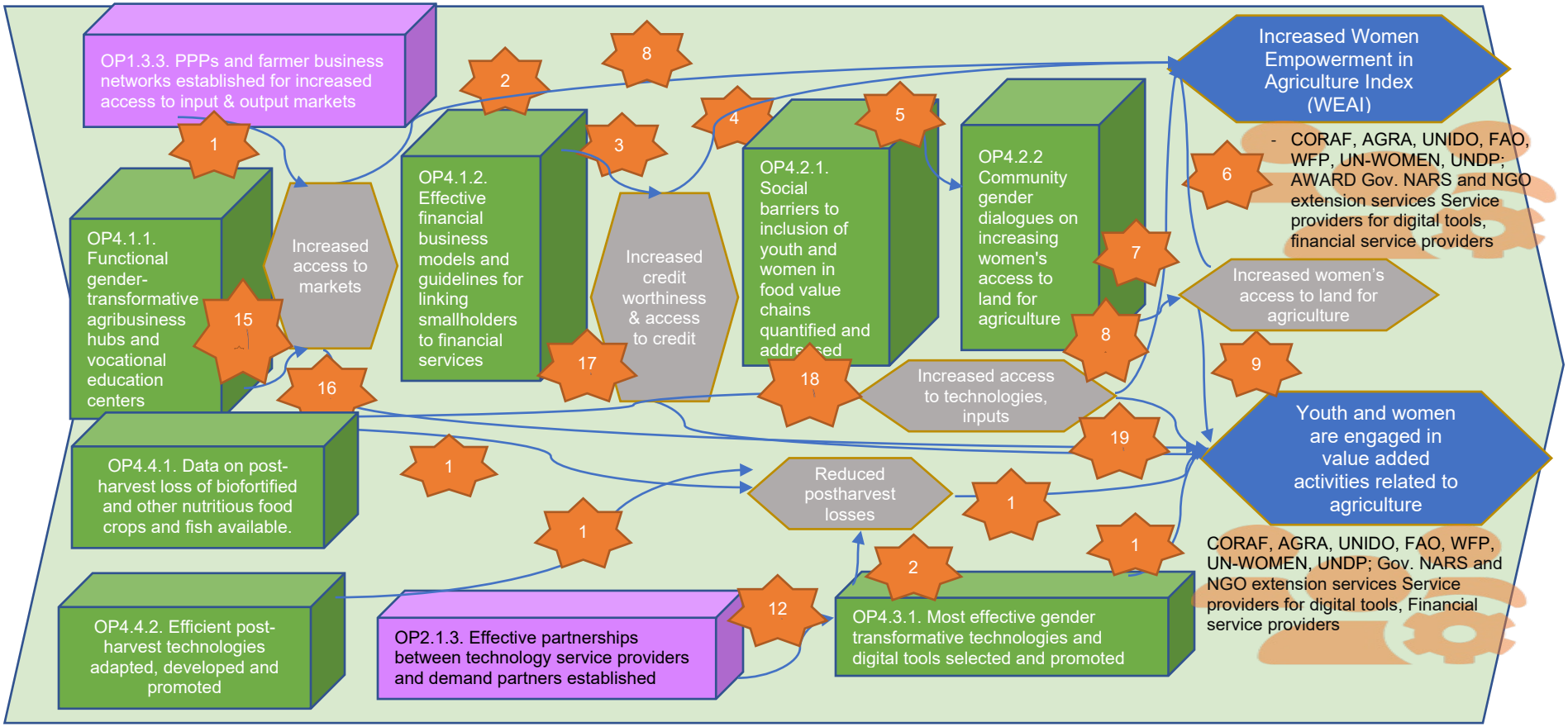
6. Links to Innovation Package and Scaling Readiness Plan

The WRDSS will guide investment decisions and support bundled innovations by WP1. These innovations on climate-resilient and nutritious crop varieties, fish breeds and GAP will be applied at landscape level to create more productive and healthy landscapes with expected economies of scale (reduced production costs and reduced market transaction costs and increased volumes of trade).

Measuring and managing performance and results

The baseline survey that will be conducted at the Initiative level will serve as reference for monitoring and evaluation (using digital and automated M&E tools) and impact assessment (ex-ante and ex-post). The learning-based framework of M&E will be used to feedback from the monitoring to improve the performance of the program.

3.2.7 Work Package 4 – TOC diagram



Assumptions for all Causal linkages: Local leaders, women and their spouses are available and interested in participating in community gender dialogues and capacity building events including training in agribusiness as this will allow social inclusive development at farm and landscape level that will strengthen business acumen of women and youth and progress economic development Barriers to increased female participation in agricultural commercialization can be identified and overcome.

3.2.8 Work Package 4 research plans and TOCs

Work Package title	**WP4: Youth and women entrepreneurship models in food value chains**
Work Package main focus and prioritization	This WP aims at promoting and preparing youth and women in developing and managing agribusiness models for food value chains while addressing social barriers. Digital tools will increase their access to better input and output markets. To satisfy market demand, co-designed and gender-transformative innovations and to increase productivity and reduce postharvest losses, innovations will be tested and out scaled using the scaling readiness framework. Youth and women will be linked to credit and insurance services through evidence-based policy options. Agribusiness hubs will help to build the capacities in technical knowledge and business skills of youth and women.
Work Package geographic scope (global/region/country)	Region: Humid zones of West and Central Africa Countries: NG-Nigeria, GH-Ghana, CI-Cote d'Ivoire, CD-The Democratic Republic of Congo, RW-Rwanda, BI-Burundi

The science

1. The proposed research questions below will identify the critical constraints to performance of women and youth in agribusiness as well as potential tools and mechanisms for addressing them.

RQ 4.1: What are the appropriate mechanisms and policy advocacy tools to facilitate access to finance and market linkages to youth and women?	
• Adapted training modules on entrepreneurship • Mapping and generating data for de-risking activities of youth and women • Design and testing contractual arrangements • Participatory set up of innovation platforms including youth and women in the food value chain • Policy brief development	OP4.1.1. Functional gender-transformative agribusiness hubs and vocational education centers OP4.1.2. Effective business models and guidelines for linking smallholders to financial services
RQ 4.2: What are the social constraints to gender and generational equality that affect gender equality in agribusiness?	
• Need assessments: a baseline and diagnostic surveys using mixed methods (qualitative and quantitative) • Quasi-experimental design to test the effect of social barriers	OP4.2.1. Social barriers to inclusion of youth and women in food value chains quantified and addressed OP4.2.2. Community gender dialogues on increasing women's access to land for agriculture
RQ4.3: What gender-transformative technologies and digital tools can enhance sustainability of women and youth agribusiness hubs?	
• Stakeholder consultations • Baseline and diagnostic surveys using mixed method (qualitative and quantitative)	OP4.3.1. Most effective gender transformative technologies and digital tools selected and promoted
RQ4.4: What are the efficient post-harvest technologies to reduce post-harvest losses in biofortified and other nutritious food crops varieties and fish?	
• Quantitative and qualitative loss assessment • Co-design and test methods and equipment to reduce postharvest losses	OP4.4.1. Data on post-harvest loss of biofortified and other nutritious food crops and fish available OP4.4.2. Efficient post-harvest technologies adapted and promoted

The theory of change

2. The causal processes

- **IF** women's and youths' access to land and financial services is increased through advocacy and multi-stakeholder processes and policy options and capacity is improved across agriculture-related agencies and local government to mainstream gender responsiveness

emphasizing access to resources in their programming; **THEN** women and youth empowerment will increase.

- **IF** gender transformative approaches are used as opposed to traditional gender accommodative approaches, social barriers to inclusion of youth and women are addressed and attitudes toward gender and generational equality in agribusiness improve, **THEN** more youth and women can effectively benefit from profitable activities and increase their income.
- **IF** digital tools for market access are promoted that address social constraints in order to increase access of youth and women to better input and output markets and, beneficiaries co-design gender-transformative innovations to produce healthy, value-added food products and services, **THEN** small scale and gender-transformative technologies and digital tools will help to engage more youth and women in value-addition.
- **IF** gender-transformative agribusiness hubs and vocational education centers are functional and building capacities in technical knowledge and business skills, **IF** agribusiness hubs focus on lucrative activities such as quality seed and crop production and marketing and on technical services including mechanization and **IF** the Initiative stimulates and informs the policy environment, **THEN** agricultural financial institutions will ease access to credit and insurance to youth and women at more affordable interest rates, de-risking productive activities and reducing potential payment defaults and building stronger business acumen with long-term provisions of guaranty of funds and improved access to land.

3. Key demand, innovation and scaling partners

Demand partners	Innovation partners	Scaling partners
Governments, women associations, processor associations, youth CBOs, agricultural financial institutional	CORAF, 2353-RIKOLTO, Gov. NARES and NGO extension services, service providers for digital tools, financial service providers, value chain actors, Advanced Ros, private sector actors, *One CGIAR Initiatives (Gender and Diversity Initiative*)	CORAF, AGRA, UNIDO, Rome-based agencies and other UN agencies; Consortium: Rice Seed Enterprises and Millers (COSEM-Riz)

4. The key risks are covered in Section 7.3

5. Interdependencies and synergies with other Work Packages

WP3 will collaborate with the three WPs. In collaboration with WP2, digital tools for resilience to climate change will be promoted to benefit youth and women. All innovations will be scaled out in partnership with WP5. WP4 will work with WP1 to promote seed production as businesses for youth and women. WP4 will also work with WP3 by utilizing and taking to the landscape, socially inclusive tools and models for healthy environments and value chain development. WP 4 will work on youth entrepreneurship and policies to enhance job creation with *"Rethinking Food Markets and Value Chains for Inclusion and Sustainability*". The WP will also collaborate on digital tools promotion with "H*arnessing Digital Technologies for Timely Decision-Making across Food, Land, and Water Systems*" and on gender-transformative approaches with "*HER+: Harnessing equality for resilience in the agrifood system*".

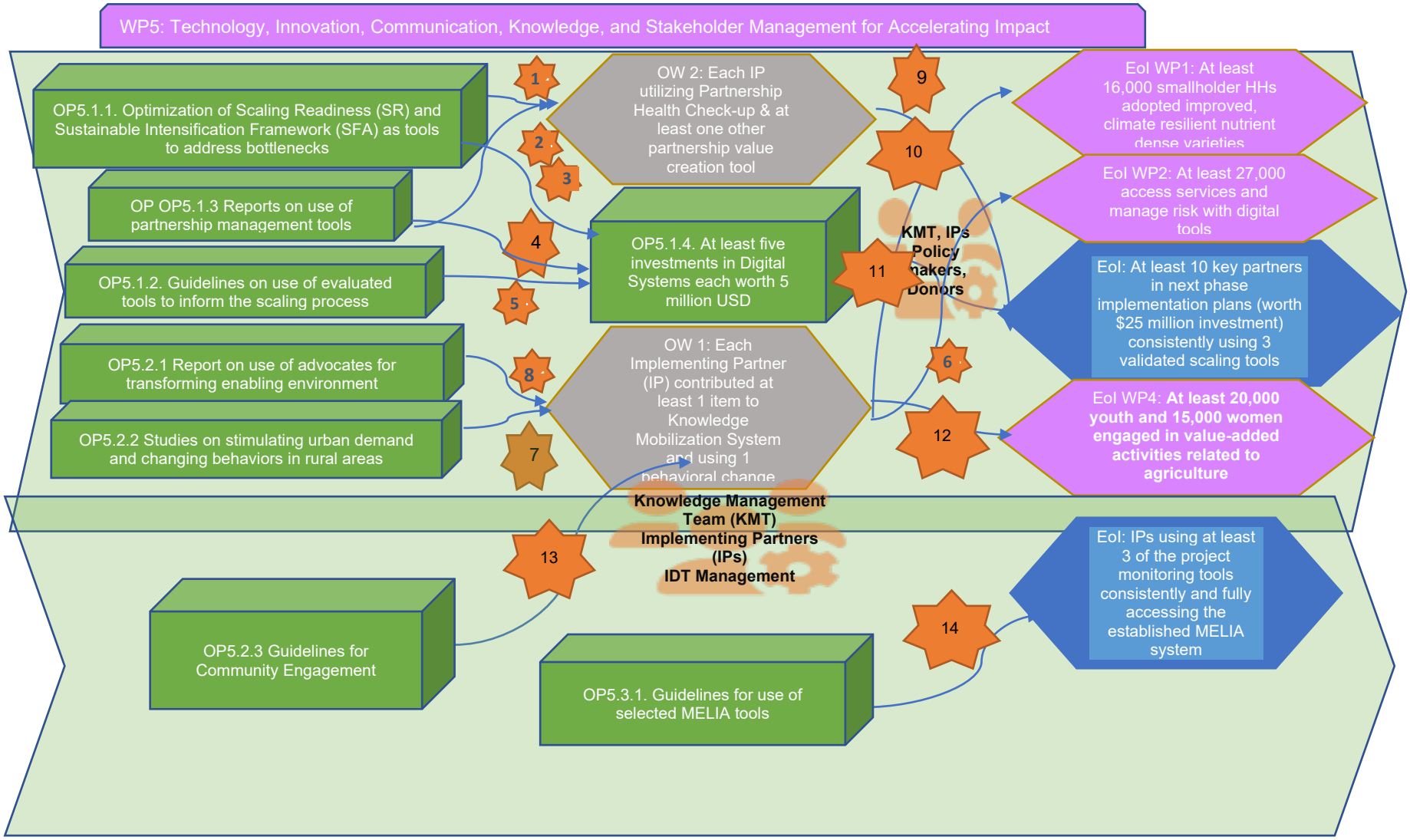
6. Links to Innovation Package and Scaling Readiness Plan

With WP1 and WP2, WP4 will engage in the generation and adoption of three core Innovations: digital tools, small-scale equipment, post-harvest technologies. These innovations will be integrated in the scaling readiness plan of the Initiative and/or validated for scaling readiness in Central Africa by applying the scaling readiness framework. The integration of actions to reduce social barriers to gender and generational equality will be at the heart of the scaling readiness approach in WP4.

Measuring and managing performance and results

Evaluation of the achievements in WP4 will be done through linkage between monitoring and evaluation (M&E) and impact assessment (IA) activities. A baseline survey will be conducted to serve as reference for both M&E and IA. Digital and automated M&E tools will be developed to track the progress toward target of output, outcome, and impact. A learning-based framework of M&E will be used to feedback from the monitoring to improve the performance of the program. Both ex-ante and ex-post impact assessment will be carried out. While ex-ante impact assessment will be done prior to scaling of the innovations, ex-post will help to generate the impact after scaling. Contrafactual framework will be adopted for ex-post impact assessment to generate robust parameters.

3.2.9 Work package 5 – ToC diagram



The assumptions for causal linkages #1-7: There is good cooperation within the project team and with partners and cross-fertilization of ideas across regional initiatives on scaling approaches and MELIA tools

3.2.10 Work Package 5 research plans and TOCs

Work Package title	**WP5: Technology, innovation, communication, knowledge and stakeholder management (TICKS) for accelerating impact investments and catalyzing impact at scale**
Work Package main focus and prioritization	This WP will utilize multiple state of art evidence-based management solutions to articulate the demand for research and innovations in WCA, increase impact investments in the Initiative's research and innovation portfolios, CGIAR and other long-term impact partners, and integrate them into a coherent TICKS management system for catalyzing the Initiative's impact. The system will be powered by the Scaling Readiness Approach (SRA) complemented by other tools and methods for managing progress in the implementation of all WPs and other selected interventions. It will design future scaling domains and expansion plans focused on smart investments, partnership expansion, and building an enabling environment.
Work Package geographic scope)	Region: Humid zones of West and Central Africa Countries: NG-Nigeria, GH-Ghana, CI-Cote d'Ivoire, CD-The Democratic Republic of Congo, RW-Rwanda, BI-Burundi

The science:

1. Addressing the research questions below is critical for understanding the factors that underlie systems' performance to develop the tools and methods that can help optimize and expand implementation efforts to ensure successful, sustainable scaling of proven innovations.

RQ5.1: Which management system architecture (workflows, methods, tools etc.) would increase the contributions of Scaling Readiness and partnership management tools to accelerate impact investments in research and innovation interventions and catalyze the impact of the R&Is at scale?	
Associated scientific methods	**Key outputs**
• Scaling Readiness Approach (SRA) • Sustainable Intensification Framework (SFI) • Models for mapping scaling domains, incl. EcoCrop (through WP3) • Citizen Science tools (WP3) • Machine learning tools • Social network analysis • Partnership Health Check-up Tool • Qualitative evaluation tools used in Implementation Science • Stakeholder partner network analysis	OP5.1.1 Optimization of Scaling Readiness (SR) and Sustainable Intensification Framework (SFA) as tools to address bottlenecks OP5.1.2 Guidelines on use of evaluated tools to inform the scaling process OP5.1.3 Three reports on use of partnership management tools OP5.1.4 At least five investments in digital systems each worth US$5 million
RQ5.2 Which are the most effective use of advocates and media systems for mobilizing knowledge and community engagement, stimulating demand and investment, and changing behaviors for reaching different target groups?	
1. Social marketing approach 2. Choice architecture 3. Consumer acceptability 4. Theory of gender and power 5. Diffusion of innovations 6. Behavioral change wheel 7. Social and behavioral change communication, with particular attention to gender relations 8. Awareness and knowledge indices	OP5.2.1 Report on use of advocates for transforming enabling environment OP5.2.2 Studies on stimulating urban demand and changing behaviors in rural areas OP5.2.3 Guidelines for Community Engagement

RQ 5.3: Which monitoring, learning and evaluation tools are most suited for rapid diagnosis and response to emerging concerns, and which contribute cost-effectively to monitoring progress, evidence building for impact, and designing future scaling efforts	
• Household survey instruments. • Sustainability indicators • MELIA tools for Initiative • Indicators/methods for evaluating power, politics, ownership, and trust issues underlying the enabling environment	OP5.3.1 Guidelines for use of selected MELIA tools

The theory of change

2. The causal processes

By 2024, two to three digital and other tools from the CGIAR platforms will have been applied within the SRA to eight innovation packages and assessed for their effectiveness.

IF a systematic approach to evaluating validated digital and other tools is adopted and mixed methods for monitoring and evaluation for their effectiveness and cost are used and **IF** adequate training of innovation partners is provided, **THEN** implementing partners will be using selected tools and methods not only in this Initiative but also in other projects and programs as well.

All WCA partners and key collaborators will be using the Partnership Health Check-up Tool and contributing towards improving partnership functioning:

IF explicitly engaging in implementation science research to understand partnership functioning improves the implementation process, **THEN** partners will adopt the participatory qualitative tools and communication practices that lead to improved functionality of their interventions and the ultimate impact of the Initiative.

3. Key demand, innovation and scaling partners
Categories of demand, innovation, and scaling partners described by previous WPs apply here. In addition, donors and government agencies are key demand partners, as achieving impact at scale is a priority, with evidence provided to justify further investment and enhance sustained uptake of key innovations. More specific to WP5 will be co-innovation partners in research organizations specialized in behavior change research and networking analysis, and scaling, impact assessment, MELIA and IT specialists in the wider One CGIAR effort. For scaling efforts, a key priority will be engaging advocates and influencers within each national food system transformation domain and prioritizing understanding of partnership selection and coordination for scaling.

4. The key risks are covered in Section 7.3

5. Interdependencies and synergies with other Work Packages
This WP package examines the tools, methods and achievements used by the other four WPs, and provides the structure for ensuring integration across WPs and knowledge consolidation and sharing across the entire program and for an external audience. To ensure the emerging findings influence policy direction, strong engagement with the system transformation Initiative Design Teams is envisioned, especially with *Food Systems transformation for healthy, safe and affordable diets, building systemic resilience to climate extremes,* and *Leveraging gender and*

social equality. Knowledge sharing with all global resilient agrifood system Initiatives will be essential, with the WP seeking to identify emerging innovations of relevance to this Initiative.

6. Links to Innovation Package and Scaling Readiness Plan
Development of Innovation Packages at the country level and deepening the understanding of how to utilize the Scaling Readiness framework is an integral part of this WP. Strong collaboration with the One CGIAR Scaling Readiness team is envisioned.

Measuring and managing performance and results
The baseline survey that will be conducted at the Initiative level will serve as a foundation for evaluating the effectiveness of selected MELIA and other innovative tools under WP5 and ultimately assessing the impact of the Initiative in meeting its diverse objectives. The learning-based framework of M&E will be used to feedback from the monitoring to improve the performance of the program.

4. Innovation Packages and Scaling Readiness Plan

4.1 Innovation Packages and Scaling Readiness Plan (IPSR)

To ensure readiness for use and enhance impact at scale and to accelerate additional investments, the SR framework will be the foundation for the Initiative's interventions. Within this Framework, the Initiative has a set of eight interconnected Innovation Packages (IPs), that are fully integrated into its five WPs. Each WP consists of one or more core innovations (products, technologies, methods) that are linked to complementary innovations or systems requisite for achieving the One CGIAR Impact Areas. The distinct IPs exhibit different degrees of scaling readiness and use and the SR of each IP will vary by location.

WPs 1, 2, 3, and 4 will use the SR to prioritize and package innovations for broader use by change agents, farmers, policy makers, and the private sector. An initial set of 32 Core Innovations were identified across the WPs based on a combination of impact evaluations from prior research, and CGIAR golden eggs, and then discussed with stakeholders.

Based on the Central SR support guidelines, WCA should be prioritized for First Wave scaling backstopping and start Light Track from quarter 1, 2022 onwards and Standard Track from quarter 4, 2022 onwards, and Advanced Track for the Initiative in quarter 1 2024, aiming to cover eight Innovation Packages.

The Initiative allocated US$780,000 to implement the Innovation Packages and Scaling Readiness plan (2022: US$0.3M; 2023: US$0.34M; and in 2024 US$0.14M).

Dedicated activities, deliverables, indicators and line items are included in the Management Plan's MELIA and Budget Sections Additional funding is foreseen through Belgian funding.

5. Impact statements

5.1 Nutrition, health and food security

Challenges and prioritization

Disruptive forces of climate change, limited access to seeds of nutritious crops, and high post-harvest losses all impact negatively on food production systems and health. In 2019 alone WCA spent US$65.7 billion importing foodstuffs[96]. Simultaneously, demand for food is transforming, characterized by a rapid increase in access to low-cost, highly processed foods, especially in urban areas that in the region contributes to the triple burden of undernutrition, micronutrient malnutrition, and obesity[97,98]. To address these issues, the IDT and CORAF engaged with a large set of stakeholders to prioritize a set of innovations with those related to nutrition and food security being top priority.

Research questions

The Initiative will address three research questions that will contribute to this Impact Area:

1. What are the critical factors that incite consumer demand for biofortified and other nutritious foods (such as traditional African vegetables varieties and inland genetically improved farmed tilapia)?
2. How can smallholder farming systems be made more productive and adaptive to climate change?
3. Which institutional and capacity support mechanisms will enhance smallholder farmers' access to markets.

Components of the Work Packages and their impact

WP1 will stimulate and match demand for nutritious and climate smart food crops, including biofortified crops (yams, cassava, sweetpotato, plantain, potato bananas, rice, maize, beans and vegetables) and fish, based on intensified, diversified, economically viable, healthier and safer food production systems; WP2 will be a match-maker between information service providers and information user on climate data, GAPs and commodity price data to value chain actors and governments for informed decision making; WP3 will take Innovations at the landscap level and use roll-out of WRDSS to guide investment decisions to create healthy and sustainable food production landscapes and improve food safety; and WP4 will develop and take to scale effective market efficiencies through improved linkages and demand creation and post-harvest innovations to generate income and build less wasteful food systems.

Measuring performance and results

(i) At least 80,000 smallholder farmers' households will have access to improved climate resilient nutrient-dense crop varieties and 16,000 will use five climate resilient, nutrient-dense crop varieties and six bundled GAPs and increase their dietary diversity scores by 30%; (ii) 3 million farmers, 30 value chain actors, and three governments will use timely climate information and early warning systems for improved decision making; (iii) 100 rural communities will develop inclusive land and water management plans and create good governance and resilience; (iv) 20,000 youth and 15,000 women will be engaged in agrifood systems value-added activities; while (v) post-harvest losses will be reduced by 20%. The metrics will include a change in area under cultivation of target crops and good agricultural practices, and uptake of nutritious crops, diet diversification, and diet quality.

Partners
The Initiative intends to work with scaling partners such as (i) CORAF and its national partners; AfDB, TAAT and with AGRA (ii) Innovation partners including the One CGIAR, NARES and agencies linked to the Scaling Up Nutrition programs; and (iii) demand partners including government ministries producers'/traders' organizations, seed producers, information service providers, as well as value chain and market agents. Strong linkages will be established with the Global Initiatives on Excellence in Agronomy and Sustainable Intensification for mixed farming systems.

Human resources and capacity development of Initiative Team
The human resources team comprises a systems agronomist and plant health, crop production, inland fish farming, seed systems and nutrition experts.

5.2 Poverty reduction, livelihoods and jobs

Challenges and prioritization
Approximately 553 million people live in WCA, with almost 50%[99] in rural areas where the incidence of poverty is 75%. An estimated 90 million of these people live under the poverty line (US$2 per day). The region has some of the highest rates of urbanization in the world with a growth of 4% per annum. Agriculture and food are crucial sources of livelihood, providing 30–50% of GDP and income and livelihoods for 70–80% of the population. The agriculture sector is dominated by smallholder farming systems reliant on rain-fed production and maintenance of natural soil fertility. The region also has one of the youngest populations in the world with 75% of the population under 35 years but with limited opportunities for youth and women.

Research questions
The Initiative will address two research questions that will contribute to this Impact Area:
1. How can the vulnerability of rural poor to major threats to food and nutrition insecurity be reduced?
2. What policy and institutional arrangements can improve farmers' access to financing and other services and how do they contribute to improving incomes?

Components of Work Packages and their impact
The Initiative will focus on raising agricultural productivity through access to innovations that will match the demand for diverse nutritious and healthy food and stimulate increased volumes of sale at local and regional markets. It will serve as a supply – demand match maker supporting WP1 in the provision of digitalized information along the value chain thus reducing transaction costs and building capacities to adapt to CC and increasing access to financial and other services. This will result in improved cushioning the vulnerability by building the capacities in sustainable agriculture and supporting gender-responsive youth and women business hubs, reduced post harvest losses and improved access to higher volumes of trade. These actions will contribute to creating jobs across the value chain and hence reduce poverty by giving youth and women additional incomes to raise them above the poverty line.

Measuring performance and results
Adding to the Impact of the Initiative on improved food and nutrition security and increased adaptation to climate change, at least 20,000 youth and 15,000 women will be able to engage in value-added activities related to agriculture. At least 50% of these will have access to credit and will be credit worthy for youth-led businesses, providing employment and technical services to communities. At least 100 rural communities will have developed informed and inclusive land and

water development plans to diversify income, increase job stability, build resilience, and reduce gender inequaities.

The metrics will include a change in the number of people that will be meaningful engaged in agriculture as a livelihood and area under cultivation; number of people that will have increased access to financial services and an increased number of effective and sustainable gender-responsive business hubs that will provide the means for poverty reduction, livelihoods and jobs.

Partners
The demand partners will include NGOs, regional organizations, development banks, the country governments and private sector firms. Innovation partners will include CORAF, NARES, universities and other international research organizations. The scaling partners will include farmers' organizations, extension services, NGOs and private sector operating in the region.

Human resources and capacity development of Initiative Team
The change processes and thus expertise that will contribute to this Impact Area will be derived from the different WPs. The Human Resources Team comprises an agriculture economist; product management and innovation specialist, business impact & sustainable finance originator; gender scientist an agribusiness and youth development expert and a value chain/market access expert.

5.3 Gender equality, youth and social inclusion

Challenges and prioritization
The disparity in gender, youth and other social inclusion contributes to wide and pervasive productivity gaps[100] in WCA, although little is known about age (generational) gaps in productivity[101]. To ensure sustainable impacts and benefits to all, inclusive research and development interventions are vital for equitable, productive, resilient, and sustainable food systems. This Initiative therefore will prioritize working towards gender-equitable and responsive control of productive assets and resources; technologies that will reduce women's and youth labor and providing the tools to and building capacity of women and youth in engaging in decision-making along a value chain of food systems activities.

Research questions
The Initiative will address four research questions that will contribute to this Impact Area:

1. What gender-transformative technologies and digital tools can enhance sustainability of women and youth agribusiness hubs?
2. What are the appropriate institutional mechanism and policy advocacy tools to facilitate access to finance and markets to youth and women?
3. What are the social constraints to gender and generational equality that affect gender equality in agribusiness?
4. What are the efficient post-harvest technologies to reduce post-harvest losses in biofortified and other nutritious food crops varieties and fish?

Components of Work Packages and their impact
The relevant outputs and outcomes include: i) Access to effective business models and guidelines for linking women and youth to financial services; ii) successful community gender dialogues on increasing women's access to land and other resources for agriculture (WP1); iii) the use and popularization of climate-resilient technologies including digital tools to make youth as positive agents of change (WP2); iv) the development and co-implementation of socially inclusive

landscape management plans (WP3); v) effective responses to social barriers to inclusion of youth and women in food value chains; and vi) gender-transformative agribusiness hubs and vocational education as part of WP4.

Measuring performance and results
By 2024, i) the WEAI will have increased by 20%; ii) gender inequalities concerning resource access and management structures will have been addressed in 100 rural communities through effective dialogues; iii) At least 20,000 youth and 15,000 women will be engaged in agricultural value-added activities and at least 50% of them will have access to credit. The metrics for this Impact Area include: i) The percentage of female smallholder farmers gainfully engaged in agribusiness (targeting at least 40%) and ii) the number of young people (women and men) engaged in agribusiness.

Partners
Scaling partners include public and private extension services, agri-based commercial entities, financial and digital service providers, and NGOs. Demand partners include youth and women associations/groups, secondary schools, producers' and traders' cooperatives/associations, and private enterprises. CGIAR community companies that hosts the technological solutions, and NARES are the major innovation partners.

Human resources and capacity development of Initiative team
The human resources team comprises an agricultural economist/agribusiness specialist; gender and youth development expert and a vocational training expert; value chain and market access expert; innovation platform and institutional (3P) expert; digital information management expert; post-harvest expert and policy support expert.

5.4 Climate adaptation and mitigation

Challenges and prioritization
According to the Intergovernmental Panel on Climate Change (IPCC) the main climate related challenges include water scarcity due to ongoing overexploitation and land degradation leading to food insecurity, exacerbating migration and conflict (high confidence), reduced crop productivity associated with heat and drought stress and increasing erosion with strong adverse effects on livelihoods and food security (high confidence), increased current and emerging/invasive pest and disease damage (high confidence)[102]. The top five climate hazards and its associated potential loss by 2050 are high temperature (US$26.6 billion), growing season reduction (US$12.4 billion), climate variability (US$5.6 billion), drought (US$1.4 billion) and floods (US$0.7 billion). More than 30 million ha of land will be affected by suitability reduction for each agro-pastoral, root and tuber crops, forest-based systems, and more than 20 million ha each for cereal-root crop mixed systems and maize mixed systems. The greenhouse emission in WCA is related to wood harvest (35%), fire (24%), deforestation (19%), livestock (19%), crops 3.3%[103]. The Initiative design was guided by the above assessment conducted to inform climate priorities for One CGIAR Regional Integrated Initiatives.

Research questions
The Initiative will address two research questions that will contribute to this Impact Area:

1. Will bundling of demand-led digital climate information services and GAPs lead to increased productivity that is sustainable?
2. What are key determinants for farmers and agricultural actors to seek for and to adopt digital based knowledge information systems?

Components of Work Packages and their impact
WP1 is dedicated to scale CSA crops and GAPs and WP2 to deliver digital climate advisory on a demand basis. WP3 will address water and landscape aspects of climate adaptation.

Measuring performance and results
Farmers (3 million), value chain actors (30) and governments (3) use improved timely climate information and early warning systems for improved decision making. Public, private and finance sector actors demand for information and services is linked to available, transformative, and cost-effective decision support tools and innovations (5). Innovation and scaling partners have an improved value proposition of their digital agriculture products and services for their 3 million smallholder end-users.

Partners
Innovation and scaling partners include private sector digital and financial services providers (e.g., Esoko, mAgro, Farmerline, Babban Gona, WorldCover and EcoBank) and public actors (national MET, NARES, *ICIPE* and CORAF). Other innovation and scaling actors include NGOs (e.g., Nourishing Africa, ACDEP) and private sector matchmakers (e.g., AGRF Deal Room, Seedstars, UK FCDO Agri-Tech Catalyst, MANOBI and WFP Accelerator).

Human resources and capacity development of Initiative Team
The HRT comprises of a climate-change scientist; digital systems specialist; digital information management expert; climate, pest and disease modeler; business impact and sustainable finance originator; human centered design specialist and product management and innovation specialist.

5.5 Environmental health and biodiversity

Challenges and prioritization
As a result of increasing population pressure and food demand natural areas are converted into intensively used croplands in often marginal areas[104]. This negatively impacts soil and water resources and the ecosystem services provided by the landscape, thereby contributing to land and water degradation, conflicts over resources[105], biodiversity loss[106], and reduced environmental health[107]. There is a need to optimize the preservation and exploitation of ecosystem services while reducing disservices from agricultural and expansion and unsustainable practices. It is hypothesized that inclusive, informed and participatory planning of water and land resources at landscape level, integrated with the One Health concept, will create sustainable landscapes and healthy living environments that sustain ecosystems services and enable safe food production from agriculture, aquaculture and livestock, thereby contributing to environmental health and preservation of biodiversity.

Research questions
The Initiative will address three research questions that will contribute to this Impact Area:

1. How can participatory water and land resources decision support systems (WRDSS) strengthen landscape resilience planning and guide investment decisions?
2. How can innovations be One Health-sensitive and scaled to contribute to healthy and productive environment, healthy diverse diets, enhanced resilience, and adaptive capacities for livelihood improvement in WCA?

3. How can ecosystems services/functions be sustained, management of water, soil and biomass flow improve, One Health principles mainstreamed, and resilient agrifood systems supported for improved communities' livelihoods?

Components of Work Packages and their impact
Building on WP1, the Initiative will bundle GAP and validated Scaling-ready Innovations, contributing to impact at scale and improved food safety. BSF-based circular bio-economy innovations will be launched in selected countries and requisite PPP established for sustainable agro-livestock production systems and the scaling of BSF. Building on WP2 and WP4, the Initiative will develop socially inclusive landscape management plans and apply proven tools for their implementation. Working with WP5, near real-time monitoring and information system of managing water resources (availability, accessibility, quality) across landscapes will result in the establishment of water budgets at district/village levels to provide related crop management information for the long term. The impact of these participatory planning processes is a good governance of the land and water resources at landscape level and the introduction/scaling of One Health-sensitive Innovations.

Measuring performance and results

By 2024, at least four governments will use inclusive approaches towards landscape management and informed and inclusive land and water management plans will have been developed by 100 rural communities. The metrics will include: the number of students, community leaders, local government/extension workers trained; learning materials on good practices and management options for multiple use of water; and the number of platforms and core groups that are established to mainstream multisectoral approaches.

Partners
Scaling partners include public and private extension services, digital service providers, and NGOs. Demand partners will include youth and women associations, farmers' groups, producers' and traders' cooperatives/associations. Some of the major innovation partners include the local governments, extension systems and the communities.

Human resources and capacity development of Initiative Team
The human resources team comprises of a governance-expert; water resources modeler; water resources specialist; natural resources management expert; social scientist; knowledge management expert and One Health expert.

6. Monitoring, evaluation, learning and impact assessment (MELIA)

6.1 Result framework

Table A: Impact Areas, collective global 2030 targets, common impact indicators and SDGs (The collective global 2030 targets are available centrally here to save space).

CGIAR Impact Areas	Impact Area 1	Impact Area 2	Impact Area 3	Impact Area 4	Impact Area 5
	Nutrition, health and food security	**Poverty reduction, livelihoods and jobs**	**Gender equality, youth and social inclusion**	**Climate adaptation and mitigation**	**Environmental health and biodiversity**
Collective global 2030 targets	End hunger for all and enable affordable healthy diets for the 3 billion people who do not currently have access to safe and nutritious food. Reduce cases of foodborne illness (600 million annually) and zoonotic disease (1 billion annually) by one third.	Lift at least 500 million people living in rural areas above the extreme poverty line of US$1.90 per day (2011 PPP). Reduce by at least half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions.	Close the gender gap in rights to economic resources, access to ownership and control over land and natural resources for over 500 million women who work in food, land and water systems. Offer rewardable opportunities to 267 million young people who are not in employment, education or training.	Implement all National adaptation Plans (NAP) and Nationally Determined Contributions (NDC) to the Paris Agreement. Equip 500 million small-scale producers to be more resilient to climate shocks, with climate adaptation solutions available through national innovation systems.	Stay within planetary and regional environmental boundaries: zero net deforestation & nitrogen & Phosphorus application of 90 Tg and 10Tg per year respectively. Maintain the genetic diversity of seeds, cultivated plants and farmed and animals.
Common impact indicators	# people benefiting from relevant CGIAR innovations	# people benefiting from relevant CGIAR innovations	# women benefiting from relevant CGIAR innovations # youth benefiting from relevant CGIAR innovations	# people benefiting from climate-adapted innovations	# ha under improved management
SDG targets	2.1, 2.2, 2.3	1.1, 1.2	2.3, 5.a, 8.5	1.5, 2.4, 13.1, 13.2	2.4, 2.5, 15.1

Table B: Action Area Impact statements and outcomes

Action Area outcomes statements	Action Area outcomes	Action Area Outcome indicators
	RAFS 1 – Smallholder farmers use resource-efficient and climate-smart technologies and practices to enhance their livelihoods, environmental health and biodiversity	RAFSi 1.1 Number of resource-efficient and climate-smart technologies at stage IV (uptake by next user), disaggregated by type
	RAFS 2 – Research and scaling organizations enhance their capabilities to develop and disseminate RAFS-related innovations	RAFSi 2.1 Number of organizations
	RAFS 3 – Public and private financial resources are invested to fund climate-smart business models	RAFSi 3.1 Total amount (USD) invested in climate smart business models

	ST & RAFS 1 – Smallholder farmers implement new practices that mitigate risks associated with extreme climate change and environmental conditions and achieve more resilient livelihoods	STRAFSi 1.1 Number of smallholder farmers who have implemented new practices that mitigate climate change risks, disaggregated by gender and type of practice
	GI 7 – Farmers have access to and use climate-resilient, nutritious, market-demanded crop varieties	GIi 7.1 Number of farmers who grow climate-smart crop varieties, disaggregated by gender GIi 7.2 Number of farmers who grow crop varieties with increased nutritional content
	ST & RAFS & GI 1 Women and youth are empowered to be more active in decision making in food, land and water systems	STRAFSGIi 1.2 Number of women, youth and people from marginalized groups who report input into productive decisions, ownership of assets, access to and decisions on credit, control over use of income, work balance, and visiting important locations
	ST 2 - Consumers have the information, incentives and wherewithal to choose healthy diets	STi 2.1 Diet quality score

Table C: Initiative and Work Packages outcomes, outputs and indicators

Result type (outcome or output)	Result	Indicator	Unit of meas ure-ment	Geograp hic scope	Data source	Data collection method	Frequenc y of data collection	Baseline value (outcome only)	Baseline year (outcome only)	Target value	Target year
Outcome (WP1)	1. Smallholder HH adopt improved climate resilient nutrient-dense crop varieties and good agricultural practices	Number of HH cultivating varieties & No. using recommended GAPs	#	Regional-WCA	Primary	HH survey	Annual	0	2022	16,000 HH	2025
Outcome (WP1)	2. Increased HH dietary diversity scores	Proportion of HH with increased dietary diversity scores	%	WCA	Primary	HH survey	Annual	0	2022	30	2025
Outcome (WP 2)	3. Farmers, VC actors and governments use improved climate information and early warning systems	Number of beneficiaries using the innovation disaggregated by gender	#	WCA	Primary & seconda ry	Farmer surveys, FGD and Literature review	Semi-annual	0	2022	3 million farmers, 30 VC actors and three governments	2025

Outcome (WP 3)	4. Inclusive land and water development plans developed by rural communities	Number of rural communities with plans	#	WCA	Primary	FGD	End of the Initiative	0	2022	100	2025
Outcome (WP4)	5. Increase in Women Empowerment in Agriculture Index (WEAI)	Proportion of empowered women	%	WCA	Primary	HH survey, FGD	Annual	0	2022	20	2025
Outcome (WP4)	6. Youth and women are engaged in value added activities related to agriculture and have access to credit	Number of beneficiaries using the innovation, disaggregated by gender	#	WCA	Primary	HH survey	Annual	0	2022	20,000 youth, 15,000 women	2025
Outcome (WP5)	7. At least 10 key partners in the next phase implementation plans consistently using 3 validated scaling tools	Number of partners and number of innovations	#	Regional-WCA	Primary	Key informant interview P. Health check study	Semi-annual	0	2022	2	2025
Output (WP1)	OP1.1.1. Increased availability and market presence of nutrient-dense foods	Proportion of marketed foods that are nutrient - dense	%	Regional -WCA	Primary	Market survey FGDs	Annual	NA	NA	20	2025
Output (WP1)	OP1.1.2. Evidence-based interventions/ recommendations for improving diet quality	Number of interventions	#	Regional -WCA	Primary	Key informants' interview	Annual	NA	NA	10	2025
Output (WP1)	OP1.2.1. Increased availability of seed of biofortified and other nutritious	Quantity of seed available	Kg	Regional -WCA	Primary	FGDs, HH & seed industry surveys	Semi annual	NA	NA	TBD	2025

	foods crop varieties and fish										
Output (WP1)	OP1.2.2. Knowledge dissemination tools for out-scaling GAP available	# of dissemination tools available	#	Regional -WCA	Primary	FGD	Semi-annual	NA	NA	5	2025
Output (WP1)	OP1.2.3. PPPs established to commercialize Aflasafe and other bio-pesticide products	Number of active PPPs	#	Regional-WCA	Primary	Key informants	Semi-annual	NA	NA	Five per country	2025
Output (WP1)	OP1.2.4. New climate-smart agriculture (CSA) practices introduced in smallholder farming systems for managing climate risks	Number of IPM & CSA practices introduced	#	Regional -WCA	Primary	FGDs	Annual	NA	NA	5 IPM $ 5 CSA practices per country	2025
Output (WP1)	OP1.3.1. The seed tracker tool validated in additional countries	Number of countries where the seed tracker is available for uptake	#	Regional - WCA	Primary & Secondary	Key informants' interview & seed tracker database	Annual	NA	NA	4	2025
Output (WP1)	OP1.3.2. Capacity of farmers and regulatory staff in standardization and quality maintenance of produce built	Number of farmers and regulatory agency staff trained	#	Regional - WCA	Primary	Key informants' interview	Annual	NA	NA	2,000 farmers and 50 agency staff per country	2025

Output (WP1)	OP1.3.3. PPPs and farmer business networks established for access to input and output markets	Number of business networks established	#	Regional - WCA	Primary	Key informants' interview	Annual	NA	NA	10 per country	2025
Output (WP2)	OP2.1.1. Existing models to mitigate climate and environmental risks validated	Number of models validated	#	Regional -WCA	Primary	Key informants' interview	Annual	NA	NA	5	2025
Output (WP2)	OP2.1.2. Validated digital models and integrated and interoperable data management frameworks for transfer and scaling of digital tools	# of models & frameworks validated	#	Regional -WCA	Primary	Key informants' interview	Annual	NA	NA	Five hubs and one vocational education center per country	2025
Output (WP2)	OP2.1.3. Effective partnerships between technology service providers and demand partners established	Number of effective partnerships established	#	Regional -WCA	Primary	FGD	Annual	NA	NA	Five per country	2025
Output (WP2)	OP2.2.1. Most effective strategy for matchmaking tested and selected for scale	Strategy document	#	Regional -WCA	Primary	Key informant interview	Annual	NA	NA	One per country	2025
Output (WP3)	3.1.1. Water quantity, quality and risks data available from participatory approaches and citizen science	Number of data bases available	#	Regional -WCA	Primary & secondary	FGD & Key informants' interview	Annual	NA	NA	Five	2025

Output (WP3)	OP 3.1.2 Regional Water & Land Resources Decision Support System operational and accessible to stakeholders	# of support systems available	#	Regional -WCA	Primary	FGD	Annual	NA	NA	Four per country	2025
Output (WP3)	OP3.1.3. A participatory toolbox for land and water resources assessment and co-designing landscape management plans is available	# of land management plans	#	Regional -WCA	Primary	Key informant' interviews	Annual	NA	NA	One per country	2025
Output (WP3)	OP3.2.1. Sustainably intensified one Health-sensitive water and energy-efficient production at landscape level	# of Integrated crop-livestock-GIFT production and practices at landscape	#	Regional -WCA	Primary	FGDs	Annual	NA	NA	TBD	2025
Output (WP3)	OP3.2.2. One Health-sensitive bundles (fish-small livestock-crop) of GAP for intensification and diversification at landscape level	Number of bundled GAPs	#	Regional -WCA	Primary	FGDs / HH surveys	Annual	NA	NA	Five per country	2025
Output (WP3)	OP3.3.1. Improved knowledge on ecosystems services/functions and preservation of biodiversity for healthy ecosystems	Number of knowledge products and # of PPPs	#	Regional -WCA	Primary	FGD	Semi-Annual	NA	NA	Four per country	2025

Output (WP3)	OP3.3.2. One Health sensitive circular bio-economy innovations like BSF for conversion of waste from biomass flow into new value chains and sustainable agro-livestock production.	# of circular bioeconomy innovations on agro-livestock productions	#	Regional -WCA	Primary	FGD	Annual	NA	NA	Four	2025
Output (WP3)	OP3.3.3 Capacities built for robust integrated monitoring and management of One Health challenges	# of trainings, # of people,	#	Regional -WCA	Primary	FGD	Annual	NA	NA	One per country	2025
Output (WP4)	OP4.1.1. Functional gender-transformative agribusiness hubs and vocational education centers	# functional business hubs & vocational centers	#	Regional -WCA	Primary	FGD	Annual	NA	NA	Five hubs and vocational per country	2025
Output (WP4)	OP4.1.2. Effective financial business models and guidelines for linking smallholders to financial services	Number of business models and guidelines that will improve access to finance	#	Regional -WCA	Primary	FGD	Annual	NA	NA	100 farmers per country	2025
Output (WP4)	OP4.2.1. Social barriers to inclusion of youth and women in food value chains quantified and addressed	Number of social barriers removed at specific nodes along the VC	#	Regional -WCA	Primary	FGD	Annual	NA	NA	Four per country	2025

Output (WP4)	OP4.2.2 Community gender dialogues on increasing women's access to land for agriculture	Number of dialogues	#	Regional -WCA	Primary	FGD	Annual	NA	NA	Five per country	2005
Output (WP4)	OP4.3.1. Most effective gender transformative technologies and digital tools selected and promoted	Number of technologies and digital tools selected and promoted	#	Regional -WCA	Primary	Key informant interview	Annual	NA	NA	Two per country	2025
Output (WP4)	OP4.4.1. Data on post-harvest loss of biofortified and other nutritious food crops and fish available.	Number of commodities evaluated for post-harvest loss	#	Regional -WCA	Primary & secondary	Key informant interview	Annual	NA	NA	Six per country	2025
Output (WP4)	OP4.4.2. Efficient post-harvest technologies adapted and promoted	Number of post-harvest technologies promoted and accepted	#	Regional -WCA	Primary	FGDs/HH surveys	Annual	NA	NA	Four	2025
Output (WP5)	OP5.1.1. Optimization of Scaling Readiness (SR) and Sustainable Intensification Framework (SFA) as tools to address bottlenecks	Number of SR and SFA assessment reports	#	Regional -WCA	Primary	Stakeholder Consulta-tions and Semi-structured surveys	Annual	NA	NA	12	2025
Output (WP5)	OP5.1.2. Guidelines on use of evaluated tools to inform the scaling process	Number of reports	#	Regional -WCA	Primary & Secon-dary	Depends on tool type including: network analysis, machine, learning, GIS	Annual	NA	NA	10	2025

						databases, etc.					
Output (WP5)	OP5.1.3 Reports on use of partnership management tools	Number of reports	#	Regional -WCA	Primary	Partnership Health Check-up and two other partnership assessment tools	6 months	NA	NA	Once per year	2025
Output (WP5)	OP5.1.4. At least five investments in digital systems each worth US$5 million	Number of proposals	#	Regional -WCA	Secon-dary	Progress reports & articles	Annual	NA	NA	Five	2025
Output (WP5)	OP5.2.1. Report on use of advocates for transforming enabling environment	Number of reports	#	Regional -WCA	Primary	Semi-structured survey and FGDs	Twice, timing may vary per country	NA	NA	One	2025
Output (WP5)	OP5.2.2. Studies on stimulating urban demand and changing behaviors in rural areas	Number of studies	#	Regional -WCA	Primary	Structured surveys	Once per study	NA	NA	Four	2025
Output (WP5)	OP5.2.3. Guidelines for Community Engagement	Number of reports	#	Regional -WCA	Primary and secon-dary	FGDs and semi-structured surveys	Annual	NA	NA	One	2025
Output (WP5)	OP5.3.1. Guidelines for use of selected MELIA tools	Number of guidelines	#	Regional -WCA	Primary	Semi-structured surveys and MELIA database	Once per selected tool	NA	NA	10	2025

6.2 MELIA plan

The Initiative will setup a reflective and accountability-based MEL system. The reflective part aims at knowledge enhancement for the results-oriented Initiative Management Hub (IMH). The accountability part is designed to monitor and evaluate the Initiative's projected transformation process. During the inception phase, the IMH will review the TOC and, agree on existing and emerging causal links, longer-term impact pathways and validate the Results Framework (RF) with stakeholders in each selected location. A baseline survey will be carried out to collect reference values of the indicators in the RF. The baseline will target different actors including smallholder farmers, youth and women, digital and technology service providers, input dealers, partners and other stakeholders. An activity-based monitoring approach will be used. The Initiative aims to establish an automated web-based MEL, interoperable with the One CGIAR system that will be used for reporting purposes. Work plans and Implementation and Progress Reports (IPR) will be archived in the MEL system and used as tools to follow up on progress on a real-time basis. Quarterly IPRs will help to draw lessons and generate knowledge for stage-gating decision making, by which the IMH and stakeholders can filter ideas, technologies, and agree on additional innovations that were not part of the Innovation Basket. Each year, one or two success stories will be selected and deepened through outcome case studies. A participatory MEL will take place alongside the annual work plan and budget workshop while mid-term and an external evaluation will be organized with support of the CAS to assess relevance, effectiveness, efficiencies, and sustainability of the change processes.

The Impact Assessment (IA) aims to test the underlying assumptions of the TOC, contribute to Innovations' scaling readiness, and assess impact of the Initiative on the expected outcomes. To test the underlying assumptions, two Randomized Controlled Trials (RCT) will be conducted. The first RCT will test the impact of using a gender transformative approach to enhance youth and women's access to and uptake of innovations. The second RCT will test the potential impact of innovations (nutrient-dense foods) and scaling methods (training method, complementary innovations, business models, etc.). The RCTs will also inform the scaling readiness analysis of the IPs. Panel data will be collected for the long-term IA of the Initiative in at least one site. Mixed qualitative and quantitative and rapid impact assessment approaches will be used to provide knowledge to adjust the TOC and to measure progress towards the end-targets of the Initiative. In relation with the MEL activity, mapping survey of scaling activities and policy supports will be conducted for scaling readiness analysis and serve at major ingredient for long term and large-scale impact studies. The mapping survey data will be interoperated with the MEL system.

6.3 Planned MELIA studies and activities

Type of MELIA study or activity planned	State the result or indicator that the MELIA study or activity will contribute to – Select from Tables A, B or C.	Anticipated year of completion (based on 2022-24 Initiative timeline)	Co-delivery of planned MELIA study or activity with other Initiatives	How the MELIA study or activity planned will inform management decisions and contribute to internal learning
1. Ex-ante, baseline and/or foresight study (i) Baseline survey of the Initiative	All outputs and outcomes	2022	EiA, Aquatic System Plant Health	Baseline data provide the benchmarks of outputs outcomes against which the team will measure progress towards the targets. It will contribute to decision regarding both MEL and IA.
2. Tracing of scaling activities & policy advice for large scale impact studies (i) Panel study to monitor changes in the dynamics of adoption and impact of innovations	All outputs and outcomes	2022–2025	EiA, Aquatic System HER+	It will inform the management about the actual achievement on the projected future impact of the Initiative and the potential large-scale and long-term impact.
3. Qualitative outcome study Mixed qualitative and quantitative assessments and Participatory MEL	All outputs and outcomes	2022–2025	EiA, Plant Health, Healthy Diets Aquatic system Nature-positive agriculture	This will help to involve all actors including beneficiaries, innovations and scaling partners in participatory evaluation and adaptation of the TOC and for stage-gating decision making by the management.
4. Causal Impact Assessment learning studies (i) RCT for assumptions testing and scaling method	Outputs 3.1.2; 4.1.1; 4.1.2	2023 and 2024	EiA ESA I: UU	Evidence from RCTs will help management to test assumption in the TOC for adaptation and to decide on innovations to be promoted and the appropriate scaling methods.
5. Scaling Readiness Assessment (i) Participatory assessment of scaling readiness with both innovation and scaling partners (ii) RCT for potential impact of innovation	Outputs 3.1.2; 4.1.1; 4.1.2	2023 and 2024	HER+; *ClimBeR;* *Plant Health* *S. intensif.* *ESA UU*	This will result in scaling domains / homologues and guidelines on how to update / prioritize innovations and in tables showing the innovation networks. It will also result in a tool to address bottlenecks, considering the management system architecture.
6. Program evaluation or review (i) Mid-term review (ii) End-of-project external evaluation	End-of-Initiative outcomes	2025	Not applicable	Midterm review will contribute to stage-gate decisions through the highlight relevance, effectiveness, efficiencies, and sustainability of the change processes.
7.Other MELIA activity (i) Annual outcome survey and routine MEL data (ii) Outcome case study	All output and outcomes	2022–2025	Not applicable	Data will be collected data on achievements and success stories this and will be used for annual internal performance, reviews, reporting and planning, contributing to stage-gate.

7. Management plan and risk assessment

7.1 Management plan

A Technical Advisory Committee (TAC) will be established for overall guidance. This committee comprises the One CGIAR directors for RAFS and WCA, CGIAR Country Focal Points and a CORAF's senior management representative. The Initiative lead will be the secretary to the TAC. The TAC will meet prior and soon after the launch and thereafter on a six-monthly basis to provide strategic guidance and review progress against the Impact Area Pathways.

The Initiative Management Hub comprises the Lead (Coordinator), and Co-Lead (resource mobilization expert) of the IDT an M&E and impact assessment specialist (part-time and shared with WP5), knowledge management expert, and a policy and partnership specialist (CORAF position). This will be supported administratively by an Executive Secretary and an Accountant. With the five WP leaders, this team will be using quantitative and qualitative evidence emanating from the MELIA processes and from WP5 research and feedback to plan and make stage gate decisions on design and management processes. The IMH will meet monthly and as and when required, to review progress and plan related activities. Minor adjustments will be made quarterly, and major adjustments annually, to ensure sufficient time to prepare and communicate about the proposed changes.

Each WP leader will be responsible for managing the team of scientists and experts within their domains, along with the linkages to relevant global Initiatives, thematic programs, and One CGIAR advisory bodies that can inform the current or future design of the WP interventions. The IMH and the WP leaders will ensure that communication outputs from within and across WPs are disseminated regularly in different media.

7.2 Summary management plan Gantt table

Initiative start date	Timelines												Description of key deliverables
	2022			2023				2024				2025	
Work Packages	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	
WP 1:			3	1	2		3	1	2			1	1. Quality seed of nutritious crops accessible. 2. Climate-adapted Good Agriculture Practices for smallholder farmers. 3. Strong Business networks.
WP 2:			4	5	6			6				6	4. Digitalized information models to mitigate climate & environmental risks and improve decision making on value chains. 5. Digital interoperable data management frameworks for transfer and scaling of digital tools. 6. Reports on effective matchmaking between suppliers of digital information and users of information needs.
WP 3:			7	9		8		9		8			7. Info-systems on real-time monitoring of water resources management. 8. Bundles of GAP available and applied at landscape level 9. BSF-based circular bio-economy innovations for agro-livestock systems.
WP 4:			11		10	12		11			12		10. Functional gender-transformative agribusiness hubs and vocational education centers. 11. Report on measures to address social barriers to inclusion of youth and women in food value chains. 12. Most effective gender transformative technologies and digital tools.
WP 5:		14		13	15								13. Report on completed validation of Scaling Readiness frameworks, and development of scaling plans. 14. Report on baseline studies conducted in Initiative target areas. 15. Guidelines for uptake and scaling out of technologies and innovations.

MELIA		16	17				18						16. Report on validated TOC and results framework. 17. An automated and web-based MEL system that is interoperable with the One CGIAR. 18. Reports on two RCTs on impact of the youth and gender transformative process and on impact of scaling methods of innovations (nutrient food dense).
Initiative Management Hub (IMH)	19 20 21			21				21					19. Contracts with key Innovation and Scaling Partners – CORAF, WorldVeg and ICIPE. 20. Report on the launch of the Initiative and approval of Work plans and budgets for 2022–2023. 21. Report on risk assessment and approved management action plan.

7.3 Risk assessment

The Initiative design team undertook a risk assessment exercise to identify and evaluate the main risks and mitigating actions for the Initiative. Risks considered included around science, cohesion (including intended and unintended consequences of technologies/innovations for natural resources, GHG emissions, and social and economic aspects), legacy work, partnerships, talent, operational, ethical and legal and other. At this phase the risk assessment is used to highlight areas of concern and improvement recommendations for the Initiative. It also provides visibility to different bodies that is needed from a good governance perspective in line with the Risk Management Framework of the CGIAR System. Following the Initiative's approval, the risk assessment will be integrated into the Initiatives workplan for continuous monitoring and management.

Main risks identified are set out as follows:

Top 5 risks to achieving impact	**Description of risk**	**Likelihood** **Rate from 1-5**	**Impact** **Rate from 1-5**	**Risk score** Likelihood x Impact	**Mitigation**
1. Climate change risks and restrictions associated to COVID-19	Climatic risk, especially growing season high temperatures and length reductions, with extreme events such as flooding, drought and gender gap pose a major source of food and nutrition insecurity and increasing pests and disease outbreaks and conflicts.	4	3	12	Deployment of climate-smart GAP, including IPM and including high-yielding stress tolerant crop varieties, and tools for weather and P&D forecasting. Improving access to financing for climate change specifically for women and youth. Using landscape approaches with building capacities in good governance that will mitigate potential conflicts because of CC.

	COVID19 is likely to impact also. Any new wave may impede progress especially in field activities including capacity building.				Forward planning to respond to COVID and building diversified nutritious systems and creating awareness around the purpose of good health.
2. Smallholder farmers, especially women are not savvy to or involved in digital information systems	Although hugely promising, the effective use of digital knowledge systems is sometimes wanting as there is not a good match between service providers on the one hand and information users on the other hand compromising the potential of farmers to make informed decisions along the value chain.	3	3	9	Social-behavioral change and human centered design capacity will be strengthened to build evidence on and address the determinants and incentives of adoption of digital services and resilient practices, gender-neutral and/or women empowering adoption. There will be deliberate match making efforts between service providers and service users.
3. Aggravated conflicts over common natural resources and unsustainable farming practices curtail the potential for healthy landscapes and sustainable ecosystems services	Current expansion of agriculture threatens environmental health and the efficient use of water and land resources. Increasing incidences of conflicts dampen the incentives to engage in sustainable agriculture. A synergistic exploitation of ecosystems services is needed to sustain agriculture and livestock production, increase food and nutrition security and preserve healthy landscapes.	3	5	15	The Initiative will utilize citizen science to discuss good governance of land and water resources and participatory processes and utilize the WRDSS to reduce conflicts, enhance access to resources and strengthen landscape planning. It will also validate and take to scale One Health-sensitive Innovations and produce diverse diets, enhance resilience, and build adaptive capacities for livelihood.
4. Pervasive disparity in gender and unconducive policy environments that aims at providing incentives to produce and market nutritious food locally	Women's and youths remain disadvantaged in their access to land and financial services while many lack the necessary technical skills and business acumen to run sustainable SMEs. Many countries in WCA resort to the importation of cheaper, less nutritious food.	4	4	16	The Initiative will develop mechanism and policy advocacy tools to facilitate access to finance and market linkages; it will strengthen PPP to develop value chains and address social constraints to gender and generational equality in agribusiness. It will promote gender-transformative technologies and digital tools to enhance agribusiness hubs.
5. Persistent low uptake of bundled innovations and relatively poor institutional capacities	A major challenge is the issue around readiness for scale for some Innovations – what determines the effectiveness of the scaling readiness framework in one region to another. To attain impact at scale, a systematic approach to evaluating validated digital and other tools and mixed methods for monitoring their effectiveness will be needed.	3	4	12	The Initiative will examine effectiveness of SR Framework in different contexts. It will design scaling domains and expansion plans focused on smart investments, partnership expansion, and build an enabling environment. It will also coordinate and update key Innovation Packages through CORAF and other R4D partners. Requisite capacities will be built.

8. Policy compliance, and oversight

8.1 Research governance

Researchers involved in the implementation of this Initiative will comply with the procedures and policies determined by the System Board to be applicable to the delivery of research undertaken in furtherance of CGIAR's 2030 Research and Innovation Strategy, thereby ensuring that all research meets applicable legal, regulatory and institutional requirements; appropriate ethical and scientific standards; and standards of quality, safety, privacy, risk management and financial management. This includes CGIAR's CGIAR Research Ethics Code and to the values, norms and behaviors in CGIAR's Ethics Framework and in the Framework for Gender, Diversity and Inclusion in CGIAR's workplaces.

8.2 Open and FAIR data assets

Researchers involved in the implementation of this Initiative shall adhere to the terms of the "Open and FAIR Data Assets Policy."

"The **Transforming Agrifood Systems in West and Central Africa (TAFS-WCA)"** Initiative will align with the OFDA Policy's Open and FAIR requirements, ensuring:

- Rich metadata conforming to the CGIAR Core Schema to maximize findability, including geolocation information where relevant.
- Accessibility by utilizing unrestrictive, standard licenses (e.g. Creative Commons for non-software assets; General Public License (GPL))/Massachusetts Institute of Technology (MIT) for software), and depositing assets in open repositories.
- Wider access through deposition in open repositories of translations and requiring minimal data download to assist with limited internet connectivity.
- Interoperability by annotating dataset variables with ontologies where possible (controlled vocabularies where not possible).
- Adherence to Research Ethics Code (Section 4) relating to responsible data (through human subject consent, avoiding personally identifiable information in data assets and other data-related risks to communities).

9. Human resources

9.1 Initiative team

Category	*Area of expertise*	*Short description of key accountabilities*
Research	Initiative Management Hub	Initiative Lead (Coordinator) and Co-Lead (Resource Mobilization). Other Research: MELIA Economist (shared with WP5); Communication. Policy and Partnership Specialist (CORAF position)
Research Support	Initiative Management Hub	Accountant and Executive Secretary.
Research	WP1: Sustainable production intensification	Lead: Systems agronomist. Other Research: Plant health expert; Crop production expert; Inland fish farming expert; Seed systems expert; and Nutritionist.
Research	WP2: Digital tools for agrifood systems transformation	Lead: Climate-change scientist. Other Research: Digital systems specialist; Digital Information Management Expert; Climate, pest and disease modeler. Business impact & sustainable finance originator; Human centered design specialist and a Product management & innovation specialist.
Research	WP3: Governance of land, water, and forest resources	Lead: Governance Expert. Other Research: Land and water resources modeler; Water resources specialist; NRM Expert; Social Scientist; Gender scientist; Knowledge Management Expert (shared time); One-Health Expert.
Research	WP4: Gender and youth responsive business hubs	Lead: Agricultural Economist/agribusiness specialist Other Research: Gender and Youth Development and Vocational Training Expert; Value chain and market access expert; Innovation platform and Institutional (3P) Expert; Digital Information management expert; Post harvest Expert; Policy Support Expert.
Research	WP5: Research Management, Design and Implementation	Lead: Technology and Innovation Scientist. Other Research: Knowledge Management Expert. Behavioral Change Specialist; Data Management Specialist; MELIA Specialist (part-time) Innovation Scaling.

9.2 Gender, diversity and inclusion in the workplace

The Initiative team will comprise individuals from diverse disciplinary and cultural backgrounds, but it is unlikely to meet CGIAR's gender target of a minimum of 40% women in professional roles. The Management team will consciously consider in its recruitment, following the guidance outlined in CGIAR's GDI Inclusive Recruitment Toolkit, and being mindful to include diverse voices into all the project activities. This will be facilitated by the training of team leaders on inclusive leadership, and the team members on gender, diversity, and inclusion within six months of the launch of the project.

Women, minorities, and other under-represented groups will hold leadership roles in the Initiative Team. This will be seen in the composition of our senior team and will extend to the fair allocation of leadership activities and accountabilities.

9.3 Capacity development

1. Initiative team leaders and managers will complete training on inclusive leadership within three months of the launch.
2. Within six months of launch, Initiative team members will complete the training on gender, diversity and inclusion, including on whistleblowing and how to report concerns.
3. The Initiative kick-off will include an awareness session on CGIAR's values, code of conduct and range of learning opportunities available within CGIAR.

Development opportunities will be made available for Initiative team members including junior staff and partners and stakeholders. These opportunities will include mentorship, internships, exchange visits to project sites in different countries and support for conference attendance and membership to active communities of practice. The Initiative will also provide specific training in leadership and scholarships specifically for emerging professionals from under-represented groups. The capacity development program will be done in partnership with CORAF through its regional centers of excellence and national centers of specialization in the target countries. Specific training events will be organized by the Initiative Management Hub or at the level of the Work Package to raise the capacity of team members and partners in implementing project activities. The final choice of the training topics will be guided by the results from needs assessment and foresight studies. It is anticipated that upgrading of skills would be required in the application of citizen science, gender-transformative approaches and in technology development and delivery, effective application of digital and modern diagnostic tools (e.g., by regulatory agencies in the seed sector), and in geographic information systems.

10. Financial resources

10.1 Budget

10.1.1: Activity breakdown

USD	**2022/2023**	**2023/2024**	**2024/2025**	**Total**
*Crosscutting across Work Packages**	1,069,649	1,950,000	1,800,000	4,819,649
Work Package 1	1,250,000	3,250,000	3,000,000	7,500,000
Work Package 2	700,000	1,800,000	1,680,000	4,180,000
Work Package 3	1,625,550	1,509,450	1,365,000	4,500,000
Work Package 4	750,000	1,950,000	1,800,000	4,500,000
Work Package 5	632,401	1,599,947	1,488,003	3,720,351
** IPs & Scaling Readiness (part of Cross Cutting)*	300,000	340,000	140,000	780,000
Total	**6,327,600**	**12,399,397**	**11,273,003**	**30,000,000**

10.1.2: Geography breakdown

USD	**2022/2023**	**2023/2024**	**2024/2025**	**Total**
RII WCA				
GH-Ghana	1,661,223	2,672,192	2,415,771	6,749,186
NG-Nigeria	1,517,981	2,831,588	2,544,307	6,893,876
CI-Cote d'Ivoire	1,542,229	2,738,219	2,484,739	6,765,187
CD-Democratic Republic of Congo	436,346	1,332,682	1,150,443	2,919,471
BI-Burundi	376,074	788,579	918,193	2,082,846
RW-Rwanda	793,746	1,256,137	1,219,551	3269434
LR-Liberia	0	390,000	270,000	660,000
CM-Cameroon	0	390,000	270,000	660,000
Total	**6,327,600**	**12,399,397**	**11,273,003**	**30,000,000**

End Notes

[1]https://www.ipcc.ch/report/ar6/wg1/#regional
[2] https://lupinepublishers.com
[3] https://www.fao.org/3/cb4474en/cb4474en.pdf
[4] https://www.ifpri.org/blog/address-triple-burden-malnutrition-focus-food-systems-and-demand
[5] https://doi.org/10.1080/14888386.2017.1351892
[6] https://www.fao.org/one-health/En
[7] https://www.stabilityjournal.org/articles/10.5334/sta.da/
[8] https://bg.copernicus.org>2016
[9] https://www.afdb.org
[10] https://au.int
[11] https://www.tandfonline.com
[12] https://www.coraf.org
[13] www.UNFSS.org
[14]https://docs.google.com/presentation/d/1XnN7MCNeZSKU0bgI7vNZJJpvyj1j1Cwp/edit?usp=sharing&ouid=110668620919215804430&rtpof=true&sd=true
[15] CRP Reviews 2020 | CAS | CGIAR Advisory Services
[16]https://www.cialca.org/wp-content/uploads/2021/06/20210601-CIALCA-ONE-CGIAR-Working-Paper.pdf.
[17] (Nerica): https://doi.org/10.1016/j.gfs.2017.03.001
[18] https://doi.org/10.1177/0030727020918388
[19] https://doi.org/10.1371/journal.pone.0201803
[20] https://doi.org/10.1111/1477-9552.12296
[21] https://doi.org/10.1016/j.jenvman.2017.06.058
[22] https://doi.org/10.1016/j.agsy.2019.102770
[23] https://doi.org/10.1016/j.worlddev.2015.04.007
[24] https://doi.org/10.1016/j.foodpol.2021.102140
[25]https://www.afdb.org/en/documents/document/multinational-cgiar-support-to-agricultural-research-for-development-of-strategic-crops-in-africa-project-sard-sc-pcr-99785
[26]https://idev.afdb.org/sites/default/files/documents/files/Strengthening%20Agricultural%20Water%20Management%20to%20Feed%20Africa%20%28AWM%29%20-%20En.pdf
[27] https://drive.google.com/file/d/1NTdHkqba84uACgN7F8S55QS90I2I2C15/view?usp=sharing
[28]https://gatesopenresearch.org/documents/5-132
[29] https://drive.google.com/file/d/1-7EHgx7vKHRwVrDFbYFstFFn1oMEET8A/view?usp=sharing
[30] http://www.coraf.org
[31] https://drive.google.com/file/d/1vrPycTyG-y5a1RvwYK9mH1RcsO6NV5qj/view?usp=sharing
[32] https://www.routledge.com
[33] https://www.worldfoodprize.org/en/events/laureate_award_ceremony/2016_ceremony/
[34] https://www.worldfishcenter.org/wfp-2021/
[35]https://www.scalingreadiness.org
[36]https://drive.google.com/file/d/1mCLqjgVuwpxvTrUyW0h3Nh38wI_QkX4O/view?usp=sharing
[37]WCA-RII_Online_Stakeholder_Survey_31AUG2021_VF
https://drive.google.com/file/d/1-7EHgx7vKHRwVrDFbYFstFFn1oMEET8A/view?usp=sharing
[38] 2021-1020 Initiative Design- Invitation letter Stakeholders Consultation and Engagement Virtual Meeting HAJA - Helsen Jan Achilles
https://drive.google.com/file/d/1ShRn9ApCgCa1Zsbuk5vMwYfvGWfw-IEN/view?usp=sharing
[39] Initiative Design_ Partners Consultation and Engagement Meeting Concept Note English
https://drive.google.com/file/d/1NhVH9_UprIdmmvFhbhplk3D4EI-D51zN/view?usp=sharing
[40]https://www.cialca.org
[41]https://www.taat-africa.org

[42] Kassie et al. 2014. https://www.researchgate.net/publication/259513984_What_Determines_Gender_Inequality_in_Household_Food_Security_in_Kenya_Application_of_Exogenous_Switching_Treatment_Regression
[43] Shiferaw, et al. 2014. https://doi.org/10.1016/j.wace.2014.04.004
[44] Khonje et al. 2015. https://doi.org/10.1016/j.worlddev.2014.09.008
[45] Wossen et al. 2017. https://doi.org/10.1016/j.jenvman.2017.06.058
[46] Jaleta et al. 2018. https://link.springer.com/article/10.1007/s12571-017-0759-y
[47]https://www.cialca.org/wp-content/uploads/2021/06/20210601-CIALCA-ONE-CGIAR-Working-Paper.pdf.
[48] (Nerica): https://doi.org/10.1016/j.gfs.2017.03.001
[49] https://doi.org/10.1177/0030727020918388
[50] https://doi.org/10.1371/journal.pone.0201803
[51] https://doi.org/10.1111/1477-9552.12296
[52] https://doi.org/10.1016/j.jenvman.2017.06.058
[53] https://doi.org/10.1016/j.agsy.2019.102770
[54] https://doi.org/10.1016/j.worlddev.2015.04.007
[55] https://doi.org/10.1016/j.foodpol.2021.102140
[56] https://population.un.org/Household/index.html#/countries
[57] https://data.worldbank.org/indicator/SI.POV.DDAY
[58] https://population.un.org/wpp/Download/Standard/Population/
[59] Alene et al. 2009. https://doi.org/10.1111/j.1574-0862.2009.00396.x
[60] Becerril & Abdulai 2010. http://www.sciencedirect.com/science/article/pii/S0305-750X(09)00215-0
[61] Asfaw et al. 2012. https://doi.org/10.1080/00220388.2012.671475
[62] Bezu et al. 2014. https://doi.org/10.1016/j.worlddev.2014.01.023
[63] Coromaldi et al. 2015. https://doi.org/10.1016/j.ecolecon.2015.09.004
[64] Manda et al. 2016. https://doi.org/10.1111/1477-9552.12127
[65] Ainembabazi et al. 2018. https://doi.org/10.1016/j.worlddev.2018.03.013
[66] Wossen et al. 2019. https://doi.org/10.1111/1477-9552.12296
[67] Dontsop et al. 2020. https://doi.org/10.1002/fes3.205
[68] Afolami et al. 2015. https://doi.org/10.1186/s40100-015-0037-2
[69] Feleke et al. 2016. http://dx.doi.org/10.7896/j.1612
[70] Hansen et al. 2018. https://doi.org/10.1016/j.agsy.2018.01.019
[71] Baiyegunhi et al. 2019. https://doi.org/10.1016/j.techsoc.2018.09.009
[72] Kondo et al. 2020. https://doi.org/10.1016/j.techsoc.2020.101408
[73] Gatto et al. 2021. https://doi.org/10.4160/02568748CIPWP20211
[74] https://doi.org/10.1016/j.heliyon.2021.e06110
[75] https://wle.cgiar.org/beyond-just-adding-women-towards-gender-transformative-food-systems
[76] https://doi.org/10.1007/s12571-015-0500-7
[77] https://ageconsearch.umn.edu/record/155535/files/4_Nguezet.pdf
[78] https://population.un.org/wpp/Download/Standard/Population/
[79] https://doi.org/10.3390/su11010185
[80] https://www.researchgate.net/publication/353637216_AN_EXPLORATION_OF_FACTORS_INFLUENCING_THE_ADOPTION_OF_ICT_ENABLED_ENTREPRENEURSHIP_APPLICATIONS_IN_NAMIBIAN_RURAL_COMMUNITIES
[81] 10.5539/jas.v12n5p145
[82] https://doi.org/10.3390/su13147801
[83] https://doi.org/10.3390/su13147795
[84] https://doi.org/10.1016/j.jenvman.2017.06.058
[85] https://doi.org/10.1016/j.gfs.2017.03.001
[86] https://doi.org/10.1016/j.landusepol.2020.104622
[87] https://doi.org/10.1080/23311932.2020.1743625
[88] Ramirez-Villegas et al (2021)
[89] https://cgspace.cgiar.org/handle/10568/113289

[90] https://wle.cgiar.org/learning-research-water-governance-priorities-one-cgiar
[91] https://wle.cgiar.org/agricultural-water-management-innovations-build-resilient-food-systems-west-africa
[92] https://wle.cgiar.org/mismatch-between-soil-nutrient-requirements-and-fertilizer-applications-implications-yield-responses
[93] https://wle.cgiar.org/business-models-urban-food-waste-prevention-redistribution-recovery-and-recycling
[94] https://wle.cgiar.org/restoring-degraded-landscapes-and-fragile-food-systems-sub-saharan-africa-synthesis-best-practices
[95] https://www.scidev.net/global/opinions/farmers-in-africa-should-switch-to-biopesticides-1/
[96] https://www.fao.org/faostat/en/#data/TCL
[97] Staatz & Hollinger 2016. https://www.fao.org/3/i6716en/i6716en.pdf
[98] https://globalnutritionreport.org/resources/nutrition-profiles/
[99] https://drive.google.com/file/d/1gUBqEgubyKjKHiHIAqPeyRY_O4sjsxS5/view?usp=sharing
[100] World Bank 2014. World Bank Document
[101] Karin Lindsjö, https://doi.org/10.1080/14735903.2020.1721237
[102] Jarvis, A et al. 2021. https://hdl.handle.net/10568/113289
[103] Roman-Cuesta, et al., 2016. https://doi.org/10.5194/bg-13-4253-2016
[104] https://doi.org/10.1038/s43247-020-00053-y
[105] DOI: 10.1080/03066150.2012.725543
[106] https://doi.org/10.1016/bs.aecr.2016.08.005
[107] https://cas.cgiar.org/spia/publications/environmental-impacts-agricultural-intensification