MItigation and Transformation Initiative for GHG reductions of Agrifood systems RelaTed Emissions (MITIGATE+)

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Proposal

September 28, 2021

Note to readers: please use the hyperlinks throughout the proposal for definitions, abbreviations, partners, references, etc.

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Acronyms

AGNES	African Group of Negotiators Expert Support
BAU	Business As Usual
CAAS	Chinese Academy of Agricultural Sciences
CC	Climate change
CGE	Computable General Equilibrium
CSA	Climate-Smart Agriculture
FS	Food Systems
CLIFF-GRADS	CLIFF-GRADS program
EoI	End of Initiative
FAIR	Findability, Accessibility, Interoperability, Reusability
GCF	Green Climate Fund
GHG	Greenhouse Gas
GHGE	Greenhouse gas emissions
GHGI	Greenhouse gas inventories
GRA	Global Research Alliance on Agricultural Greenhouse Gases
GUI	Graphics User Interface (GUI)
HICs	High-Income Countries
HER+	Harnessing Equality for Resilience in the Agrifood System Initiative
IAMs	Integrated Assessment Models (IAMs)
IPCC	Intergovernmental Panel on Climate Change
KCSAS	Kenya Climate Smart Agriculture Strategy
KCSAIF	Kenya Climate Smart Agriculture Implementation Framework
LLs	Living Labs
LMICs	low- and middle-income countries
MACC	Marginal Abatement Cost Curves
MEL/IA	Monitoring, Evaluation and Learning/Impact Assessment
MRV	Measuring, reporting, verification
MSPs	Multi-Stakeholder Platforms
NAMAs	Nationally Appropriate Mitigation Actions
NARES	National Agricultural Research Extension Systems
NDC	Nationally Determined Contribution
PA	Paris Agreement
ST	System Transformation
TACCC	Transparency, Accuracy, Completeness, Comparability, and Consistency
UNFS	UN Food Systems
UNFCCC	United Nations Framework Convention on Climate Change
WEAI	Women's Empowerment in Agriculture Index

MITIGATE+ Initiative Proposal – Sept 28, 2021

Summary table

Initiative name	**MI**tigation and **T**ransformation **I**nitiative for **G**HG reductions of **A**gri-Food systems Rela**T**ed **E**missions (MITIGATE+)
Primary Action Area	System Transformation
Geographic scope	China, Vietnam, Bangladesh, Ethiopia, Kenya, Colombia, and Peru
Budget	US$ 33,000,000

1. General information

- **Initiative name: MI**tigation and **T**ransformation **I**nitiative for **G**HG reductions of **A**gri-FS Rela**T**ed **E**missions (MITIGATE+)

- **Primary CGIAR Action Area:** System Transformation

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2. Context

2.1 Challenge statement

The new IPCC Working Group 1 report[1] makes grim reading, and the urgency for accelerated climate mitigation has never been clearer. Increasingly, the US$12 trillion global food system (FS) is in the spotlight, contributing 21–37% of global greenhouse gas (GHG) emissions (72% of which from the Global South[2],[3]). Whilst this system provides critical food and nutritional security, livelihoods, and socio-economic benefits like peacebuilding, negative externalities such as emissions, 33% of agricultural soil degradation, 20% of aquifer overexploitation, 60% of biodiversity loss, and fish stock depletion[4] ensure the need for systems transformation is urgent, as articulated repeatedly at the recent UNFS summit.

The Paris Agreement (PA) target *of limiting global temperature increases to 1.5°C* was a critical milestone in catalyzing systems change. Whilst it urges high-income countries (HICs) to act *first* to reduce emissions, it also emphasizes the necessity of a *global* response to climate change (CC) in the context of sustainable development and poverty eradication, specifically by supporting financial flows consistent with low GHG emissions (GHGE)

development across *all* countries[5]. To date, mitigation efforts have failed to live up to the PA and within FS, progress has been slow due to key challenges:

- National FSs are not well characterized, with poorly quantified GHGE (especially food loss/waste) and weak linkages to nutrition, gender, and environmental targets making it difficult to set intervention priorities, track progress, and report impacts.
- Policy and financial instruments to reduce FS GHGE and enhance sinks often focus on subsistence agriculture (e.g., REDD+) or globally traded agricultural commodities (e.g., zero-deforestation supply chains), which, though well-meaning, fail to tackle the domestic FS primarily responsible for emissions in tropical countries.
- Private sector action is stymied by misaligned incentives and a lack of regulatory frameworks for emissions reductions. Transnational companies are only starting to green their supply chains and offset emissions in response to consumer pressure, though efforts are still insufficient as they address emissions linked with international but not domestic markets.
- Domestic policies support the private sector's pursuit of short-term profits in ways that externalize GHGE costs at the expense of long-term FS viability.
- Effective practices exist to reduce the GHG intensity of all components of FS and create or enhance sinks in aquatic production systems, soils, and forests, but scaling these has been challenging, as the constraints faced by different change actors are poorly understood or difficult to overcome, and incentives are missing or misaligned.
- Broader understanding of FS approaches by decision-makers is needed to stimulate both policy momentum and investment in FS solutions.

MITIGATE+ addresses these challenges directly. In seven countries that are, for FS, regional top-tier emitters, **MITIGATE+ focuses on reducing FS emissions** and the predicted consequences of climate change (CC) on future generations, sustainable development, and social equity. It will ensure that civil society, multilateral, government, academic, and private sector actors in target countries are equipped with the knowledge, information, and tools they need to make robust evidence-based decisions as they confront challenges in FS discourse, policy development, and implementation to reduce GHGE contributions. The expected "big lift" is a reduction, by 2030, in emissions by 1.1 Gt CO_2e y^{-1}, representing a 6.5% decrease in annual global FS emissions, with 8 million people benefitting from mitigation and co-benefits over the Initiative's ten-year lifespan.

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

- Global and national government agencies, civil society, and private sector planners increase their capacity to use co-developed tools, data, and analyses to design at least five inclusive FS emissions reduction strategies and/or carbon sink initiatives (2024). MITIGATE+'s "FS Climate Intervention Planning Framework" (FOODCLIP) (see 3.2, WP1) tool is integrated into decision-making processes (2030).

- Increased rigor and certainty in data, knowledge, tools, and capacity improves food-system GHG emission monitoring and UNFCCC national communications in at least five countries, subsequently improving the global stocktake (2024, 2029). Improved transparency empowers governments and stakeholders to establish viable mitigation targets, support scaling, verify measures' impacts, and ensure fair distribution of benefits and costs (2030).

- Food sector actors and communities participating in Living Labs (LLs) build frameworks for co-design, adaptation, testing, and mainstreaming of low- and negative-emissions mitigation solutions, based on principles of gender and social equity (2024). FS in seven countries increase value chain efficiency, reduce food loss and waste, and deliver co-benefits of climate resilience more equitably (2030).

- Interventions targeting carbon sequestration and reduced GHGE are scaled up and out via five CGIAR technologies that demonstrate climate mitigation effectiveness (2024). Investors and policymakers are incentivized to emphasize GHG emission reductions from FS in next-generation Nationally Determined Contributions (NDCs) (2025, 2030).

- Food system approaches to low GHGE, climate-resilient development are high on the world's political agenda (2024). Resources allocated to low-emissions FS development increase, stimulating mitigation action. Informed FS decision-making is based on solid science, good governance, and principles of gender and social equity (2030).

2.3 Learning from prior evaluations and impact assessments (IA)

Lessons from A4NH[6], CCAFS[7], FTA[8] and WLE[9] highlight:

Scope of the work: Reviews showed that FS research missed opportunities by focusing solely on rural parts of FS landscapes, largely ignoring urban areas. Our Living Labs (LLs) approach integrates rural-urban linkages to better understand cause and effect, and ensures that system transformation is based on underlying political and economic cause and effect mechanisms.

Gender: Assessments pointed to CRP weaknesses in the areas of gender and inclusion, highlighting cases needing greater attention to this increased research effectiveness. MITIGATE+ actively supports and promotes gender-transformative and -transdisciplinary approaches, increasing gender equity and social inclusion, and aims to avoid exacerbating existing gender and other social inequities. The LLs, planning, and scaling work will promote agency among women, youth, disabled, and other marginalized groups.

Data quality and accessibility: Reviews showed the importance of scale of data collection and due attention to data quality assurance, as well as national and local-level capacity, accessibility and 'ownership' in increasing transparency and underpinning more confident conclusions, acceptance by government and non-government actors, and policy action. We have integrated data quality analysis into our MEL/IA plans.

Capacity building: Reviews noted that capacity development in several CRPs followed "learning-by-doing" models at the expense of formal training. They recommended integrating these approaches with more formal capacity building, particularly of younger researchers, to ensure that a new generation of scientists continues innovation in this area. We will enhance the CLIFF-GRADS program, partnering with the GRA, to provide international research experience to young professionals from low- and middle-income countries (LMICs).

2.4 Priority-setting

Our priority setting was guided by review of the scientific literature, surveys of international and national policy documents (154 NDC reports and 107 Biennial Update Reports), professional experience of team members with FS GHG mitigation, and consultations with both leading scientific experts and national stakeholders (see section 2.6).

Main priority: As the new IPCC report[1] makes clear, low emissions development solutions urgently need to be found to address the social and economic challenges of the 21st century. Whereas FS contribute up to 37% of global GHGE and need to be part of this transition, MITIGATE+ has been designed to **focus primarily on reducing GHGE in food systems** as a first order of priority, targeting seven countries that are top GHGE emitters for their respective regions.

Country selection prioritization: Country selection was prioritized according to the likelihood of MITIGATE+ making rapid progress during the first phase of implementation while generating broadly applicable results, as well as by financial realism, i.e., the assumption that 'critical mass' via scaling can be quickly and cost-effectively reached in 2024-2030. Demand exceeds our ability to respond, and we had additional requests from Egypt, and countries in Francophone W. Africa and S.E. Asia. Criteria included:

1. Pan-tropical distribution of countries
2. Significant FS emissions within regional country groupings (Data: EDGAR-FOOD database)
3. Moderate to good governance effectiveness to deliver on commitments (Data: World Bank Governance Indicators)
4. Broad range of mitigation activities identified in NDCs and national plans
5. Previous CGIAR mitigation related research upon which to build

Table 1. Prioritization criteria

Country	Country group	Emissions Rank within group	Governance effectiveness*	NDC mitigation actions						Prior CGIAR mitigation research
				Croplands	Livestock	Forests	Wetlands	Blue economy	Restoration	
Colombia	LAC	10	-0.01	X	X	X			X	X
Peru	LAC	12	-0.19	X	X	X	†		X	X
Ethiopia	Africa	7	-0.63	X	X	X				X
Kenya	Africa	11	-0.35	X	X	X		X	X	X
China	Asia	1	0.47	X	X	X	X		X	X
Bangladesh	Asia	6	-0.73	X	X	X	X	X	X	X
Vietnam	Asia	7	0.05	X	X	X	X	X	X	X

* Governance effectiveness values range between 2.5 (very effective governance) and -2.5 (very weak governance); † Peru: national discussions to undertake mitigation actions in peat swamps are ongoing.

The selected countries represent top-tier countries with respect to FS emissions in their regions. Assessment of the NDCs indicate that they all commit to ambitious mitigation targets and identify multiple activities to mitigate CC by reducing livestock, crop production, and deforestation emissions. Countries also plan to pursue nature-based solutions like protecting,

conserving, and recovering natural resources and ecosystems, as well as measures to strengthen protected areas. REDD+ policies are part of many national plans.

Prioritizing responses to challenges: The main constraints for mainstreaming a FS perspective in CC mitigation efforts to be targeted for prompt action during Initiative implementation are: i.) Lack of understanding of the carbon and non-carbon opportunities in FS interventions inhibits planning processes (addressed by strengthening national food system planning and coordination capacity in WP1); ii.) Lack of data and methods for measuring FS GHG emissions at the FS level (countries and the UNFCCC follow a sectorial approach) (addressed by improving GHGE MRV and data accuracy in WP2). iii.) Beyond the narrative around plant-based diets, the literature does not provide for a clear understanding of what FS interventions can achieve for reducing GHG emissions (addressed via research to cover knowledge gaps in WP1, identification, piloting, and scaling of mitigation approaches in WP3). iv.) Lack of concrete examples of scalable technologies that can transform the entire FS from GHG sources to net carbon sinks (addressed by gender-responsible scaling in WP4) and v.) FS perspectives are not yet well understood by global, national, or local stakeholders (addressed by formal training for media personnel and young professionals (CLIFF-GRADS) and learning by doing for mid-career professionals in WP5).

2.5 Comparative advantage

- **Record of accomplishment**: For over 20 years, we have been developing approaches for reducing non-CO_2 GHGE (Inter-Center Working Group on Climate Change, CCAFS), reducing deforestation (FTA), and enhancing carbon sinks through nature-based solutions like landscape restoration (WLE).
- **Intellectual leadership**: CGIAR is associated with credible, high-quality analysis, independent thinking, a reputation for tackling difficult and controversial issues, and an ability to reach and convene diverse actors and stakeholders.
- **Inclusive agenda**: CGIAR teams have invested and built capacity on gender-responsive and empowerment research including research on gender norms and how these influence women's, men's and youth's agency to engage with agricultural innovation, contributing to more inclusive development and adoption of livelihood innovations that support climate resilience of marginalized social groups.
- **Responsiveness**: We can provide robust scientific and policy advice to government and other stakeholders by building on a broad and long-established knowledge base. CGIAR is a key knowledge source for IPCC, UNFCCC, IPBES, the Bonn Challenge, etc.
- **Quality of staff**: Our staff come from diverse nationalities and cultures and bring top-level expertise from a wide range of disciplines.
- **Partnerships**: we have access to skills and networks of diverse partners operating at local, national, regional, and global levels.
- **Grounding in local conditions**: We have a record of accomplishment in undertaking and communicating research that meets the needs of communities across the tropics.
- **Business-friendly orientation:** CGIAR research has been supporting the private sector to achieve corporate-based CC targets such as zero-deforestation and zero-net degradation value chains. [xviii], [xix].

2.6 Participatory design process

Bangladesh: Consultations revealed demand for better quality FS GHGE data (incorporated into MITIGATE+) and science to support various low-emissions FS pathways. MITIGATE+ aligns with Bangladeshi national plans, e.g., the 8th Five-year plan (forthcoming), the National Environmental Management Plan, National Aquaculture Development Strategy. MITIGATE+ will focus on priority districts Dhaka (urban) and Mymensingh (northern district), and key value chains (rice and fisheries). Key partnerships were identified.

China: Meetings and email exchanges with the Chinese Academy of Agricultural Sciences (CAAS) highlighted an opportunity for collaboration on GHGE reduction. China will bring considerable financial, human, and technical resources to support the work, as well as political influence and economic interests. The potential for GHG mitigation in China is *enormous*.

Vietnam: Consultations highlighted demand from the government for One CGIAR assistance (via MITIGATE+) to help the country meet NDC targets. Priorities include innovative measuring, reporting, verification (MRV) tools and approaches, integrating the private sector in mitigation processes (MITIGATE+ WPs 2 & 4) focusing on increasing in-country MRV capacity and FS-scaling/blended finance). Stakeholders highlighted *an opportunity for MITIGATE+ to work with Vietnam, Thailand, Laos, and other Southeast Asia countries in a 'mitigation' nexus to multiply emissions reduction impacts across the food, land, and water systems*.

Colombia: Multilateral meetings and virtual consultations with national and subnational stakeholders, including commodity value chain committees, emphasized (1) LLs are key to improving communication between sciences and communities, (2) strong national focus on single value chains or sectors, (3) alignment with the zero-deforestation value chain agreement, REDD+, and peace process, and (4) Amazonia region is important — livestock and cacao commodities are priorities. MITIGATE+ partners were identified.

Peru: A virtual workshop with national, subnational, academic, and producer organizations emphasized that (1) land-based perspectives prevail in Peru, with the FS narrative in its infancy, (2) best practices from the "unidades productivas de monitoreo" need to be integrated, (3) MITIGATE+ aligns with national programs and strategies, and (4) priority regions for Peru are Amazonia and the Andes (MITIGATE+ will focus on Amazonian departments). Peru's NDC increases its emissions reduction ambition from 30% to 35% by 2030, which requires a big push on emission reductions.

Kenya: Consultations and trainings on the Transparency Framework of the PA delivered by MITIGATE+ IDT leadership for 40 African country government representatives of AGNES (African Group of Negotiators Expert Support), revealed demand for more capacity building, technical low-emissions development guidance (under development with MITIGATE+ participation), and greater support for national low-emissions development. National, private sector, research and international stakeholders revealed demand for better FS baseline data and for mitigation strategies to cover productivity and adaptation (incorporated into MITIGATE+ design). MITIGATE+ aligns with the Kenya Climate Smart Agriculture Strategy (KCSAS) and Implementation Framework (KCSAIF), its updated NDC, and its National climate action plan.

Ethiopia: Consultations revealed similar demands as in Kenya. MITIGATE+ fully aligns with Ethiopia's Climate-Smart Agriculture (CSA) Roadmap 2020-2030, its updated NDC, and Climate Resilient Green Economy Strategy. Priority areas for Ethiopia include agroecological zones (AEZ) around protected natural areas and standing forests.

Documentation of MITIGATE+ consultations is provided in the annexes: (Annex A) List of participants with affiliations, (Annex B) National consultation summaries and geographic recommendations, and (Annex C) Support letters.

2.7 Projection of benefits

The projections below transparently estimate reasonable orders of magnitude for impacts which could arise 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.

MITIGATE+ will deliver multiple benefits across the five CGIAR Impact Areas. The projected benefits exercise covers the expected results from CGIAR innovations to be reached by 2030. Given the strong links being established with other Initiatives, there are likely to be additional impacts, but these are not included in the calculation at this stage to avoid double accounting and uncertainty. As the various Initiatives further develop, the projected benefits for MITIGATE+ will be adjusted to reflect the additional impacts.

2.7.1 Climate adaptation and GHGE reduction

 # tons CO2e averted: Following the IPCC's conclusions about the urgency of reducing emissions across sectors, including achieving FS transformation to accelerate GHGE reduction, MITIGATE+ focuses primarily on ***reducing food system emissions***. Our calculations assume that target countries remain committed to the objectives of the PA and will continue to undertake action and allocate resources accordingly. A recent UNFCCC report shows that countries continue to assert their commitments to these targets[10]. In the projected benefits for MITIGATE+, both reductions in emissions and increased carbon sequestration are estimated.

We calculated emission reductions for two scenarios. The first scenario is for stabilization of emissions at 2015 levels, based on data from the EDGAR-FOOD database and a linear projection of current emissions growth rates to 2030. Baseline conditions show that FS emissions are currently increasing in all target countries, except Colombia. Stabilizing

emissions at current levels by 2030 and maintaining the rate of decrease in Colombia would reduce emissions by 0.33 Gt CO_2e y^{-1}in 2030 (Table 2), representing a 9% reduction from a linear business-as-usual (BAU) scenario in 2030 for these countries and translating to a cumulative emissions reduction of 1.5 Gt CO_2e between 2022 and 2030. This is the lower bound of the expected impact from this Initiative. Given renewed expressions of national commitments to the PA targets, we expect a high probability of achieving this impact.

Helping countries further bend the curve will yield additional benefits. Thus, we calculated a second scenario based on a technical potential emissions reduction (i.e., with no economic analysis of feasibility). There are multiple emission reductions pathways that meet the PA targets, but our starting point for this scenario is the IPCC Special Report on Global Warming of 1.5ºC[11], which projected that global CO_2 emissions must reach **net zero in 2055** and that net non-CO_2 radiative forcing must be significantly reduced after 2030. Thus, emissions in our target countries must be reduced by 45% by 2030. Table 2 displays aggregated 2015 GHGE, including land-use change, for the end of Initiative (EoI) and a technical potential emissions reduction scenario at 45% below the baseline emissions, with net emissions reductions of 1.1 Gt CO_2e y^{-1}. To put the mitigation potential of food systems into context, it is worth noting that emissions from crop and livestock are expected to increase by 30–40% between 2021 and 2050, under BAU scenarios that include efficiency improvements and dietary changes linked to increased incomes[12].

We expect MITIGATE+ to stimulate a high level of commitment to system transformation, in conjunction with other investments by the GCF, World Bank, national governments, the private sector, and others. The expected outcome is that countries will achieve the technical potential emissions reduction, which will result in a **6.2% reduction in global FS emissions** by 2030. We rate the probability of this outcome as moderate because no country, except Brazil, has yet achieved such a dramatic decrease in emissions in such a short time, despite countries continuing to pledge to meet PA targets.

In addition to the emission reductions, carbon sequestration through soil and ecosystem restoration offers opportunities for achieving net negative emissions. We will calculate the potential of CO2 removals through nature-based solutions during the inception phase of the Initiative.

Table 2. Mitigation scenario calculations for potential emissions reductions in food systems

	Food system emissions, including LUC (GtCO$_2$e y^{-1})				
	Baseline Emissions 2015	BAU emissions 2030	Stabilization scenario emission reductions	Potential EoI Emissions	Technical Potential Emission Reductions Scenario
	A	B	B – A	C	C – A
Bangladesh	0.17	0.19	0.01	0.11	0.06
China	2.42	2.68	0.26	1.57	0.85
Colombia	0.12	0.11	0.01	0.07	0.04
Ethiopia	0.14	0.15	0.01	0.09	0.05
Kenya	0.06	0.06	0.00	0.04	0.02
Peru	0.12	0.13	0.01	0.08	0.04
Vietnam	0.16	0.19	0.03	0.11	0.06
Sum	3.19	3.50	**0.33**	2.07	**1.12**

 # people benefiting from climate resilience innovations: Building climate resilience is an important co-benefit of actions taken to reduce FS GHGE, particularly through (WP3) work in LLs to identify, co-design, and trial climate mitigation approaches and tools with multiple adaptation benefits such as increased productivity, profitability, and benefits for environmental health and biodiversity. Eight million people are expected to perceive these co-benefits by 2030 and increase landscape-level resilience to climate events such as flooding and drought (impacts to be estimated jointly with ClimBeR and other Initiatives and communities during the inception stage).

2.7.2 Projections for other One CGIAR Impact Areas

For projections of impact around nutrition, poverty, and gender, the CGIAR benefits approach is based on estimating breadth of our impact — numbers of people affected by our research results. Living labs typically work at meaningful intermediate scales within a larger context[13] and serve as boundary spanners to facilitate scaling out and up[14]. As we will work in areas where populations range from hundreds of thousands to tens of millions, our potential reach over the long-term is considerable. We make moderate estimates initially that we will produce **direct benefits** for approximately **4 million people** (1 million in China, and ~500,000 people per each of the other six target countries) by 2030. We conservatively estimate that scaling will double the number of people reached. Impacts may be greater as countries scale-up climate actions. We estimate that 50% of the beneficiaries (4 million) will be women, with the other 50% youth (evenly split between men and women). These represent significant (health [DALYS][15] and income[16]) impacts for individuals and households. MITIGATE+ impact projections are shown in Table 3.

Nutrition, health, & food security
 # people benefiting from relevant CGIAR innovations: Food security and nutrition improves by (i) reducing on-farm, post-harvest, marketing, and processing food loss and waste and (ii) increasing efficiency in the food system — as more food becomes available at lower prices (in principle) and accessibility increases — benefiting households that are net food buyers. Reduced waste at food banks improves support to the food insecure[17,18].

Poverty reduction, livelihoods & jobs
 # people benefiting from relevant CGIAR innovations: Reducing food loss before the farm gate and increasing farming system productivity increases producer incomes[15]. Improved infrastructure to reduce post-harvest losses also stimulates overall economic development by enabling access to new (non-agricultural) employment opportunities[19].

Gender equality, youth & social inclusion
 # women & youth benefiting from relevant CGIAR innovations:
Diversification of production offers scope for both smallholder and female employment, provides higher returns to land and labor, scope for income diversification, while shorter growing cycles may soften seasonal liquidity constraints — all of which support poor rural households[16].

Environmental health & biodiversity
 # ha (aquatic and terrestrial) under improved management:
National commitments to the [Bonn Challenge](#)[20] by target countries commit them to restoring at least 25 million ha, including forestland and wetlands. Our work through the LLs and WP1 research will contribute 10% of this target, with scaling (WP4) doubling the restoration area (partially via mitigation work around avoided deforestation in protected natural areas, partially from landscape restoration, including soil regenerative practices in production systems).

Table 3. Initiative impact projections

Breadth indicator	Breadth number	Depth	Probability
(Climate adaptation & mitigation): # tons CO_2e averted through stabilization	0.33 Gt CO_2e y^{-1}	Significant	High certainty
# tons CO_2e averted through FS transformation	1.2 Gt CO_2e y^{-1}	Transformational	Medium
(Nutrition, health & food security): # people benefiting from relevant CGIAR innovations	8 million	Significant	Medium
(Poverty reduction, livelihoods & jobs) # people benefiting from relevant CGIAR innovations	8 million	Significant	Medium
(Gender equality, youth & social inclusion): # women and youth benefiting from relevant CGIAR innovations	6 million	Significant	Medium
(Environmental health & biodiversity): # ha (aquatic and terrestrial) under improved management	5 million ha	Transformational	High certainty

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

3.1.1 Full Initiative TOC diagram
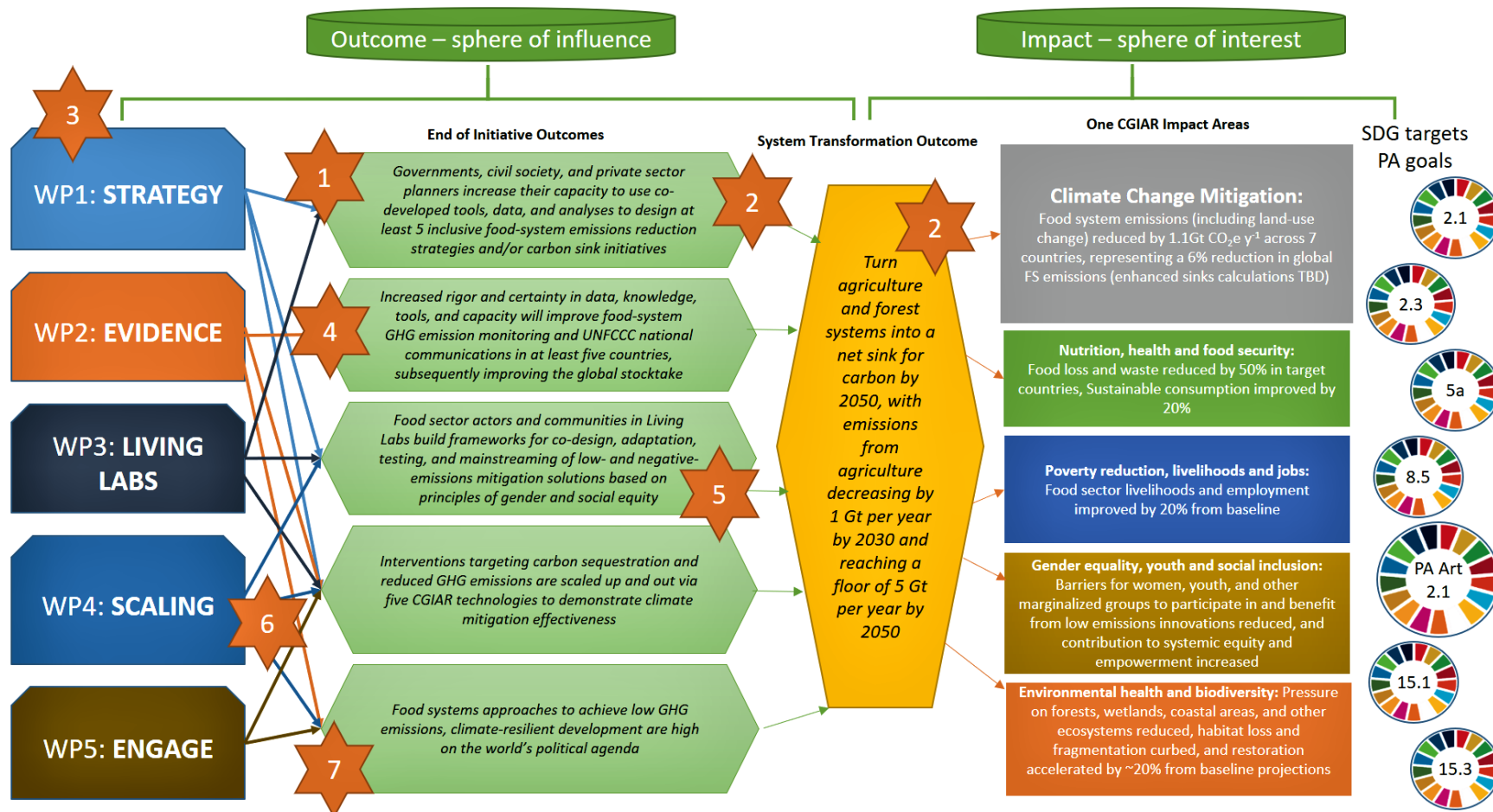
Stars refer to risks identified in section 7.3

3.1.2 Full Initiative TOC narrative

MITIGATE+ derives its mandate from Article 2.1 of the PA, which sets the international objective to: (a) reduce the impacts of CC and hold the increase in the global average temperature to 2°C or to 1.5°C above pre-industrial levels, (b) foster **low emissions development**, in a manner that **does not threaten food production**; and (c) make finance flows consistent with low GHG emissions and climate-resilient development pathways.

Our **TOC** builds on a policy learning framework that recognizes that policy processes are inherently linked to power struggles, driven more by conflicts of interest and competition than rational, solution-oriented processes. Institutions, interests, ideas and information shape the choices of how low emissions FS development contributes to social and individual welfare. To achieve **effective**, **efficient,** and **equitable** low-emission FS development, we envision three mechanisms through which MITIGATE+ will effectuate change:

1. **Aligning incentives and investments:** The logic of international finance for low-emission development is compelling, but must be complemented by viable business models and economic incentives. The potential for incentives to trigger transformational change depends on factors related to who bears costs, who reaps benefits, what mechanisms are in place to ensure equity, and how risks are mitigated. MITIGATE+ will address these issues and explore solutions with stakeholders.

2. **New ideas and information:** Awareness of the contribution of FS to global GHG emissions drives the call to reduce their impacts to achieve the PA targets. MITIGATE+ will provide scientific evidence of the contribution of FS to CC and identify opportunities for addressing it as part of solutions to interconnected social and environmental challenges.

3. **New actors and coalitions:** Shifting economic incentives, new ideas, and changes in discourses can prompt societal transformation because power relations among key actors change. As new actors enter the FS and gain power in decision-making, they can use their agency to change the political representation of specific interests, correcting information asymmetries and social/environmental injustices.

MITIGATE+ will facilitate change via five **pathways**: (1) strengthening national capacity to integrate FS changes that reduce GHG emissions, food loss/waste, the GHG intensity of supply chains, and land degradation, while simultaneously promoting sinks, ecosystem restoration, social equity, and healthy diets; (2) improving transparency, accuracy, comparability, and consistency of data for planning, monitoring, and reporting; (3) co-developing and applying mitigation solutions for FS via Living Labs; (4) scaling best bet mitigation practices with proven CGIAR technologies and innovations to demonstrate mitigation effectiveness, incentivizing increased investment in mitigation actions and next generation NDCs; and (5) fostering greater understanding of how low GHG emissions FS development contributes to global GHG mitigation targets.

By 2030, MITIGATE+ **End-of-Initiative Outcomes** (Section 2.2) will contribute to targeted **System Transformation (ST) Outcomes** (See TOC Figure), and our targets under all five One CGIAR Impact Areas (Section 4) and SDGs (Results Framework). MITIGATE+ will support all other ST mitigation-related targets under the CGIAR Impact Area of Climate adaption and mitigation. We will pursue synergies with Initiatives with a significant FS focus, such as NEXUS Gains, Sustainable Animal Productivity for Livelihoods, Nutrition and Gender
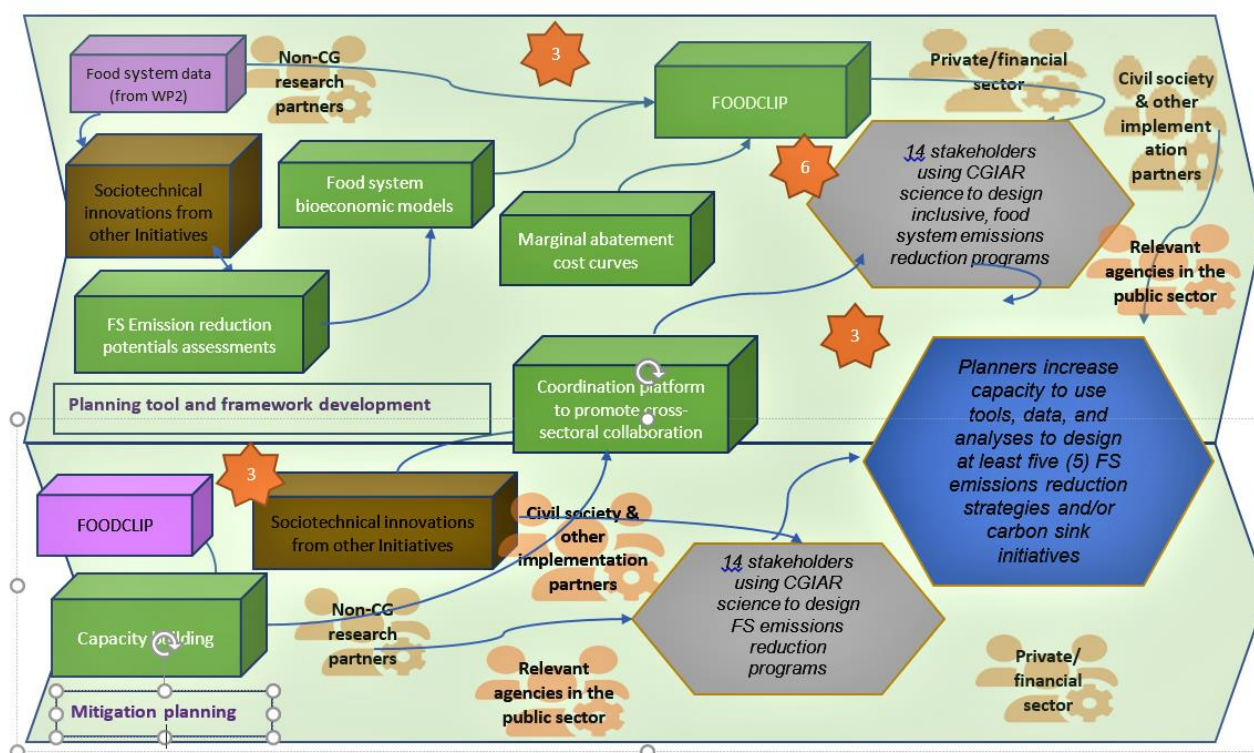
inclusion (SAPLING), Livestock, Climate and Systems Resilience (LCSR), Agroecology, ClimBeR, EiA, Nature-Positive Solutions, SHiFT, Rethinking Food Markets and Value Chains for Inclusion and Sustainability, Asian Mega Deltas, HER+, and Resilient Cities through Sustainable Urban and Peri-urban Agrifood Systems.

3.2 Work Packages TOCs

3.2.2 *Work Package 1: Research plan and TOC*

Work Package 1	**MITIGATE+ STRATEGY:** Planning for food systems transformation
Work Package main focus and prioritization (max 100 words)	WP1 supports national stakeholders to define the priorities, scope, and goals for low-GHGE, climate-resilient FS development. WP1 will co-develop and test a "FS Climate Intervention Planning Framework" (FOODCLIP) and pilot its application in each target country. FOODCLIP will be a user-friendly integrated modeling and planning framework designed to assist stakeholders in analyzing the tradeoffs and synergies between mitigation and other dimensions of FS (i.e., healthy diets; social, economic and environmental sustainability), building scenarios of potential futures, and designing policies and programs. The framework will be used to design emissions-reduction and carbon-capture initiatives at subnational and national scales.
Work Package geographic scope (global/region/country)	WP1 activities will be implemented in the seven countries (China, Vietnam, Bangladesh, Ethiopia, Kenya, Colombia, and Peru) that are the focus of the MITIGATE+ Initiative. WP1 results will also be universally applicable at global level.

Work Package 1 (STRATEGY) diagram

The science

Key research questions	Main proposed scientific methods	Key outputs
1. How do political and socio-ecological processes create opportunities or obstacles for FS mitigation across various sectors of the economy, and at which spatial and temporal scales?	**Political economy analysis** to identify the influence of interests (economic, ideological, professional) on the making and implementation of climate policy and related national programs.	**National analysis** (with international dimensions) of key drivers and contributors of global and national GHGE in FS and exploration of opportunities and priority setting for alternative mitigation actions, given environmental boundaries and transformational needs.
2. At global and national scales, what are the key drivers of global and national emissions in FS — immediate drivers, and the underlying political, social and economic drivers? What are the options for addressing the drivers and what is the relative performance of these options?	**Economics of alternative mitigation strategies**: Develop Marginal Abatement Cost Curves (MACC) (broken down by social groups) to systematically assess the efficiency, economic viability and distributional effect of alternative mitigation pathways.	**Country CGE analysis informed by Marginal Abatement Cost Curves** (MACC): economy-wide scenario analysis of alternative mitigation strategies informed by cost-benefit analysis disaggregated by social groups
3. How do the sectoral and governance contexts determine how FS projects and programs (e.g., at the province level) might be implemented in terms of design, development and validation, incentives, benefit-sharing, involvement of local institutions, social equity, etc.?	**Global and country Computable General Equilibrium (CGE) modelling:** Use of datasets (from WP2, the CGIAR, IIASA and other sources), coupled with insights from WP3, WP4, to analyze the mitigation implications of alternative future scenarios regarding food demand and supply, dietary shift, land and water systems, trade policies, and so on.	**Information exchange** among a wide range of stakeholders to promote cross-sectoral collaboration.
4. How can we integrate a socio-ecological understanding of FS into a CC mitigation planning framework to support low-emissions, climate-resilient FS development?	**Tool Development (FOODCLIP):** Co-develop (with FS actors, practitioners, and policymakers) of fit-for-context planning and monitoring system of tools for reducing FS GHGE. FOODCLIP builds on existing CGIAR science and will integrate new findings.	**FOODCLIP**: A "FS climate intervention planning framework" (FOODCLIP).
5. How can we engage the private sector in product labelling of carbon footprints to leverage the influence of environmentally conscious consumers toward low-emission production?		**Capacity development curricula** contextualized to national, local, and sectoral needs specifically designed to build capacity in implementing global GHG emission reduction solutions in target countries.
6. How can we best support NARES in setting up new schemes for carbon crediting and acquiring project funding for MRV and NAMA development?	**Capacity Development**: Formal and informal training (including learning by doing) to build institutional capacity in participating countries for: (1) National GHG assessments (WP2) using Tier 2 methodology for ex-ante/ex-post GHG assessment; and (2) Support project planning and policy development.	**Clearing House on mitigation for NARES and private sector.** An open-source platform for ad-hoc requests coming from different countries and for initiating joint proposals at international donors.

Linkages
- Support to WP1 (with Output 1) and WP3 (suggesting solutions to be tested and consolidated in a learning process with LLs).
- Contribution of data, insights, planning tools, assessments, and identification of potential upscaling pathways (policy) to be harnessed for WP4 scaling work.
- Data for WP4 regarding key pathways for reducing emissions, and on potential global and national level synergies and trade-offs with sustainable development.
- Planning learning and results contributes to WP5.

WP1 theory of change

End-of-Initiative outcome: *Global and national government agencies, civil society, and private sector planners increase their capacity to use co-developed tools, data, and analyses to design at least five (5) inclusive food-system emissions-reduction strategies and/or carbon sink initiatives (2024). Use of FOODCLIP is fully integrated into formal decision-making processes (2030).*

The role of FS actions in low-emissions development is under-appreciated and typically addressed in a sectorial manner. WP1 targets stakeholders in the public, academic, civil society, and private sectors, as well as farmers and farmer cooperatives that hold the keys to initiating socially equitable, low-emissions development actions. WP1 will (i.) Develop tools and planning frameworks to support ex-ante analyses (including market analysis) of options for informed planning; and (ii.) Support the development of effective, efficient, and equitable low-emissions food-system development plans.
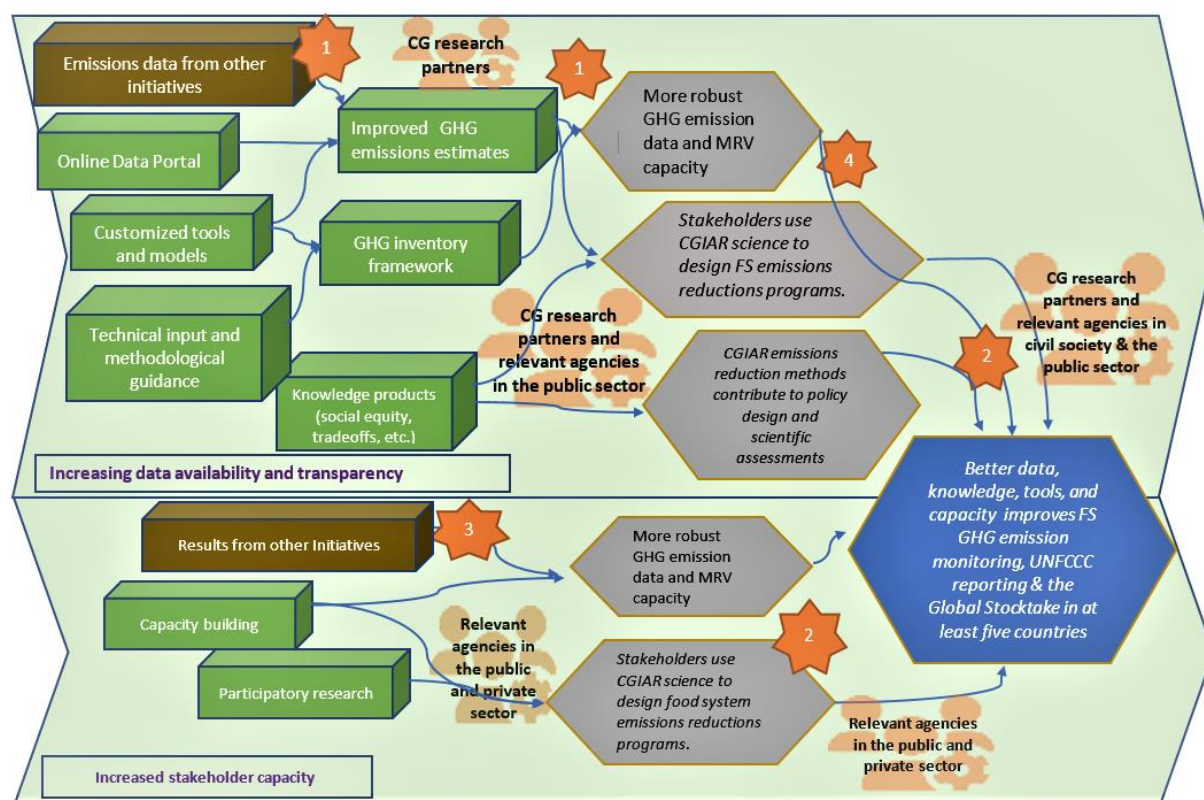
Our **theory of change** uses two Impact Pathways (IP). **IP1** focuses on targeted research to support the development of tools for planning for low-emissions development. MITIGATE+ will work with stakeholders to co-design, develop, and test planning tools and protocols for emissions reduction actions covering social, economic, and biophysical aspects of the FS, integrating market and non-market techniques to assess the economic viability of emissions reductions alternatives. Social tools will help stakeholders assess the desirability of specific changes to the FS and understand the distribution of impacts (burdens and benefits) of alternatives on women and youth to better manage tradeoffs and strategize for social equity. Tools will be embedded in a FS climate intervention-planning framework (FOODCLIP) that provides for stakeholder participation in the development of viable business cases and public support for these initiatives. Scenario-based planning and development of FS will be exhaustively documented.

IP2 focuses on developing local (initially) and national (later) capacity for FS mitigation plans. Activities include scoping studies to define priorities and goals for emissions reductions in FS to identify specific challenges in the different contexts. FOODCLIP will be used for ex-ante analyses, generative scenarios, and developing MRV systems. Scaling partners (government and non-government actors at all levels and relevant sectors) will be actively involved in inter-sectoral institutional linkages and planning. Planning will be institutionalized in Nationally Appropriate Mitigation Actions (NAMAs) and MRV systems. Other institutionalized outcomes include updated NDCs and improved pathways to meet NDCs and SDGs. Mitigation is a new topic in most LMICs so there will be open questions around the implementation and funding opportunities via carbon crediting schemes, MRV, NDC and NAMA, etc., therefore MITIGATE+ will build a clearinghouse for all information. Policy engagement at national and local levels will rely on multi-stakeholder forums, one-on-one engagement, and discussion platforms to increase participation and transparency as a basis for broad buy-in and addressing stakeholder concerns. National action plans will embed local and sub-regional planning so they can provide national coherence, ensure effective allocation of resources, and integrate into international frameworks through NDC revisions and national communications to the UNFCCC. **WP1 Outcome**: *14 governments, civil society, and private sector partners are using CGIAR science to design inclusive, FS emissions reduction programs.*

Work Package 2: Research plan and TOC

Work Package 2	MITIGATE+ EVIDENCE: Data, evidence, and tools for FS transformation
Work Package main focus and prioritization (max 100 words)	WP2 provides subnational, national, and global actors with the critical data, methods and tools, evidence, and capacity required to reduce FS GHGE, including (i.) reliable measurements and activity data collection on food production and consumption for direct and indirect estimation of GHG emission factors (EFs) as well as EFs integrated in an Online Data Portal equipped with a user-friendly Graphics User Interface (GUI) for higher-tier GHG inventories (GHGI) and mitigation scenarios at national scales; (ii.) information on the synergies and trade-offs between GHG mitigation and food security at national scales in LMICs differentiated by social groups and gender; (iii.) GHGE from high-carbon landscapes including land-based aquaculture, land expansion and land use with high emissions in short-lived climate pollutants, namely methane; and (iv.) capacity to implement robust Tier 2 inventory methodology and MRV systems. WP2 supports more accurate inventory accounting, target-setting and verification of results for NDCs and the Global Stocktake.
Work Package geographic scope (global/region/country)	WP activities will be implemented in the seven countries that are the focus of the MITIGATE+ Initiative (China, Vietnam, Bangladesh, Ethiopia, Kenya, Colombia, and Peru). The WP will also be universally applicable at global level.

WP2 (EVIDENCE) diagram

The science

Key research questions	Main proposed scientific methods	Key outputs
1. How can we improve the empirical basis of current FS GHGE estimates and scenarios of mitigation potential, based on improved activity and GHGE data? How can we apply these improvements to improve inventories and assess practical mitigation potentials by integrating economic and institutional considerations and support planning, including NDC development?	**Data collection**: Systematic compilation of literature data and data mining from national sources to facilitate mitigation scenarios and assess the economics (including institutional economics) for key FS mitigation interventions. This will be supplemented by targeted measurement campaigns to generate primary data to close data gaps.	**Improved Baselines of National GHG inventories.** Important agricultural GHG emission sources will be calculated using improved and higher-tier methodologies as previously possible.
	Development of a user-friendly Graphics User Interface (GUI): The GUI comprises customized models and tools to estimate GHGE and generate scenarios for inventory makers using data generated in activity 1. Existing tools, such as IPCC tools, the Agriculture and Land Use Greenhouse Gas Inventory (ALU) tool, the Agro-Chain GHGE (ACE) calculator; Ex-Ante Carbon Balance Tool (EX-ACT), as well as simulation models for Tier 3 will be integrated into these modelling frameworks. Moreover, the GUI will also have a routine for carbon footprint calculation of food products.	**Online Data Portal:** Offering improved data accessibility, in particular for activity data, emissions drivers, and Tier 2 EFs, leading to **improved transparency, accuracy, completeness, comparability, and consistency of data** (TACCC) for GHGE estimates

Customized tools and models for improved planning, implementation and impact assessment that integrate better information on drivers, baseline activity and emissions data, and that quantify uncertainty. |
| 2. How can improved predictions and scenarios be used to enable decision making at sub-national and national levels to inform policies and measures, better manage tradeoffs between specific social groups (e.g., women, indigenous groups, youth, and other, socio-economic groups), and support implementation?

3. How can integrated assessment models be iteratively improved as tools to guide GHG mitigation actions and decisions, particularly by incorporating development trajectories and mitigation actions into forecasts of GHG mitigation and considering other co-benefits, whilst differentiating for gender and other relevant social factors? | **Interaction with IAM Teams**: Close collaboration with teams running Integrated Assessment Models (IAMs) to integrate better data and scenarios into their global analyses, resulting in generation of more realistic outputs for tropical countries. In turn, those IAM outputs will support decision making under FOODCLIP. | **Knowledge products and technical assistance & capacity development** for reporting on FS emissions and mitigation scenarios that assess impacts, social equity, diets, land-use tradeoffs, and other socio-economic impacts (differentiated for gender, youth, disabled, and marginalized groups) involved in FS mitigation. |
| 4. How can we adapt IPCC AFOLU and other guidelines for FS GHGE assessments to develop practical tools for project/program implementers? | **MRV:** Develop indicators that relate well to GHG mitigation and sequestration and integrate them in a MRV systems for tracking FS emissions | **Methodological guidance and technical assistance** for undertaking these GHG emission assessments including real-time monitoring and collection of activity data for GHG emission estimates.

Technical input (better data) provided to IAM teams to help them develop and assess mitigation pathways more robustly |
| 5. How can we develop and show-case efficient MRV systems that are tailored for distinct food systems? | **Targeted research through the Living Labs (WP3):** We will apply a range of field measurements and surveys to identify the best-bet options, that are already applied by champion farmers, meeting the needs of stakeholders at different spatial and temporal scales. | A **GHGI framework** for FS that is consistent with national reporting requirements of Enhanced Transparency Framework of the PA and tools. |

> **Linkages:**
> - GHGI framework to be tested through applied research and piloting in LLs in WP3 and at national scale (WP4).
> - Capacity and data methodology improvements arising from WP1 evidence, including the institutional changes. required to mainstream them, will be mapped out along scaling pathways by WP4 and communicated by WP5.
> - GHGE information and FS innovations from WP2 will feed into the creation of FOODCLIP (WP1).
> - Success stories contribute to WP5.

WP2 theory of change

End-of-Initiative outcome: *Increased rigor and certainty in data, knowledge, tools, and capacity will improve food system GHGE monitoring and UNFCCC national communications in at least five (5) countries, subsequently improving the global stocktake (2024, 2029). Improved transparency empowers governments and FS stakeholders to establish viable mitigation targets, support scaling, verify mitigation measure impacts, and ensure fair distribution of benefits and costs (2030).*

Knowledge, capacity, and data gaps constrain the ability of governments and global mitigation actors to establish feasible national GHGI and mitigation strategies and associated targets, design effective mitigation measures, and rigorously measure their impacts, seriously undermining the validity of UNFCCC reporting and stocktaking for the new round of NDCs (2025). Uncertainty at national level is reflected in the uncertainty at global level. The *demand for better quantification of GHGE* and reduction targets by national governments is growing in line with recognition that *FS solutions are only as effective as the accuracy of their evidence base*. This WP aims to increase data availability and access, fill key data gaps in the target countries, and build capacity to use data for design and implementation of effective FS mitigation initiatives. Our **theory of change** for WP2 is organized around two IPs: **IP1** Increasing data availability and transparency; and IP2 increasing stakeholder capacity to access and use data.

IP1 focuses on building rigor into the evidence, tools, and methods used to estimate: (i) food consumption-based GHGE at national scales; (ii) trade-offs between GHG mitigation, food security, and adaptation to CC in LMICs differentiated by gender and other variables; (ii) GHGE for different types of FS, including from land-based aquaculture and land-use change in high-carbon landscapes.

IP2 focuses on boosting stakeholder capacity to inventory GHGE with at least Tier 2 methodology and to implement robust MRV systems. The Initiative will develop an online data portal, improved GHGE estimation, and a FS GHG inventory framework **(Output)**. Targeted capacity building will enable countries to use inventories to improve planning and national reporting under the PA, by ensuring they have effective protocols in place with easy-to-assess indicators to collect activity data of different systems, determine cost-effective mitigation strategies and develop robust MRV systems for accountability. Institutionalization of improvements to evidence-based decision-making and MRV systems is likely to require institutional change.

Collectively, accomplishment of WP2 Outcomes can be expected to contribute to the EoI outcome. We will secure the following **WP2 Outcomes** for three actor groups: (1) Seven national governments use more robust GHGE data and MRV capacity to improve national GHGI and design, implementation, impact assessment, and accountability of UNFCCC reporting, the Global Stocktake for the new NDCs (2025), and their current NDCs; (2) At least

14 government, civil society, and private sector partners have improved capacity and accountability to implement and use robust MRV systems and related CGIAR tools/science to support the development of more impactful and equitable FS emissions reductions programs; and (3) Decisionmakers such as policymakers, IAM teams, and international development organizations use CGIAR FS emissions data, evidence/knowledge, methods, and tools to inform at least ten pieces of legislation, strategic plans, or country reports on GHGE reduction.

Work Package 3: Research plan and TOC

Work Package 3	MITIGATE+ LIVING LABS
Work Package main focus and prioritization (max 100 words)	Applying a [living Labs (LLs) approach](#), WP3 implements place-based participatory action research to support FS stakeholders and partners in important FS to co-design, tailor, and test integrated socio-technical Innovation Packages to reduce GHG sources and enhance sinks whilst improving social equity. The scale of a LL is a "food-shed", defined as a largely geographically bounded "space" where inter-linked components of a relatively contained FS for a small/medium municipality (comprised of land/water systems, physical and market infrastructure, and value chain actors/people and the social structure that shapes how people behave and interact, etc.) work to nourish people and provide food-related opportunities. The LLs will prioritize mitigation approaches that demonstrate potential for delivering sustainable development co-benefits, such as adaptation to CC, increases in productivity, more equitable socio-economic and environmental benefits-sharing for the most vulnerable in society.
Work Package geographic scope (Global/Region/Country)	One LL in each of the seven target countries (Bangladesh, China, Colombia, Ethiopia, Kenya, Peru, and Vietnam), leveraging a range of entry point opportunities for optimal transformation to a low-emissions FS.

WP3 (LIVINGS LABS) diagram

The science

Key research questions	Main proposed scientific methods	Key outputs
1. What can we learn from previous participatory action research (such as community-based conservation, gender transformative approaches or development and integrated landscape approaches) regarding institutional, socioeconomic, financing, and policy factors and conditions for achieving results through LLs?	Literature review and synthesis analysis of knowledge and lessons learned regarding whose behavior to influence and how. This will be supported by stakeholder interviews to ensure that approaches are tailored to a region.	**A conceptual framework** for applying the LL approach to FS transformation research and a process for updating and reflecting on LL TOC by stakeholders and partners.
2. What are the most effective and inclusive approaches and processes	Digital technology-supported [stakeholder](#) and [network mapping](#), [political economy analysis](#), and innovative participatory and inclusive	**Multi-Stakeholder Platforms (MSPs)** established for each LL, capable of redressing power imbalances and securing the inclusive

for identifying, mapping, convening, catalyzing, and engaging/building a relationship with stakeholders from different sectors and other key actors in each LL to transparently co-define desired outcomes and shared vision of, or connected values around, FS transformation, aligning with national NDCs and commitment to other international conventions and ensuring that the voices of marginalized social groups are represented, heard and acted on?

3. What transformative approaches will inspire and empower women and men to seek solutions and contribute increased agency so that mitigation interventions contribute to increased wellbeing over the mid to long term? Moreover, how should such approaches support gender transformation, social equity and specifically the empowerment of women and members of marginalized social groups in a way that enhances self-reliance and self-advocacy and expands their opportunity spaces to contribute to, and benefit from, transforming FS to low-emissions, climate-resilient pathways?

4. What subnational-level institutional, social, and technical capacities and conditions are essential for stakeholders to effectively participate in testing FS mitigation approaches in LL settings? With this knowledge in hand, how can we best meet those conditions, strengthen capacities, and empower marginalized groups?

5. What strategies and configurations are needed to accelerate the proliferation of LLs as constructed in pilots in a scale-up and -out phase (WP4)?

engagement, community facilitation, consensus building and compromise supporting, and social learning approaches, such as games and participatory/collaborative modeling, to support the design, negotiation, and implementation of equitable and inclusive Multi-Stakeholder Platforms (MSPs) as effective governing bodies of LLs.

Collaborate closely with HER+ to examine how different socio-technical innovations affect the agency and influence of and benefits to women, youth, and other vulnerable members of society.

Use and build on GENNOVATE methodology and tools (research on gender norms and agency in relation to agricultural innovation (www.GENNOVATE.org)

Combine gender- and socio-economically disaggregated diagnostic analysis, economic valuation (e.g., true cost accounting), modeling and scenario simulation analysis, and ex-ante assessment of tradeoffs (including distributional effect) and synergies of alternative (bundles of) sociotechnical innovations from WPs 1 and 4, with co-identification with communities and FS actors to select potential mitigation approaches to apply at LL-scale, test with a citizen science model, and adapt based on continuous evaluation.

Stakeholder surveys and analysis to understand their relationships, dynamics, perspectives, constraints, and aspirations.

Identification of capacity and leadership building approaches that can be harnessed to improve effectiveness, efficiency and equity of LLs.

representation of women, youth and marginalized groups.

FS Mitigation approaches developed, validated, and legitimized by FS stakeholders of each LL. These include measures to reduce food loss and waste, reduce terrestrial and aquatic ecosystem degradation and increase restoration designed/tailored and tested in LLs.

Stakeholder profiles developed and analyzed with political science perspective to inform intervention design. Innovative tools identified for capacity building and leadership.

Transformative, innovative tools and approaches for women, youth and community empowerment and guidelines and experiences on how to combine a LL approach with a gender transformative approach and its outcomes.

Data (geo-referenced and gender-disaggregated as relevant) collection at field, household/farm, community, landscape, and food-shed levels to enable evaluation, determinant and contribution analysis, and ground-truthing of mitigation impacts through field measurements.

Synthesis of lessons learned across LLs and guidance on developing future LLs for FS transformation.

Linkages

WP3 will:

- Lean on learning emerging from the strategy and planning framework work under WP1; build on assessment of high-potential CGIAR technologies and identification of strategies to blend financing under WP4; provide valuable feedback regarding on-the-ground effectiveness (including cost-effectiveness) of mitigation approaches, thus informing national and global-scale mitigation strategies (WP1) and scaling research (WP4).
- Work closely with HER+ on examining the aspects of socio-technical innovation adoption that can affect the agency and benefits of participation of women, youth, and other vulnerable members of society.
- Coordinate and possibly merge LL locations (e.g., Agroecology's LLs in Kenya and Peru; Resilient Aquatic Foods Initiative's AquaLabs in Bangladesh and Kenya) to consolidate resources and impact.
- Supplement the data and evidence from WP1 with place-based, food-system-specific, primary data collection

WP3 theory of change

End-of-Initiative outcome: *Food sector actors and communities in Living Labs build frameworks for co-design, adaptation, testing, and mainstreaming of low- and negative-emissions mitigation solutions based on principles of gender and social equity (2024). The FS of seven (7) countries increase supply chain efficiency, reduce food loss and waste, and deliver co-benefits of climate resilience more equitably (2030).*
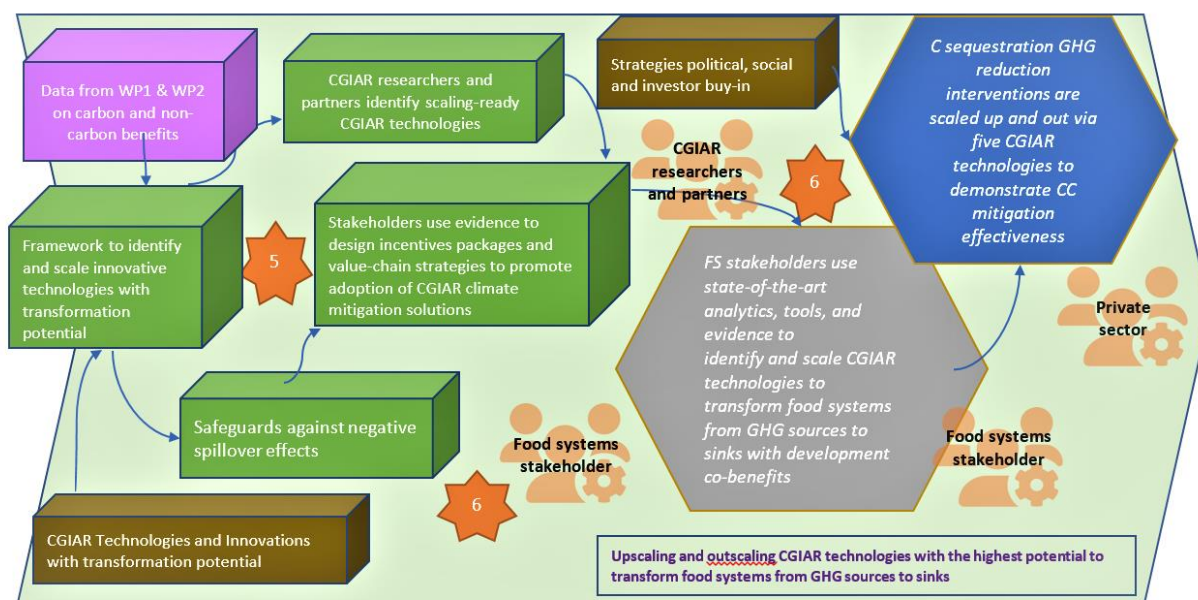
Living Labs (LL) are designed to serve as valuable intermediaries among citizens, research organizations, companies, cities and regions for joint value co-creation, rapid prototyping, or validation (ENoLL 2021). In WP3, we follow Pfotenhauer's (2017) view that LLs are steppingstones capable of fueling system transformation. We have organized the WP around **outcomes focused on**: (I) targeting key FS governance and decision-making actors to increase their capacity to implement the mitigation measures tested in LLs in their respective FS, and (II) ensuring that development co-benefits (economic, social, cultural) are shared more equitably among all FS stakeholders, including women, young people, and marginalized members of society. The socially-equitable decision-making framework that LL actors and communities will use to identify, plan, pilot, and adapt mitigation innovations will be designed around rigorous stage-gating principles, including (a) assessing the maturity and scaling-readiness of innovations, (b) ensuring adequate management of innovation pipelines from proof of concept through piloting and scaling stages, and (c) ensuring that ex-ante evidence for effectiveness (including cost-effectiveness) of innovations is in place, leading cumulatively to go/no go decisions.

The **theory of change** for WP3 is that in building co-design mechanisms, establishing multi-stakeholder platforms (MSPs) to identify new mitigation approaches, strong community support, leadership capacity, and on-the-ground testing of the most potentially transformative FS mitigation tools and approaches including gender transformative approaches, we will achieve two WP3 outcomes, namely **WP3 Outcome 1:** Key FS stakeholders (civil society, city, and subnational FS governance actors, farming associations) use the evidence, socio-technical innovations, and learning generated by MITIGATE+ to increase their capacity to assess, plan, and implement low-emissions development solutions and climate adaptation co-benefits in target FS, and **WP3 Outcome 2**: Women, youth, and other marginalized groups equitably participate in, and benefit from, the creation of a fairer, more sustainable climate mitigation and adaptation co-benefits sharing structure. This can only be achieved if we have a MEL/IA system in place to diagnose LLs in terms of gender norms, agency, and intersectional (dis)advantages, and to measure and test the impact of socio-technical innovation bundles on the rate of technology adoption, and empowerment/agency status, of women, youth, and other marginalized groups, *and* if we take care to establish inclusive and equitable MSPs in each LL that are capable of redressing power imbalances and securing more inclusive representation (**WP3 Output**). We believe that this will result in a solid basis for communities at LL scales to implement mitigation measures and practices that deliver both mitigation *and* adaptation benefits, in step with the broader, more equitably distributed social (including human health) and environmental co-benefits that are essential to sustained uptake over the longer term.

Work Package 4: Research plan and TOC

WP4	MITIGATE+ SCALING: Scaling low-emissions FS
Work Package main focus and prioritization (max 100 words)	WP4 focuses on supporting countries to create the enabling environment for scaling up and out at least five CGIAR technologies and innovations (crop and livestock management, value chains, market and institutions) with potential to transform FS from GHG sources to low emission FS, while delivering sustainable development co-benefits, including conflict resolution and poverty reduction. CGIAR has developed an impressive body of agricultural technologies aimed at improving farm productivity, access to nutritious and affordable food, and sustainability of natural resources and ecosystems. WP4 will work with CGIAR researchers, FS stakeholders, and government and non-government actors in repurposing these technologies and value chains, and laying the institutional groundwork for scaling these innovations as cornerstones of integrated solutions that contribute to achieving CGIAR and LMICs CC mitigation and sustainable development targets.
Work Package geographic scope (global/region/country)	WP4 will focus on selected value chains located in the seven geographies targeted by MITIGATE+ (China, Vietnam, Bangladesh, Ethiopia, Kenya, Colombia, and Peru), with a special focus on countries mired in, or emerging from conflict and fragility.

WP4 (SCALING) diagram

The science

Key research questions	Main proposed scientific methods	Key outputs
1. In conjunction with WP1 and WP2, which works at global and national scales, as well as with WP3 (which works at LL scale): Which (bundles of) CGIAR technologies demonstrate the greatest potential to transform FS from GHG carbon sources to sinks when taken up at scale? 2. (With support from WP3) What are the determinants of the adoption and scaling of CGIAR-based mitigation strategies for different user groups (differentiated by gender, socio-economic status and ethnicity and possible other relevant factors), especially for countries mired in, or emerging from, conflict or fragility? 3. (With inputs from WP1, WP2 and WP3) What are the (potential) socio-economic and ecological co-benefits that can reasonably be produced from solutions selected for scaling? How do these co-benefits, and their distribution, differ according to gender, user group, and geography? What are the risks of unexpected negative social, economic, and environmental spillover effects across various domains or for specific vulnerable social groups? How can we anticipate these negative effects, and even prevent them? 4. (In conjunction with WP1 and WP3) What are the most appropriate institutional arrangements, policy approaches, and methodological guidelines to promote equitable, socially inclusive climate solutions? 5. How can we best blend climate finance with funding for achieving sustainable development priorities, such as those relating to rural development, biodiversity conservation, social equity and peacebuilding? What are the best incentives packages and financial mechanisms to scale the adoption of CGIAR climate solutions for different user groups in conflict-affected areas?	(Drawing from research from WP1 and 2) Systematic literature reviews and synthesis studies, targeted primary data collection combined with stakeholder consultations and participatory approaches, to **identify candidate CGIAR technologies** and innovations with high potential to reduce FS emissions when adapted to target country contexts and the tradeoffs of these technologies. **Socioeconomic, and behavioral analyses**, and application of tools, such as the RTB, **Gender Responsible Scaling Tool**, to understand the factors and behavioral change triggers and constraints for farmers and value chain stakeholders for adopting sustainable land uses, such as conservation practices and agroforestry. **Ex-ante and ex-post impact assessments** to explore carbon and non-carbon economic and non-economic benefits as well as the undesired spillover effects associated with scaling CGIAR technologies up and out, with particular focus on impacts on women, youth, disabled, and other sub-groups of society. **Stakeholder consultations** for an in-depth understanding of structural conditions and institutional bottlenecks as well as the required enabling environment needed for adoption and determine opportunities for producers and small and medium-sized enterprises to access and be competitive in markets **Spatially explicit analyses** to determine priority areas at subnational/FS level for reducing emissions and areas where mitigation priorities overlap with areas with the highest potential to deliver SDG co-benefits, as a means to identify opportunities for blending climate and SDGs and peacebuilding funding as well as to get buy-in from stakeholders, including governments, the private sector, farmers associations and civil society donors.	At least five **CGIAR technology-derived, scaling-ready climate solutions** with high potential to transform FS to low emission FS. (*Solutions to be tested and fine-tuned in LLs WP3*). **Assessment of the determinants of adoption and factors enabling** or constraining the adoption (scaling up and out) of the five identified CGIAR-based climate solutions. Set of documented (potential) carbon and non-carbon benefits as well as the **undesired spillover effects** associated with scaling CGIAR technology up and out. **Institutional arrangements, policy approaches and methodological guidelines** to facilitate the scaling pathway for identified 'best bet' solutions, as well as a number of **investment prospectuses or strategies** developed to attract private, public and climate finance investment to the solution. Five strategies, including financial investment and business plans, to blend public and private funding, for out and up scaling of technologies and safeguards to prevent unexpected spillover effects such as emissions leakage. Five use cases of successful **blending of climate finance with SDGs and peacebuilding funding**.
Linkages:		

- WP1 and WP2 will incorporate, as much as possible, the modeling of CGIAR technologies with the highest potential to mitigate CC as identified in WP4 (in WP1, through the strategy modelling exercise, and in WP2, through modelling the emissions factors for the five selected CGIAR technologies to be scaled/pre-scaled in WP4)
- WP4 will use WP1 ex-ante impact assessment of the global-scale impact of certain drivers (scenario analyses), differentiated by gender and other relevant social factors, on mitigation scenarios, to inform and add granularity to WP4 research into how these drivers might also affect technology adoption and scaling success at subnational and value chain level.
- WP4 will draw on outputs from WP2's policy support outputs, specifically information, data, guidance, and co-development for national policy stakeholders to identify scaling pathways for a follow-up project phase
- WP4 will coordinate with Nexus Gains on issues relating sustainable value chains, with the Agroecology Initiative and Natural-positive solutions Initiative on approaches and technologies that demonstrate potential to deliver co-benefits on biodiversity and environment, and with Digital Transformation on potential private sector carbon financing.
- Works in tandem with WP2 to plot scaling pathways for policy integration (scaling up).
- Prepares scaling pathways for five mitigation solution 'best bets', some of which may be tested or identified at Living Lab level, e.g., cassava value chains which are both local (cassava for food and land restoration) and potentially global (cassava starch as alternative to replace portion of the global cornstarch market) in scope, are highly accepted by local communities and can prepare degraded land for eventual cultivation of high value crops such as cacao.
- Helps set international agendas and responds to them in collaboration with WP5.

WP4 theory of change

End-of-Initiative outcome: *Interventions targeting carbon sequestration and reduced GHGE are scaled up and out via five CGIAR technologies to demonstrate climate mitigation effectiveness (2024). Investors and national-level policymakers are incentivized to emphasize GHG emission reductions from FS in next generation NDCs (2025, 2030).*

CGIAR has developed an impressive body of agricultural technologies (commodity crops, institutional innovations, governance and business models, and value chains of global significance) aimed at improving farm productivity, access to nutritious and affordable food, and the sustainability of natural resource management. However, for these technologies to have a tangible effect on CC mitigation, and to power the development trajectory of our FS from their current status as *sources of GHGE* to the ideal status of *carbon sinks*, they must plan for, incorporate, and deploy at scale a suite of mitigation practices designed to accelerate progress towards climate mitigation goals in parallel with their other sustainable development objectives.

Our **theory of change** for WP4 is that for the massive and sustained scale-up of CGIAR mitigation technologies and science to occur, we must effectively demonstrate how a 'test' group of CGIAR technologies might be retrofitted and optimized to enhance their performance towards climate mitigation targets (emissions reduction, deforestation avoidance, landscape restoration, carbon capture) while enhancing agricultural production, the integrity of the FS and human development needs such as security, equity, and peace. The **IP** of WP4 will develop a roadmap of actionable scaling pathways (both up and out), secure political buy-in, and incentivize climate finance investment for five impactful CGIAR technologies (commodity crops, value chains, business models). Through the use of **WP4 Outputs,** namely; climate mitigation 'best bet' solutions based on CGIAR technologies, strategies to secure political, social and financial buy-in from relevant stakeholders, scaling pathways to scale MITIGATE+ solutions up and out, and the design of safeguards against negative spillover effects to different segments of society, we expect to achieve the **WP4 Outcome** of Researchers, economists, policymakers, and other FS stakeholders use state-of-the-art analytics, tools, and evidence to identify and scale CGIAR technologies and innovations with the highest potential to transform FS from GHG sources to carbon sinks while simultaneously delivering sustainable

development co-benefits, like poverty reduction, environmental protection (conservation), and conflict resolution in their respective geographies.
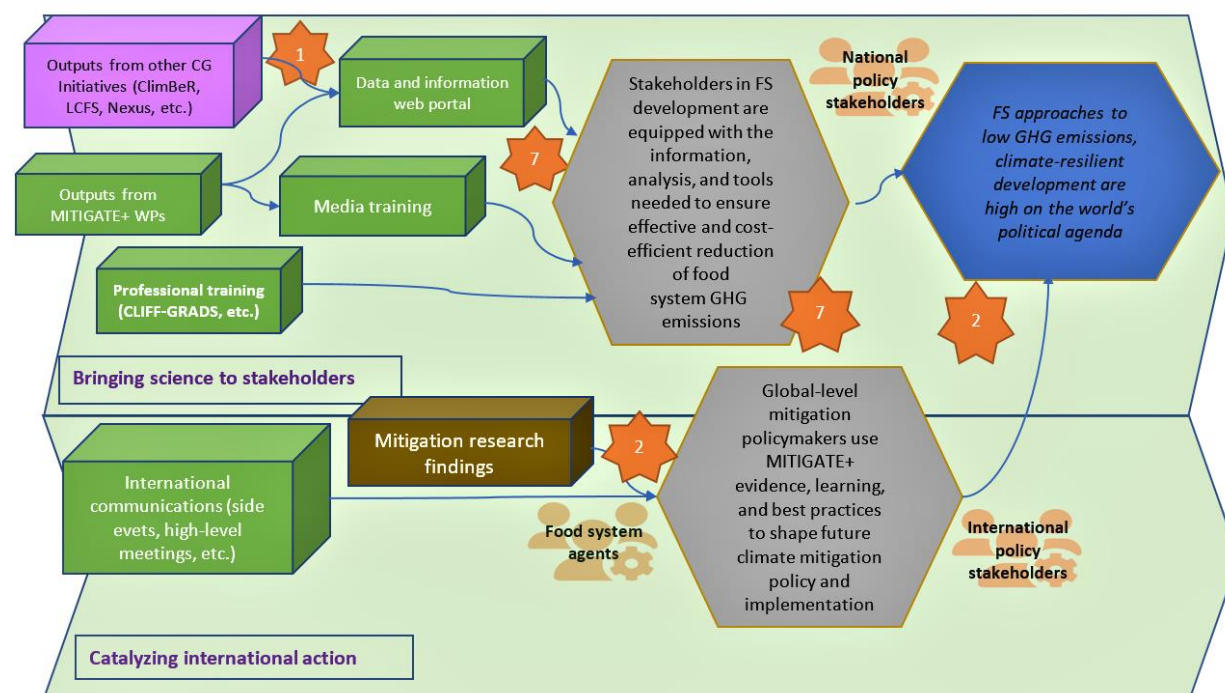
Selecting five (5) CGIAR technologies (commodity crops, local-to-global value chains and business models) with significant scaling potential for carbon capture/emissions reduction in the first three-year cycle will allow us to rapidly demonstrate the efficacy of MITIGATE+ interventions, incentivizing private, public and climate finance actors to invest in bringing mitigation solutions to the scale required to trigger system transformation in the 2024-2030 cycle. WP4 entails partnerships with CC focal points in countries with ambitious CC commitments, such as the environment and agriculture ministries, NGOs, international cooperation agencies and stakeholders participating in dialogue platforms for value chains and food sectors centered around the selected solutions.

Work Package 5: Research plan and TOC

Work Package 5	MITIGATE+ ENGAGE: Engagement and agenda transformation
Work Package main focus and prioritization (max 200 words)	Mitigating CC through a Fs lens is a key element of FS transformation. However, the complexity of the challenge means that the changes required to achieve system transformation are often poorly understood and operationalized in LMICs and emerging economies, where agriculture generates livelihoods for large portions of the population. Additionally, global-level agreements affecting CC mitigation and adaptation often lack a strong evidence base for how mitigation works (or does not) at national and subnational scales. WP5 addresses this by ensuring that policymakers and practitioner communities have the information, analysis, and tools they need to achieve *efficient* and *cost-effective* reduction of FS GHGE in line with generation of *equitable* impacts and co-benefits, at national and international scales, and by fostering south-south knowledge exchange and cooperation. The WP outreach and communications efforts will elevate lessons learned and best practices in our research WPs to national and international audiences (e.g., UNFCCC, UNFS, and CBD dialogues). This will ensure that results reach key stakeholders in appropriate formats to better inform and shape climate mitigation policy.
Work Package geographic scope (global/region/country)	The primary focus of this WP will be at international and national scales. This WP will inform stakeholders at international and national levels for program design and support LMICs negotiators with targeted information. It will target international donors and financial institutions to ensure that they have information to guide investments in low-emissions FS development. Core WP activities will target communications around the lessons being learned at the national level in countries that are the focus of the MITIGATE+ Initiative, i.e., China, Vietnam, Bangladesh, Ethiopia, Kenya, Colombia, and Peru. The low-emissions development arena is evolving quickly, so the Initiative must maintain flexibility to respond to opportunities in other countries over the life of the Initiative.

WP5 (ENGAGE) diagram

The science

Key research questions	Main proposed scientific methods	Key outputs
This WP is focused on external communications, outreach, and partner engagement. It is not a scientific WP and does not feature any research questions. However, we will apply a learning framework to our outreach efforts to improve information delivery and adapt formats for increased impact.	This WP builds on previous CGIAR work in the CRPs to reach multiple audiences to enhance knowledge and learning about low-emissions FS development among target audiences, such as work in CCAFS on low-emissions development, work in FTA on REDD+, and work in WLE around landscape restoration. Specifically: **Website Development**: Expansion of the AgMRV website and developing a global information hub for communicating knowledge and learning generated by the Initiative. The global information hub will be developed as a vehicle for forging stronger links with other organizations active in low-emissions FS research and implementation, including acting as a portal for their work and hosting a library of research and learning outputs. The Initiative will build web presences in French and Spanish, next to English (at least) to reach stakeholders in Africa, Latin America and elsewhere. **Media and outreach**: Media training, outreach events, relationship building, and message development to support the media to convey accurate information around low-emissions FS transformation. Methodologies will include: (a) media training seminars, including field visits to project sites, (b) a database of journalists, (c) press releases, social media campaigns in appropriate languages around publications, research findings, and conferences, and other types of public communications and messaging products, and (d) technical assistance for freelance journalists in	A new web-centric **communication and knowledge sharing strategy** that combines contemporary social media tools with more traditional outreach channels to bridge the gap between low-emissions development research, policy, and practice. The strategy will operate at both global and national levels, with sub-national reach. **Knowledge sharing** activities will comprise the following interdependent and mutually reinforcing elements (**Outputs**): A **global knowledge hub** (AgMRV website) acting as a partnership vehicle and portal for global research on low-emissions FS research. **Media training, outreach** events to create and maintain effective **public communication messaging**

	Latin America, Africa and Asia to help them produce multimedia stories on low-emissions FS. **Events**: Series of high-profile global events, including the Global Landscapes Forum, UNFCCC side events, and meetings of the Committee on World Food Security to raise awareness of low emission FS knowledge and learning, complemented by more regionally focused Global Landscapes Forum chapters that focus on national level issues. **Publications:** Publication of a series of publications in appropriate formats (e.g., journal papers, occasional papers), and of at least one multi-author book synthesizing project knowledge and learning. **Capacity Development**: Hosting of the [CLIFF-GRADS program](), a joint CGIAR - Global Research Alliance initiative on Agricultural Greenhouse Gases (GRA) training program for PhD students from LMICs of short research stays (4-6 month). Projects under the CLIFF-GRADS program will provide scientific training and research on the measurement, modelling and mitigation of GHGE, or carbon storage in agricultural systems relevant to LMICs in the context of enhancing food security. Students will be placed in Initiative research teams to support and carry out projects in association with CGIAR and GRA scientists. **South-south knowledge exchange and cooperation**: Organizing workshops and exchange programs to catalyze and facilitate knowledge exchange and cooperation among case study countries, at both inter-governmental and civil society levels.	around low-emissions FS research and this Initiative. A series of **high profile global and national-level events**, side events, and meetings (i.e., the Global Landscapes Forum, UNFCCC side events, Committee on World Food Security) to raise awareness of low emission FS and of specific country-level needs, barriers, and leverage points. **Publications** (e.g., journal papers, occasional papers) and at least one **multi-author book** synthesizing project knowledge and learning.

Linkages

- The Initiative will develop a low-emissions FS blog as a virtual news service on low-emissions, climate-resilient FS development that will feature research and implementation news of CGIAR teams and partners, with articles raising awareness of new publications, research findings and conferences. As appropriate stories will be translated into French and Spanish (at least).
- The Initiative will periodically engage freelance journalists to produce multimedia stories on low-emissions FS development. In addition, the Initiative will build a database of journalists and proactively engage with mainstream media, including hosting journalist-training workshops in Asia, Africa and Latin America.
- The Initiative will maintain CGIAR's use of high-profile global events, such as the UNFCCC side events, Committee on World Food Security, Global Landscapes Forum, to raise awareness of FS and CC knowledge and learning.
- The project will generate a series of publications in appropriate formats (e.g., journal papers, occasional papers), and will publish at least one multi-author book synthesizing project knowledge and learning.
- This WP is the communications and outreach element of the Initiative and will ensure that the results of each WP reach appropriate stakeholders to ensure impact.

WP5 theory of change

End-of-Initiative outcome: *Food system approaches to achieve low GHGE, climate-resilient development are high on the world's political agenda (2024). Resources allocated to low GHGE FS development increase, stimulating action on mitigation. Informed FS decision-making is based on solid science, good governance, and principles of gender and social equity (2030).*

Many of the major achievements of previous CGIAR CRPs (CCAFS, FTA, and WLE) may be attributed to strong partnerships with *external* partners such as civil society, independent media, and government actors, which have led both to exciting joint research initiatives and more effective 'socialization' of research results among end users. WP5's TOC is designed around two **Impact Pathways** that, although highly interdependent, target the needs and priorities of actor groups at two distinct scales, namely **IP1:** Informing policymakers and food-system practitioners at *subnational (e.g., LLs), regional (especially South-South), and national scales on the mitigation potential of FS actions*, and **IP2:** Raising awareness among policymakers and stakeholders at the *global scale*.

Under **IP1**, we recognize that the actors in national FS policy often have uneven access to information and varying technical capacity to produce, provide and translate knowledge into direct economic benefits or support for public decision-making. By training country professionals in GHG mitigation and low-emissions FS development, we will increase public trust in research organizations as independent brokers for learning, thus greatly facilitating the push for effective, efficient and equitable mitigation policies to be adopted in-country. WP5 **Outputs** under IP1 include training for next generation climate action leaders (CLIFF-GRADS program), training for country media outlets, think tanks, policy institutes, and journalists in how to synthesize information from our publications and websites, and training on how to communicate more effectively about low-emissions FS transformation in print and electronic media.

Under **IP2**, we recognize that the process of harnessing policy learning for low-emissions FS development policy design at global levels also needs to be better managed, especially in term of linking national-level ambitions more realistically to UNFCCC, UNFS, and other global commitments. Through national-to-global knowledge management, globally-significant publications, and participation in high profile global and national-level events, side events, and meetings (i.e., the Global Landscapes Forum, UNFCCC side events, Committee on World Food Security) (**Outputs**) we will raise global-level awareness of the specific needs, drivers, barriers, and leverage points for low emission FS transformations, thereby contributing to better informed implementation of global agreements, policy, and commitments.

We will secure the following **WP Outcomes** for two actor groups, namely: (1) Policymakers and practitioner communities active in FS development at national and subnational (LL) scales are equipped with the information, analysis, and tools they need to ensure effective and cost-efficient reduction of FS GHGE in line with generation of equitable impacts and co-benefits, and (2) Policymakers, stakeholders, and decision-makers involved in global-level climate mitigation and adaptation policy (such as the UNFCCC, UNFS, and post-Aichi dialogues) use evidence, learning, and best practices emerging from national and subnational-level mitigation implementation efforts to inform and shape future climate mitigation policy and implementation.

4. Innovation Packages and Scaling Readiness Plan

MITIGATE+ will use the One CGIAR Scaling Readiness approach to pilot, adapt, stage-gate, and scale three (3) Innovation Packages out of the following:

1. (WP1) FOODCLIP (**scaling type**: *vertical*)
2. (WP2) An improved GHGE estimation model (**scaling type**: *vertical*)

3. (WP2) GHG Inventory Framework (**scaling type**: *vertical*)

4. (WP3) Socially inclusive decision support tool/framework for use by MSPs in LLs (**scaling type**: *vertical*)

5. (WP4 (MITIGATE+ Scaling) 5 **CGIAR technology-derived, scaling-ready climate solutions** with high potential to transform FS from GHG sources to carbon sinks, including solutions for food loss and waste management, aquaculture and territorial restoration, carbon capture, and deforestation avoidance. (**Scaling type**: *horizontal* and *vertical*)

6. (WP5) An expanded-capacity global knowledge hub for measurement, reporting, and verification of GHGE. (**Scaling type**: *horizontal*)

In 2022, innovations will be stage-gated by level of **maturity.** The i**mproved GHG emissions estimation model** (WP2), e.g., blends existing tools such as the Agro-Chain GHG Emissions (ACE) calculator and IPCC protocols, but upgrades functionality by incorporating emerging CGIAR digital technologies and Big Data analytics (~75% scaling-ready). The inclusive decision-making tool framework in WP3 must go through an extensive co-design and consultation process with women, youth, disabled, and other social group representatives before it is scaling-ready (~45%). The innovation pipeline will be stage-gated, with certain criteria (cost-effectiveness, evidence, piloting data, social equity indicators met, etc.) designed to inform go/no go decisions that to move an innovation further along the R4D funnel (or conversely, to abort if uptake by end users and markets is estimated to be low).

MITIGATE+ will join Wave 1 of the One CGIAR scaling strategy, with backstopping commencing in Q2 2022 for five mature, stage-gated CGIAR innovations (WP4), and scaling readiness reports/strategies developed to 2024 for at least two other MITIGATE+ Innovation Packages. MITIGATE+ has allocated resources to implement the Innovation Packages and Scaling Readiness plan in WP4. Dedicated activities, deliverables, indicators, and line-items are included in the Management Plan, MELIA, and Budget Sections.

5. Impact statements

5.1 Nutrition, health & food security

Challenges and prioritization: While urgent global actions on CC mitigation in the context of sustainable development are needed, the world also faces a food-related health crisis, manifested in persistent hunger, pervasive and varying forms of malnutrition, and rising unhealthy food consumption[21,22]. Greater and "smarter" investments are needed to rapidly accelerate a low-emission path toward securing an adequate and affordable supply of diverse foods needed for sustainable healthy diets. Many foods are currently produced, distributed, prepared and consumed at the expense of environmental quality (e.g., soil, water, air pollution and GHGE), subsequently harming human health[23]. In this context, MITIGATE+ aims to: 1) tackle food loss and waste across value chain stages to reduce both emission and hunger, 2) strengthen the production-consumption linkage and synergies between mitigation and healthy diets, 3) promote climate-smart farming/livestock/aquaculture/landscape and nature-positive solutions that deliver both mitigation and sustainable productivity gains within planetary boundaries, and 4) elevate efforts on clean energy cooking to reduce emissions and indoor

air pollution, one of the main causes of respiratory diseases, with disproportional impact on women and girls[24].

Research questions: (**WP1**) What are the options for tackling food loss and waste and promoting healthy low environmental footprint (including GHGE) diets and how to integrate them in national strategy development? (**WP3**) How to support FS stakeholders in LLs through Multi-Stakeholder Platforms in co-developing and testing mitigation approaches that enhance healthy diets and environmentally mediated human health? (**WP4**) What are the risks of potential negative social (including nutrition, human health, and food security), economic, and environmental spillover effects from scaling across various domains or for specific vulnerable social groups? How can we anticipate these negative effects, and even prevent them?

Components of Work Packages: (**WP1**) Integrating nutrition, health and food security concerns into FOODCLIP and nutrition and food security outcomes in scenario analysis, (**WP2**) Collecting the right data to allow for this integration, (**WP3**) Taking a holistic approach in supporting FS stakeholders in LLs to co-develop and test mitigation approaches, and (**WP4**) Explicitly addressing nutrition, health and food security in scaling readiness analysis.

Measuring performance and results: The MEL team will use a multi-dimensional approach to measure changes in food and nutritional security using common indicators related to food production, income, total and food expenditure, share of expenditure on food, calorie consumption, dietary diversity, and nutritional status. Indicators will be refined to country contexts and Initiative food system interventions. We will have a core set of common indicators across countries to support comparative analyses. Analyses will initially focus on the LLs but as scaling gets underway, we will design appropriate analytical/sampling frameworks.

Partners: *CGIAR*: SHiFT; *Non-CGIAR innovation partners*: WHO, PATH. *Demand partners*: National/subnational government as well as agencies responsible for SDGs 2 and 3; national/local NGOs. *Scaling partners*: As above, plus international development communities.

Human resources and capacity development of Initiative team: Our team will include nutrition scientists and agricultural economists, as well as experts on environmental health.

5.2 Poverty reduction, livelihoods & jobs

Challenges and prioritization: Poverty reduction, livelihoods, and jobs are acute priorities for LMICs and FS mitigation actions (including any necessary accompanying safety net measures) should not jeopardize but to contribute positively to these objectives. LMIC households/consumers are particularly vulnerable to price increases, because they generally spend larger shares of their incomes on food consumption as compared to their HIC counterparts and large proportions of smallholder farmers in LMICs are net-consumers of food. Tradeoff analysis that assesses local as well as economy-wide impact of alternative mitigate approaches on different sectors and diverse social groups at different spatial and temporal scales is critical to the ability of MITIGATE+ to deliver mitigation and co-benefits. MITIGATE+ will identify and prioritize mitigation approaches that are economically viable and socially responsible by protecting and introducing opportunities to grow livelihoods, income, and employment for actors across the value chain.

Research questions: (**WP1**) What are the economy-wide impacts of alternative mitigation approaches on different sectors and diverse social groups at different spatial and temporal

scales and how to integrate them in national strategy development? (**WP3**) How to support FS stakeholders in LLs through Multi-Stakeholder Platforms in co-developing and testing mitigation approaches that protect and/or enhance people's opportunities for poverty reduction, livelihoods and jobs, particularly those of specific vulnerable social groups? (**WP4**) What are the risks of potential social, economic, and environmental spillover effects from scaling across various domains or for specific vulnerable social groups? How can we anticipate these negative effects, and even prevent them?

Components of Work Packages: (**WP1**) Integrating poverty reduction, livelihoods and jobs concerns into FOODCLIP and poverty and job outcomes in scenario analysis, (**WP2**) Collecting the right data to allow for this integration, (**WP3**) Taking a holistic approach in supporting FS stakeholders in LLs to co-develop and test mitigation approaches, and (**WP4**) Explicitly addressing poverty reduction, livelihoods and jobs, especially in relation to peace-building effort, in scaling readiness analysis.

Measuring performance and results: The MEL team will use a multi-dimensional approach based on the DFID five livelihood capitals to measure changes poverty, livelihoods and employment. Indicators related to value chain management efficiencies (e.g., post-harvest food loss), agricultural productivity, household consumption and expenditure, livelihood and income diversification, youth employment and aspirations for agricultural and non-agricultural job opportunities will be refined to specific contexts and approaches to food system interventions. We will have a core set of common indicators across countries to support comparative analyses. Analyses will initially focus on the LLs but as scaling gets underway, appropriate analytical/sampling frameworks will be designed.

Partners: *CGIAR*: Rethink market, National Policies and Strategies; *Non-CGIAR innovation partners:* World Bank. *Demand partners*: National/subnational government as well as agencies responsible for SDGs 1 and 8; national/local NGOs. *Scaling partners*: As above, plus international development communities.

Human resources and capacity development of Initiative team: Our team will include agricultural economists and sociologists.

5.3 Gender equality, youth & social inclusion

Challenges and prioritization: CC is strongly associated with global social inequities with regards to both the causes and the impacts, which is exacerbated in FS of LMICs. To achieve effective, efficient and equitable low-emission FS development, MITIGATE+ must avoid exacerbating existing gender and other social inequities and *actively* adopt transdisciplinary, gender-transformative approaches and actions that increase gender equity and social inclusion. MITIGATE+ will: 1) integrate and build capacities on transdisciplinary and socially inclusive approaches to food-system emissions reduction strategies and/or carbon sink initiatives across all WPs; 2) adopt a gender-transformative approach in our place-based research focused on removal/relaxation of restricting gender norms; and 3) employ rigorous local gender and social analysis to guide the scaling of mitigation solutions.

Research questions: (**WP1**) How can gender and social inclusion concerns and objectives best be addressed and integrated in 'FOODCLIP'? What capacity development and minimum datasets are required? (**WP2**) How can the viewpoints and aspirations different social groups be integrated into planning scenarios to support decision-making at sub-national and national

levels? (**WP3**) What transformative approaches will inspire and empower women and men in different age groups to seek solutions and contribute increased agency so that mitigation interventions contribute to increased wellbeing over the mid- to long-term? (**WP4**) How do the potential risks, costs, benefits, of solutions selected for scaling and their distributions differ according to gender, the vulnerability of social groups, user group, and geography?

Components of Work Packages: (**WP1**) Integrating gender, social equity, and inclusion concerns into FOODCLIP, (**WP2**) Collecting the right data to allow for this integration, (**WP3**) Taking a gender transformative approach in LLs to co-develop and co-test sociotechnical climate solutions and measure their effect on women, youth, and other less well-represented social groups (including adoption rates, barriers), and (**WP4**) Gender-responsible scaling of mitigation solutions.

Measuring performance and results: The MEL team will use a multidimensional approach to document the extent to which gender equality, youth and social inclusion approaches are integrated in public consultation during national strategy development, track the impacts of FS interventions on different social groups, track progress on gender transformation, women's empowerment using the Women's Empowerment in Agriculture Index (WEAI) and # women and # youth benefiting from relevant CGIAR innovations. Indicators will be refined to country contexts and Initiative food system interventions. We will have a core set of common indicators across countries to support comparative analyses. Analyses will initially focus on the LLs but as scaling gets underway, we will design appropriate analytical/sampling frameworks.

Partners: *CGIAR*: HER+. *Demand partners*: NGOs working on rights of women, youth, indigenous peoples and historically marginalized populations; Government agencies responsible for SDGs 3, 5, 8, 10 and 16. *Scaling partners*: As above, plus international development communities.

Human resources and capacity development of Initiative team: One FTE gender research coordinator; social scientists with strong gender research background playing prominent (if not leading) roles in each WP; Partnership with networks of IA experts; Internal capacity development for Initiative team members at inception stage and continuing periodically.

5.4 Climate adaptation & mitigation

Challenges and prioritization: *See Challenge statement*. FS produce 21-37% of global GHGE (72% of which come from LMICs, with the AFOLU sector a major concern). MITIGATE+ addresses this issue with a particular focus on FS in LMICs and emerging economies that produce a disproportionate amount of GHGE, in addition to delivering climate adaptation (and other SDGs) as co-benefits.

Research questions: *All RQs outlined in WPs 1-4 TOC section.* Examples include: (**WP1**) What are the key drivers of global and national emissions in FS – both immediate and underlying (root cause) political, social and economic drivers? (**WP2**) How can integrated assessment models be iteratively improved as tools to guide GHG mitigation actions and decisions, particularly by incorporating development trajectories and mitigation actions into forecasts of GHG mitigation as well as considering other co-benefits, whilst differentiating for gender and other relevant social factors? (**WP3**) What subnational-level institutional, social, and technical capacities and conditions are essential for stakeholders to effectively participate in testing FS mitigation approaches in LL settings? (**WP4**) What are the best incentives

packages and financial mechanisms to scale the adoption of CGIAR climate solutions for different user groups in conflict-affected areas?

Components of Work Packages: *All Outputs listed in WPs 1-5 TOC section*. Examples include: **(WP1)** FOODCLIP, and National analysis of key drivers and contributors of global and national emissions in FS and exploration of opportunities and priority setting for alternative mitigation actions, (**WP2**) Online Data Portal offering improved data accessibility, in particular for activity data, emissions drivers, EFs, leading to improved transparency, accuracy, completeness, comparability, and consistency of data for GHGE estimates, (**WP3**) Multi-Stakeholder Platforms (MSPs) established for each LL, capable of redressing power imbalances and securing the inclusive representation of women, youth and marginalized groups. (**WP4**) At least five **CGIAR technology-derived, scaling-ready climate solutions** with high potential to transform FS to low emission FS. and (**WP5**) Continuation of the CLIFF-GRADS program to train the next generation of LMIC professionals in GHG mitigation and carbon storage strategies.

Measuring performance and results: The MEL team will use a multi-dimensional approach to assess impacts related to reduced emissions and climate resilience in food systems, as outlined in section 4.7.

Partners: *CGIAR partners*: ClimBeR to maximize synergies and complementarities between climate adaptation and climate mitigation pathways. *Demand partners*: Funders such as USAID, GIZ, NORAD, and BMGF, national ministries of environment and agriculture in all target countries, China, in-country IAM teams, IPCC (for purposes of accuracy of emissions reporting) and national government representatives, including those representing 40 African countries involved in recent mitigation training provided by Dr. Louis Verchot, Lead of the MITIGATE+ team. *Scaling partners*: NGOs and International organizations, FS actors (especially policymakers) and value chain stakeholders.

Human resources and capacity development of Initiative team: Our team will include several climate scientists, land and FS scientists and value chain experts. It will also include experts on IPCCC guidelines and on measuring, reporting and verification of GHGE.

5.5 Environmental health & biodiversity

Challenges and prioritization: Although the focus of MITIGATE+ is CC mitigation, it delivers environmental health and biodiversity conservation outcomes as co-benefits, just as the global FS itself goes beyond delivering food to broader socio-economic benefits such as building social capital and peace. However, the FS also contributes to environmental degradation, deforestation, water pollution, ecosystem destruction, and biodiversity loss. By reducing pressure on forested areas and natural ecosystem, and by implementing nature-positive opportunities for carbon sink creation along FS value chains, MITIGATE+ will curb habitat loss and increase restoration by ~20% from baseline projections and help partnering countries to restore at least 25 million ha, including forestland and wetlands.

Research questions: (**WP1**) How can biodiversity and other environmental values be integrated into FS mitigation planning processes? **WP2**) How can community-based monitoring support implementation of FS actions that generate biodiversity co-benefits? (**WP3**) What FS best practices support the integrity of protected natural areas, their buffer zones, and restoration of degraded lands? (**WP4**) How can we blend climate finance with

funding for achieving sustainable development priorities, such as those relating to rural development, biodiversity conservation, social equity and peacebuilding?

Components of Work Packages: (**WP1)** National analysis of key drivers and contributors of emissions in FS and priority setting for alternative mitigation actions, given environmental boundaries, (**WP3**) The LLs will prioritize mitigation approaches that demonstrate potential for delivering environmental and social co-benefits. (**WP4**) Set of documented (potential) carbon and non-carbon benefits as well as the undesired spillover effects associated with scaling CGIAR technology, and (**WP4**) Strategies, including financial investment and business plans, to blend public and private funding, for scaling, including safeguards against spillover effects,

Measuring performance and results: The MEL team will use a multi-dimensional approach to measure environmental health and biodiversity using common indicators related degraded land restoration, nature-based solutions and landscape management. Indicators will be refined to country contexts and Initiative food system interventions. We will use a core set of common indicators across countries to support comparative analyses. Analyses will initially focus on the LLs but as scaling gets underway, we will design appropriate analytical/sampling frameworks.

Partners: <u>CGIAR partners</u>: ClimBeR to maximize synergies and complementarities between climate adaptation and climate mitigation pathways, ex-CGIAR partners CIFOR, ICRAF. <u>Demand partners:</u> donors, government agencies, REDD+ actors, conservation agencies, WWF, Bonn Challenge stakeholders. <u>Scaling partners</u>: NGOs, conservation agencies, WWF, Bonn Challenge stakeholders and international organizations.

Human resources and capacity development of Initiative team: Our team will include biodiversity, soil and land scientists, as well as experts on the Rio Conventions relating to biodiversity and land degradation.

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

6.1 Results framework

CGIAR Impact Areas				
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				
The collective global 2030 targets are available centrally here to save space.				
Common impact indicators that your Initiative will contribute to and will be able to provide data towards				
• # households benefiting from relevant CGIAR innovations that reduce domestic food waste • # farmers (or farmer organizations) and other value chain actors benefiting from CGIAR innovations that reduce food loss • # people benefiting from relevant CGIAR sustainable consumption innovations.	• # people benefiting from relevant CGIAR innovations that lead to increased food sector employment. • Improvement in food sector wages.	• Improved empowerment and inclusion of women, youth and marginalized groups in FS mitigation engagement • # women benefiting from relevant CGIAR innovations • # youth benefiting from relevant CGIAR innovations	• # tonnes CO_2 equivalent emissions reduced • # tonnes CO_2 equivalent removals increased • # plans with evidence of implementation • # $ climate mitigation investments • # NDCs with FS mitigation actions	• # ha wetland protected • # ha degraded terrestrial and aquatic ecosystems restored • # ha under improved management with mitigation benefit • # ha reduced deforestation
SDG/PA targets				
2.1	2.3	5.a: and 8.5:	PA Art 2.1	15.1: and 15.3:
Systems Transformation				
Action Area outcomes		**Action Area outcome indicators**		
ST 1 - Farmers use technologies or practices that contribute to improved livelihoods, enhance environmental health and biodiversity, are apt in a context of climate change, and sustain natural resources.		STi 1.1 - Number of farmers using climate smart practices disaggregated by gender		
ST 3 - Governments and other actors take decisions to reduce the environmental footprint of food systems from damaging to nature positive.		STi 3.1 Area of land under improved mitigation plans (or area that is decreasing in net carbon emissions – more ambitious and longer term)		

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.
ST & RAFS & GI 1 Women and youth are empowered to be more active in decision making in food, land and water systems	STi 1.1 - Number of farmers using climate smart practices disaggregated by gender

Initiative and Work Package outcomes, outputs and indicators											
Result type	Result	Indicator	Unit of measurement	Geographic scope	Data source	Data collection method	Frequency of data collection	Baseline value	Baseline year	Target value	Target year
Outcome	Global and national government agencies, civil society, and private sector planners increase their capacity to use co-developed tools, data, and analyses to design at least five (5) inclusive food-system emissions reduction strategies and/or carbon sink initiatives (2024)	Strategies developed	# strategies developed	National/s ubnational: China, Vietnam, Bangladesh , Ethiopia, Kenya, Colombia, and Peru	Partnering national governments (ministries, agencies)

Strategy, Plan, or Official document

NDC reports Initiative estimates | Key stakeholder interviews

Document reviews | Biennial | 0 strategies | 2021 | 5 | 2024 |
| Outcome | Increased rigor and certainty in data, knowledge, tools, and capacity will improve food-system GHG emission monitoring and UNFCCC national communications in at least five countries, subsequently improving the global stocktake (2024, 2029). | Number of NDC reports with higher-tier GHG EFs and improved activity data.

Initiative data used to design FS mitigation and provide ex-ante impact assessments | # NDC reports

local mitigation plans | National

Sub-national | NDC reports

Project design documents | UNFCCC website or national ministry

Stakeholder consultation | Biennial | 0 | 2021 | 5 | 2024 |

	Initiative and Work Package outcomes, outputs and indicators										
Result type	Result	Indicator	Unit of measurement	Geographic scope	Data source	Data collection method	Frequency of data collection	Baseline value	Baseline year	Target value	Target year
Outcome	Food sector actors and communities in Living Labs (LLs) build frameworks for co-design, adaptation, testing, and mainstreaming of low- and negative-emissions mitigation solutions based on principles of gender and social equity (2024).	Number of Multi-stakeholder platforms established Inclusive indicators such as: Proportion of women and men participating in MSPs	# platforms established and functioning Proportion of women's participation	Subnational/National	Project data collection	Stakeholder and other surveys	Biennial	Not available ex-ante. TBD established through a baseline survey	2022	Positive trend in all indicators	2024
Outcome	Interventions targeting carbon sequestration and reduced GHGE are scaled up and out via five CGIAR technologies to demonstrate climate mitigation effectiveness (2024)	Technologies scaled	# technologies	Subnational to national	Project data collection	Field and stakeholder surveys	End of Initiative	N/A	2021	5 climate mitigation solutions	2024
Outcome	Food systems approaches to achieve low GHGE, climate-resilient development are high on the world's political agenda (2024).	# of FS side events at UNFCCC meetings # countries identifying foo system actions in national mitigation plans	# side events # NDCs	Global	UNFCCC side event agenda NDC documents	Reading UNFCCC side event agenda NDC document surveys	Semi-annual	"Low"	2021	"High"	2024

	Initiative and Work Package outcomes, outputs and indicators										
Result type	Result	Indicator	Unit of measurement	Geographic scope	Data source	Data collection method	Frequency of data collection	Baseline value	Baseline year	Target value	Target year
Output	A "FS climate intervention planning framework" (FOODCLIP) developed and used	FOODCLIP created and available online Typical website traffic and use indicators	# web pages # visits and length of stay # downloads	Global and National	Google analytics	Code snippet linked to google analytics	Weekly	0 planning frameworks	2022	1 planning framework	2024
Output	Online Data Portal developed	Data portal created and available online Typical website traffic and use indicators	# web pages # visits length of stay # downloads	Global and National	Google analytics	Code snippet linked to google analytics	Weekly	0 data portals	2022	1 data portal	2024
Output	Improved GHGE estimation model	Model	# models	Global	Model publication	Literature review	Annual	2 modelling tools	2015	1 new or improved GHGE estimation modelling framework	2024
Output	GHG Inventory Framework consistent with national reporting requirements of Enhanced Transparency Framework of the PA developed	Framework published	# papers	National	Google scholar	Web search	Annual	0 Frameworks	2017	1 new or improved GHG inventory framework	2024

	Initiative and Work Package outcomes, outputs and indicators										
Result type	Result	Indicator	Unit of measurement	Geographic scope	Data source	Data collection method	Frequency of data collection	Baseline value	Baseline year	Target value	Target year
Output	Multi-Stakeholder Platforms (MSPs) and Decision-Making Framework	Participation of women Participation of youth Participation of other groups identified as being marginalized	%	Subnational	Meeting attendance registries	Taking attendance at meetings	Annual	N/A	N/A	Positive trend over time	2024
Output	Reduced food loss and waste	Food waste reductions	Tons	Subnational	Project data collection	Household/community surveys	Monthly/ weekly	N/A	N/A	20% reduction	2024
Output	Reduced terrestrial and aquatic ecosystem degradation, increased restoration	Ha under improved management/decreased degradation and increased restoration	Ha	Subnational	Project data collection	Field and remote sensing surveys	Biennial	N/A	2022	5 million ha	2024
Output	At least five **CGIAR technology-derived, scaling-ready climate solutions** with high potential to transform FS from GHG sources to carbon sinks are scaled	Climate solutions/pathway/technologies	# solutions # pathways # technologies	Subnational to global	Project data collection	Field and stakeholder surveys	End of Initiative	0	2021	5	2024
Output	A global knowledge hub acting as a partnerships vehicle and portal for global research on low-emissions FS research	Knowledge hub functional Knowledge hub use metrics	# web pages # visits length of stay # downloads	Global and National	Google analytics	Code snippet linked to google analytics	Weekly after knowledge hub is launched	0	2021	1	2024

	Initiative and Work Package outcomes, outputs and indicators										
Result type	Result	Indicator	Unit of measurement	Geographic scope	Data source	Data collection method	Frequency of data collection	Baseline value	Baseline year	Target value	Target year
Output	CLIFF-GRADS program to train the next generation of LMICs professionals in GHG mitigation and carbon storage strategies	Trainings, Technical assistance sessions	# trainees	National	Training reports	Reading training reports	Annual	CLIFF-GRADS program, trainees from LMICs of short term (4-6 month).	2015	At least 40 CLIFF-GRADS trained per year	2024

6.2 MELIA plan

MEL/IA activities are a key component of Initiative performance management and will provide continuous progress of the project's overall TOC, by aligning with the Initiative's research and outreach objectives. The key success factor will be our capacity to develop and integrate learning feedback mechanisms that allow the team to adapt quickly to the MEL/IA findings.

A MEL/IA team consist of the Initiative leader, WP leaders, and a full-time MEL/IA coordinator. The MEL/IA coordinator will lead the development of a detailed MEL plan in consultation with partners and stakeholders. A MEL system will be developed during the first quarter of implementation that will guide each WP on data collection procedures for both WP and program indicators. The MEL/IA coordinator will be responsible for: (1) ensuring active participation of stakeholders in MEL processes; (2) the adequate and consistent use of MEL tools and methods including novel ex-post Impact Assessment approaches that will be specifically developed for MITIGATE+ (3) timely reporting; and (4) the communication of MEL outputs and results.

A MEL/IA team will consist of the Initiative leader, WP leaders, and a full-time MEL/IA coordinator. The MEL/IA coordinator will lead the development of a detailed MEL plan in consultation with partners and stakeholders. A MEL system will be developed during the first quarter of implementation that will guide each WP on data collection procedures for both WP and program indicators. The MEL/IA coordinator will be responsible for: (1) ensuring active participation of stakeholders in MEL processes; (2) the adequate and consistent use of MEL tools and methods; (3) timely reporting; and (4) the communication of MEL outputs and results.

The MEL plan will include a collective learning and adaptation plan to promote continuous learning, inclusiveness, communication, and transparency. The MEL plan will identify learning questions with stakeholders around assumptions underlying the TOC that will be tested through causal impact assessment research. In addition to the objective-level MEL, four cross cutting strategies will be included: capacity development, gender equality and indigenous peoples, adherence to FAIR (findability, accessibility, interoperability, and reusability) data principles and communications and awareness. Learning questions will focus on analyzing processes and workflows to capture lessons about how to structure and prioritize research and delivery, sequencing of events, and how logistics affect outcomes.

MEL indicators and data collection methods are summarized in the results framework above and have been selected based on our TOC and stakeholder priorities. These will be refined during the Initiative inception workshop and after a review by the CGIAR SPIA team.

The MEL system will serve as a management tool for reviewing Initiative progress, troubleshooting implementation constraints, and determining whether specific elements require adjustment or refocusing to respond to evolving conditions. Learning will be integrated into Initiative management through programmed activities that support annual work plan development. We will organize annual "pause and reflect" workshops to review progress and take stock of learning, update the MEL plan for the coming year, and prepare a synthesis of lessons learned that will support development of annual work plans.

Impact Assessment (IA) studies will use monitoring data (among others) to understand the constraints and successes of Initiative interventions/innovations. The IA framework focuses

on three thematic areas associated with our objectives: (1) the consortium, its partners, and governance processes; (2) the regional network and knowledge/services provided; and (3) the regulatory level and related decision-making. In addition to ex-ante studies, we expect two types of IA ex-post studies. At the institutional level, we will use a combination of qualitative and quantitative approaches to evaluate the adoption of strategies, scaling mechanism and behavior changes. We will select at least two reference sites for IA studies and apply experimental (BACI[25], RC[26]) or non-experimental methods for evaluating environmental and socioeconomic effects.

6.3 Planned MELIA studies and activities

The Initiative implementation team envisions 4 special studies during the second half of the Initiative. These studies are designed to inform implementation and phase 2 adjustments to Initiative design and will therefore be undertaken in the second half of the initial 3-year period. Studies will focus on the 4 cross-cutting strategies and may be implemented in conjunction with other Initiatives as appropriate. Terms of reference for each study will be based on MEL/IA plan documents and will be finalized as part of the Year 2 and 3 MEL/IA work plans.

Type of MELIA study or activity	Result or indicator title that the MELIA study or activity will contribute to.	Year of completion	Co-delivery of planned MELIA study with other Initiatives
Causal Impact Assessment learning studies and Qualitative outcome study	The role of capacity development in achieving LL goals	2023	TBD - initiatives implementing LLs
Ex-post impact assessment	Monitoring participation in capacity building to enable and empower professionals to develop low-emissions development plans and contribute to improving national reporting.	2023, 2024	TBD - Initiatives that contribute to mitigation
Ex-post impact assessment	The contribution of the use of FAIR principles to Initiative data to wider use and re-use of project data.	2023	Digital Technologies
Ex-post impact assessment	Improved FS outcomes from increased social inclusion and agency and participation of women, youth and other marginalized groups in FS governance.	2024	HER+
Scaling readiness studies	Assess mitigation and co-benefits, tradeoffs and spillover effects associated with scaling up/out, with particular attention to impacts on women, youth, and other marginalized groups of society.	2024	N/A
Tracing of scaling activities and policy advice, as a base for long-term, large scale impact assessments	Impacts of Initiative communications and outreach efforts on raising awareness of mitigation opportunities in FS	2024	N/A

7. Management plan and risk assessment

7.1 Management plan

At inception stage, we will establish an **Initiative Management Unit (IMU)**, composed of (5) WP leaders, the Initiative leader and co-lead, and the MEL/IA Coordinator. Additional budget for the times, resources, and effort required to play an active role in the PMU has been planned. The IMU will, as a body, will be responsible for overall coordination, oversight, monitoring and evaluation, learning, and high-level reporting tied to delivery of Initiative deliverables as outlined in the Initiative-level TOC, Each WP leader is responsible for accomplishing the individual targets of that WP towards Action Area and CGIAR-level Impacts, under the overall oversight of the IMU and under the specific guidance of the MEL/IA Coordinator. Monitoring measures will capture feedback from next users (the immediate target group) of MITIGATE+ deliverables. The IMU will practice adaptive management, following a results-based management approach with a systematic way to allow for adjustments as necessary, i.e. remaining flexible and responsive to emerging opportunities in a fast-changing work environment. TOC risk and assumption monitoring is included in the MEL process and will monitor identified and new risks and mitigation strategies to minimize potential impact. The MEL/IA activities will provide continuous assessment of the project's overall TOC, by aligning with the Initiative's research and outreach objectives. MEL will be treated as a research component, where we test and update our TOC. Activities will, therefore, be carried out from inception and throughout the research planning and delivery cycle to improve Initiative performance over time.

7.2 Summary management plan Gantt table

Initiative start date		Timelines												Description of key deliverables (maximum 3 per row, maximum 20 words per deliverable)
		2022				2023				2024				
Work Packages	Lead organization	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Work Package 1: MITIGATE+ STRATEGY: Planning for food systems transformation	CIFOR and CGIAR				1,4				2				3,5	*1.*FS Climate Intervention Planning Framework, *2.* National analysis of key drivers, CGE scenario analysis, MACC and other economic valuation analysis, *3.* Coordination platform and information exchange among a wide range of stakeholders, *4.* Capacity building curricula developed and contextualized, *5.* Capacity building implemented and evaluated
Work Package 2: MITIGATE+ EVIDENCE: Data, evidence, and tools for FS transformation	CGIAR						1		3,5				2,4	*1.*GHG inventory framework for national reporting requirements of the Enhanced Transparency Framework of the PA, *2.* Online data portal for improved data accessibility, *3.* Customized tools and models for improved GHGE estimation.*4.* More robust GHGE data, evidence, and MRV, *5.* Improved capacity and accountability to implement and use robust MRV systems and related CGIAR tools/science
Work Package 3: MITIGATE+ Living Labs (LLs)	CGIAR				1			2	4				3,5	*1.*Stakeholder identified, mapped, and analyzed with political science perspective, *2.* Multi-Stakeholder Platforms and Decision-Making Framework, *3.* Transformative, innovative tools and approaches for women, youth and community empowerment developed and tested, *4.* Data collection at various levels to enable evaluation, determinant and contribution analysis, and ground-truthing, *5.* Synthesis of lessons learned across LLs and guidance on developing LLs for FS transformation
Work Package 4: MITIGATE+ SCALING: Scaling low-emissions FS	CGIAR				1				2				3,4	*1.*Identification and scaling readiness assessment of at least five CGIAR technology-derived climate solutions with high potential to reduce emissions with co-benefits, *2.* Support to countries in creating enabling institutional environment for scaling, *3.* Support to the development of business models and investment prospectuses to attract private, public and climate financing, *4.* Co-development of seven use cases of successful blending of climate finance with SDGs and peacebuilding funding
Work Package 5: MITIGATE+ ENGAGE: Engagement and agenda transformation	CGIAR		1		2,3,5				3,4,5				3,4, 5	*1.*New web-centric communication and knowledge sharing strategy, *2.* Global knowledge hub, *3.* A series of high profile global and national-level events, *4.* Publications, *5.* Continuation of the CLIFF-GRADS program
Innovation Packages & Scaling Readiness														See above (Folded into WP4)
MELIA	CGIAR			1			1	2, 3				1	3, 4,5	*1.*Annual "pause and reflect" workshops, *2.* Causal Impact Assessment learning studies and Qualitative outcome study for

														WP3, *3.* Ex-post impact assessment for WP1 and WP2, *4.* Ex-post impact assessment for WP3 and Scaling readiness studies for WP4, *5.* Tracing of scaling activities and policy advice, as a base for long-term, large scale impact assessments for WP5
Project management	CGIAR	2	1	1	3,2			3,2			3			*1.*Contracts/sub-contracts, *2.* Annual workplan, *3.* Annual report

7.3. Risk assessment

Top 5 risks to achieving impact (note relevant Work Package numbers in brackets)	**Description of risk (50 words max each)**	**Likelihood** **Rate 1-5**	**Impact** **Rate 1-5**	**Risk score** Likelihood x Impact	**Opportunities**
Weak political will at national and subnational levels to change policies, production practices, and incentives around the current FS to facilitate development of climate-resilient, low-emissions FS (**WP1, WP2, WP4**).	Countries and subnational regions are reluctant to push their thinking beyond land-based perspectives on reducing emissions.	3	5	15	MITIGATE+ incorporates participatory decision-making and co-design as a core part of the Initiative; there will be ample opportunities to socialize the required changes with FS actors from subnational to national scales, as well as (via WP1, 2, and 5) target global policymakers and decision-makers with better evidence, data, and scaling demonstrations to support more realistic target setting and more accountable impact verification. WP4 will also provide a convincing case for further investment to investors and governments by demonstrating how existing CGIAR technologies and value chains can be optimized for mitigation solutions in practical (and cost-effective) ways.
Lack of capacity on the part of certain stakeholders to understand and use technical information (**WP5**)	We see emerging evidence that this risk is real as external evaluations of CG research related to CC mitigation have shown that stakeholders have expressed concern over the technical nature of the material presented. FTA and CCAFS experiences have shown that capacity for effectively using highly technical information (e.g., GHGI) on the ground is limited. Local project developers often do not have the capacity to use project outputs.	3	5	15	This risk is more acute over the short term, and it will become less important as capacity is developed in many technical areas. Within the project, we expect to remedy this situation with targeted capacity building (**WP2, WP5**) to raise the level of immediate stakeholders (research subjects) so that they can participate in the research in a more meaningful way.
(**Initiative level**) National governments unable to break the cycle of poorly supported emissions and carbon targets, weak capacity to implement system changes to facilitate mitigation goals, and inadequate	A failure of national governments to understand, support, and adopt at scale MITIGATE+ innovations, methodologies, and tools for more accurate target setting, GHGE estimation, and MRV, undermines the ability of national (and subnational) governments and FS actors to accurately plan for, target, and report on FS-derived GHGE and carbon capture.	3	5	20	A key component of the MITIGATE+ priority setting exercise was to identify a 'coalition of the willing' from within a pool of countries with (a) significant FS emissions, signaling equally significant opportunities for multiplying the impacts of mitigation measures (e.g., China), and (b) an expressed willingness (demand) to accelerate national progress towards

Top 5 risks to achieving impact (note relevant Work Package numbers in brackets)	Description of risk (50 words max each)	Likelihood Rate 1-5	Impact Rate 1-5	Risk score Likelihood x Impact	Opportunities
data and methods for MRV (measurement, reporting, verification) systems.					achieving NDC targets and PA commitments by 2030 (with carbon neutrality slated for 2050). This priority setting exercise resulted in the identification and cultivation of strong, mutually beneficial partnerships with the national government actors and ministries, as well as with other demand and scaling partners (private sector, civil society organizations, scientists, NARES) around the subnational FS we will be targeting. The strength of these partnerships is the mitigation measure of this particular risk, therefore.
Women, youth, Indigenous Peoples, and marginalized members of society remain as passive targets (recorded as traditional 'reach statistics') rather than active agents of transformation and equitable users of the benefits of the new FS configuration (**WP3**).	Mitigation objectives are met, but at the cost of social inclusivity, gender equity, and other human development objectives (jobs, security, nutrition, adequate food).	2	5	10	Equitable, inclusive co-design lies at the heart of WP3 development, which revolves around the establishment of a socially inclusive decision-making framework that enables all members of a community contributing to, and drawing from, a single FS, to participate equitably in decisions on the adoption and testing of mitigation approaches at local level. MITIGATE+ will coordinate with HER+, the Gender Initiative and draw on the tools of the GENDER Platform, to ensure that WP3 activities incentivize women, youth, IP, and other marginalized groups, to play an active role in driving change and in sharing more equitably in its eventual benefits, e.g., testing socio-technical innovations and mitigation practices to ensure that they meet their social, economic, and cultural needs in tandem with emissions reduction goals.
(**Initiative level**) Economic interests clash with environmental interests.	Land uses driving GHGE, deforestation, and carbon depletion in selected FS (e.g., conventional livestock farming systems) prove too profitable to incentivize subnational FS governments and sector actors towards making changes to make those sectors more sustainable.	3	5	15	Article 2.1 of the PA urges us to "adapt to the adverse impacts of CC and **foster climate resilience and low GHGE development, in a manner that does not threaten food production".** Indeed, the approach of MITIGATE+ is to help governments pursue greater climate resilience and low GHGE development in a manner that *does not threaten food production*, i.e., the objective mitigation is in perfect harmony with the economic, production, and profit goals of the agricultural sector that makes up a large part of the FS. MITIGATE+ will not disrupt

Top 5 risks to achieving impact (note relevant Work Package numbers in brackets)	Description of risk (50 words max each)	Likelihood	Impact	Risk score Likelihood x Impact	Opportunities
		Rate 1-5	Rate 1-5		
					food production or the economic activity around the FS; instead, it feeds effective evidence, mitigation solutions, and cost-effective methodologies into existing value chains, sectors, and technologies to exploit untapped opportunities for carbon capture and GHGE reduction, thus securing a win-win for both the economy of a FS *and* the environment
Top assumptions to achieving impact (note relevant Work Package numbers in brackets)	**Description of assumption (50 words max each)**	Likelihood	Impact	Assumption score Likelihood x Impact	Opportunities
		Rate from 1-5	Rate from 1-5		
1. (**Initiative TOC/Impact Area level**) IPCC methods for calculating FS emissions reductions offer valid baseline for calculating targets under Impacts	Initiative targets under Action Area Impact for climate mitigation and adaptation, i.e., to reduce FS emissions (including land-use change) by 1.1Gt CO2e y^{-1} across 7 countries, representing a 6% reduction in global FS emissions, is well-supported by IPCC methods of calculating gigatons of Co2 equivalent expected from various actions, thus proving the target figures to be achievable.	3	5	15	Targets are based on 2015 IPCC estimation of emissions levels, but there is room to monitor and update these targets during the Initiative time span, drawing on a combination of NDC reports, the EDGAR database, and the Initiative's own estimates and evidence from implementation.
2. (**Initiative TOC level**) Approaching commitments towards meeting PA targets under Article 2.1. and Global Stocktake for 2025 NDCs and NAPs create global impetus towards more effective mitigation action.	Pressure on national governments from approaching PA commitments and more ambitious NDC/NAP (2025) targets, coupled with intensifying focus on longer-term development of low-emissions FS from, *inter alia*, the UNFCCC, the UNFS, the CBD/GBF, etc. creates political impetus at global and national scales to retrofit and reorganize FS towards lower carbon footprints in general, and support for MITIGATE+ specifically.	5	5	25	The Global Stocktake for the 2025 round of NDCs and NAPs, coupled with increasing consensus around the need to reduce the carbon footprint of global FS (which produce between 27 and 31% of all GHGE, presents an opportunity for MITIGATE+ to trigger system transformation via enhanced political will and consensus around the need to make significant institutional and system-level changes (i.e., the convergence of the *four Is* of interests, institutions, information, and ideas).
3. Rigorous global datasets are available for comprehensive analysis of the drivers, constraints, and costs associated with reducing the carbon footprint of FS (**WP1**)	Datasets of drivers and costs of, and constraints to reducing global and national emissions in FS (including MACC and CBA) should enable the Initiative to co-design with national and global FS stakeholders the techniques, practices, technologies, and enabling conditions required for successful mainstreaming *into* mitigation strategies and scaling pathways.	4	5	20	Evidence, analysis, and data from WP2, the CGIAR, IIASA and other sources will be used, coupled with insights from facilitated stakeholder consultations using multi-stakeholder platforms, to analyze global demand and supply of land, resources, and trade flows available for mitigation at a global scale.

Top 5 risks to achieving impact (note relevant Work Package numbers in brackets)	Description of risk (50 words max each)	Likelihood	Impact	Risk score Likelihood x Impact	Opportunities
		Rate 1-5	Rate 1-5		
4. Data and evidence underpinning **WP2** have broad validity	Data and models underpinning the evidence, data, and tools work have broad validity and span different sectors of FS, thus adding weight to emissions factors calculation and target setting	4	4	16	The tools and models will be based on existing tools, e.g. the Agro-Chain GHGE (ACE) calculator, tool for estimating total GHGE (GHG) associated with a food product or food loss and waste (FLW), Cattle Methane Similarity Matrix Calculator, the Global Livestock Environmental Assessment Model (GLEAM), the - Ex-Ante Carbon Balance Tool (EX-ACT), the Source-selective and Emission-adjusted GHG CalculaTOR for Cropland (SECTOR), the Agricultural Life Cycle Inventory Generator, The Direct Land Use Change Assessment Tool; the Agriculture and Land-use Policy Simulator (ALPS) + IPCC tools
5. Sufficient levels of community buy-in, social inclusiveness, gender equity, and political will exist at Living Lab level to ensure effective identification, testing, and implementation of mitigation approaches at FS level (**WP3**).	There is buy-in by civil society groups to using the living lab approach for transforming FS toward MITIGATE+ objectives. There is local demand for and the political will to change, and the targeted FS actors at Living Lab level welcome new ideas. (In cooperation with HER+) Barriers and constraints to increased participation by women, youth, and vulnerable members of society in MITIGATE+ activities, consultation, and design processes, as well as in equitable benefits sharing from FS that deliver a low carbon footprint without harming production, incomes, or social balances, can be overcome.	4	5	20	There is an exciting opportunity to cross-pollinate learning with HER+ and the GENDER Platform on how sociotechnical innovation bundling and testing at Living Lab or FS / project site level can impact on the equity, empowerment, and agency of women, youth, and other members of society like Indigenous Peoples who may be sometimes excluded from co-development of these innovations, thus resulting in low CGIAR technology (crops, value chain models) adoption. We have an opportunity to do things differently here. By making the processes associated with the co-design, testing, and validation of mitigation approaches at LL level more socially inclusive, we can figure out if these adjustments have a significant impact on eventual mitigation technology uptake.
6.(All WPs, but especially WP4) Willingness on the part of subnational, national, and global FS actors to apply systems thinking to CGIAR technologies (commodity crops, local-to-global value chains) to exploit all opportunities for optimizing	Countries and subnational regions are keen to go beyond land-based perspectives on reducing emissions, and express willingness and motivation to complement them with a FS perspective as a means to identifying opportunities for scaling mitigation solutions at reducing emissions from agriculture, forestry and other land use.	4	5	20	Demonstration of how a FS / socioecological system framework approach might accelerate mitigation along a pilot group of promising CGIAR crops or value chains (**WP4**) is an opportunity to convince and incentivize others to invest in scaling pathways and mass adoption in later stages (2024-2030).

Top 5 risks to achieving impact (note relevant Work Package numbers in brackets)	Description of risk (50 words max each)	Likelihood	Impact	Risk score Likelihood x Impact	Opportunities
		Rate 1-5	Rate 1-5		
carbon capture, GHGE reduction, and deforestation avoidance.					
7.(WP5) Stakeholder capacity to use highly technical research, analyses, and information to implement effective mitigation approaches will increase with time, ensuring better uptake of One CGIAR science and results for low-emissions FS development.	Stakeholders are capable of using the sometimes highly technical information that will be disseminated. The assumption is that global-level stakeholders have a very high capacity to understand, use, and benefit from even very technical information, that this capacity is lower among smallholders, entrepreneurs, and small businesses at Living Lab level, and at a medium level for national FS policy actors and practitioners.	4	5	20	The CGIAR has decades of experience in tailoring the design and delivery of different information and knowledge products to different audiences in step with known stakeholder capacity for absorption and use of technical information.

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. MITIGATE+ 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 - table

Category	Area of Expertise	Level of effort (FTE)	Short description of key accountabilities
Senior/Principal scientists	Biophysical sciences	0.5	Initiative leadership
Senior/Principal scientists	Social and biophysical sciences	4.6	Lead work package research in multiple sites
Senior/Principal scientists	Social and biophysical sciences	4.2	Lead country research and engagement with stakeholders
Scientist/associate scientist	Biophysical sciences	5.0	Lead field teams in WP 2 and WP 3
Scientist/associate scientist	Social l sciences	4.0	Lead field teams in WP 3 and WP 4
Scientist/associate scientist	Gender	1.0	Coordinate work on gender issues across WPs and countries
Scientist/associate scientist	Biophysical sciences	2.0	Implement research in WP1
Scientist/associate scientist	Social sciences	2.0	Implement research in WP1
Postdoctoral scientists	Geospatial analysis	4.0	Planning, GHGI
Postdoctoral scientists	Ecology/agronomy	7.0	Participatory research
Postdoctoral scientists	Economics/sociology	7.0	Participatory research
Postdoctoral scientists	Finance	2.0	Markets/commodities
Postdoctoral scientists	Institutional economics/ political science	6.0	Policy research - enabling conditions
Research assistants	Various	7.0	Support field components of the research
Research assistants	Spatial sciences	3.0	Support GIS/remote sensing research
Reseach support	Contracts and finance	1.0	Support project management
Reseach support	Administrative assistant	1.0	Support project management
Senior Communications officer	Communications	1.0	Lead WP5 implementation
Junior communications officer	Writer	1.0	WP5 implementation
Research support	MEL and Impact assessment (Senior)	1.0	MEL implementation

9.2 Gender, diversity and inclusion in the workplace

Continuing current practice in our research teams and the example set by the One CGIAR and, the leadership of MITIGATE+ is evenly balanced (one male, one female as Co-Leads). Of the fifteen-member Initiative Design Team, 46% (seven professionals) are female, while 54% (eight professionals) are male, thus easily meeting the CGIAR's gender target of a minimum of 40% women in professional roles and the team is comprised of individuals from

diverse national/cultural/ethnic and disciplinary backgrounds. Once MITIGATE+ launches and permanent positions on the team are announced, we will use the GDI Inclusive Recruitment Toolkit to craft terms of references and position openings that actively encourage women and applicants from historically underrepresented ethnic or national backgrounds to apply. The Initiative team includes a Gender Specialist, who will monitor all recruitment to ensure an adequate balance between women and men for professional roles in the PMU and Initiative team at large. The Initiative will use best practices within the CGIAR to establish and implement professional development, mentoring, and leadership development tracks for women, minorities, and other underrepresented groups during Initiative development (by 2024).

9.3 Capacity development

Capacity building is a cornerstone of the MITIGATE+ TOC to improve future GHGE and carbon storage planning, estimation methodologies, verification, accountability, and low-emissions FS development approaches. It includes:

- (**WP2**): Training to enhance national partners' capacity in collecting activity/FS data, maintaining databases, implementing MRV, co-developing and applying knowledge and MITIGATE+ technologies/tools including forecast/scenario analysis tools for ex-ante/ex-post GHG assessment; and (3) cross-sectoral project planning and policy development.

- (**WP1 & WP3**): Learning-by-doing participatory action research and joint learning platform to develop capacities of FS stakeholders, especially historically underrepresented/underprivileged, as well as capacities of researcher and international development communities to better support local FS changes

- (**WP5**) Continued hosting of the **CLIFF-GRADS program**, a joint CGIAR - Global Research Alliance initiative of mentorship in partnership with the GRA to train the next generation of LMIC professionals in GHG mitigation and carbon sequestration strategies.

- (**WP5**) Training for journalists and media organizations to increase their capacity to convey accurate information around low-emissions FS transformation. Capacity development will include formal media training seminars, including field visits to project sites, coupled with informal technical assistance for freelance journalists in Latin America, Africa and Asia to help them produce multimedia stories on low-emissions FS.

MITIGATE+ Initiative team leaders and managers will complete training on inclusive leadership within 3 months of launch. Within 6 months of launch, MITIGATE+ team members will complete training on gender, diversity, and inclusion, including on whistleblowing and how to report concerns. The Initiative kick-off will include an awareness session on CGIAR's values, code of conduct and range of learning opportunities available within CGIAR.

10. Financial resources

10.1 Budget

USD	2022	2023	2024	Total
Crosscutting across Work Packages	961,633	983,886	1,007,252	2,952,771
Work Package 1	1,766,783	1,801,952	1,838,879	5,407,614
Work Package 2	1,781,202	1,815,963	1,852,461	5,449,626
Work Package 3	2,414,816	3,012,865	3,339,309	8,766,990
Work Package 4	2,636,714	3,240,115	3,572,179	9,449,008
Work Package 5	318,375	324,561	331,056	973,992
Innovation packages & Scaling Resources	0	0	0	0
Total:	**9,879,523**	**11,179,342**	**11,941,135**	**33,000,000**

10.1.2: Geographic breakdown

USD	2022	2023	2024	Total
Colombia	1,317,626	1,481,461	1,578,112	4,377,199
Ethiopia	1,317,626	1,481,462	1,578,113	4,377,201
Kenya	1,312,213	1,475,943	1,572,484	4,360,640
Bangladesh	1,318,581	1,482,433	1,579,102	4,380,116
Vietnam	1,318,263	1,482,110	1,578,774	4,379,147
Peru	1,317,626	1,481,461	1,578,112	4,377,199
GLOBAL	1,088,983	1,250,759	1,345,248	3,684,990
China	888,605	1,043,709	1,131,193	3,063,507
Total:	**9,879,523**	**11,179,342**	**11,941,135**	**33,000,000**

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