CGIAR

INITIATIVE ON
Low-Emission
Food Systems

CGIAR Research Initiative on

Low-Emission Food Systems

Annual Technical Report 2023

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Title: Annual Technical Report 2023: CGIAR Research Initiative on Low-Emission Food Systems

Suggested citation: CGIAR Research Initiative on Low-Emission Food Systems. 2024. Annual Technical Report 2023: 'CGIAR Research Initiative on Low-Emission Food Systems. Montpellier, France: CGIAR System Organization. https://hdl.handle.net/10568/141676

Acknowledgements

This work is part of the 'CGIAR Research Initiative on Low-Emission Food Systems. We would like to thank all funders who supported this research through their contributions to the CGIAR Trust Fund: https://www.cgiar.org/funders.

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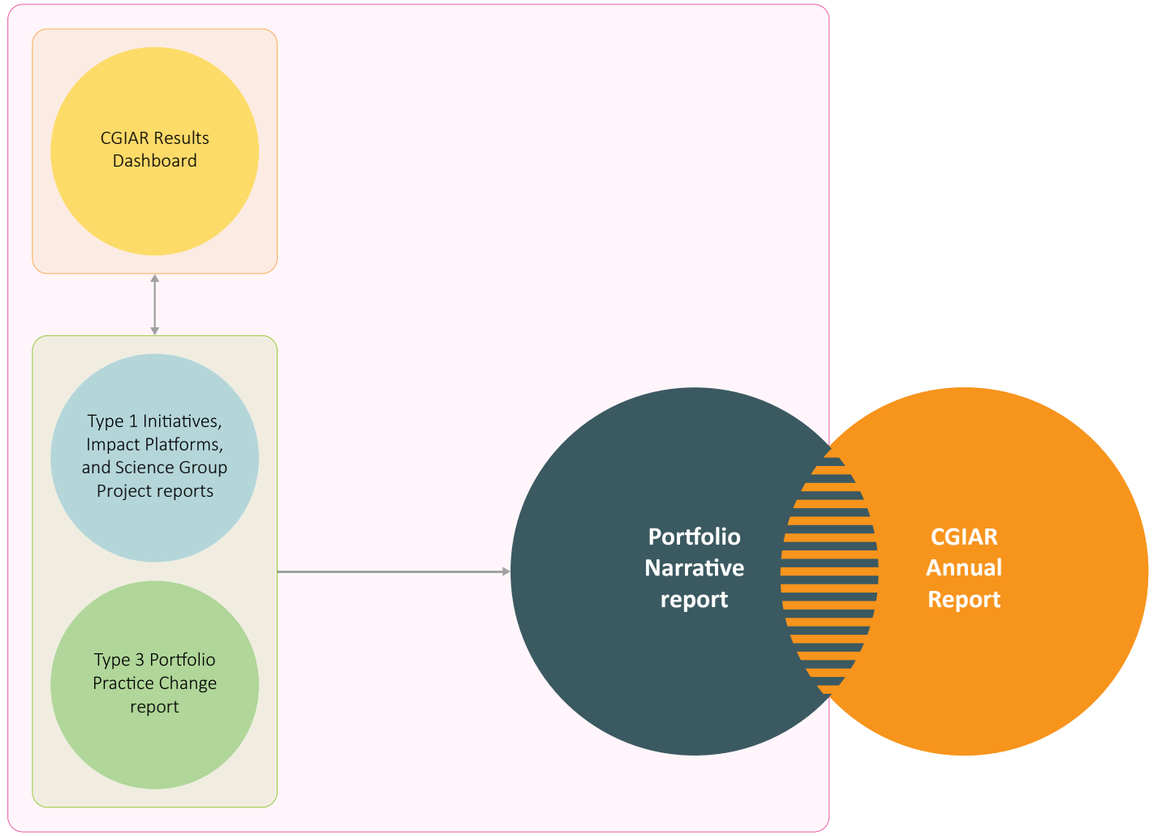
CGIAR Technical Reporting 2023

CGIAR Technical Reporting has been developed in alignment with the CGIAR Technical Reporting Arrangement. This Initiative report ("Type 1" report) constitutes part of the broader CGIAR Technical Report. Each CGIAR Research Initiative submits an annual "Type 1" report, which provides assurance on Initiative-level progress towards End of Initiative outcomes.

The CGIAR Technical Report comprises:

- Type 1 Initiative, Impact Platform, and Science Group Project (SGP) reports, with quality assured results reported by Initiatives, Platforms and SGPs available on the CGIAR Results Dashboard.
- The Type 3 Portfolio Performance and Project Coordination Practice Change report, which focuses on internal practice change.
- The Portfolio Narrative, which draws on the Type 1 and Type 3 reports, and the CGIAR Results Dashboard, to provide a broader view on Portfolio coherence, including results, partnerships, country and regional engagement, and synergies among the Portfolio's constituent parts.

The CGIAR Annual Report is a comprehensive overview of CGIAR's collective achievements, impact and strategic outlook, which draws significantly from the Technical Report products above. For 2023, the Annual Report and Technical Report will be presented online as an integrated product.



Section 1: **Fact sheet and budget**

Initiative name	Mitigate+: Research for Low-Emission Food Systems
Initiative short name	Low-Emission Food Systems
Initiative Lead	Louis Verchot (l.verchot@cgiar.org)
Initiative Co-lead	Wei Zhang (w.zhang@cgiar.org)
Science Group	Systems Transformation
Start – end date	01/01/2022 – 31/12/2024
Geographic scope	**Countries** China · Colombia · Kenya · Viet Nam
OECD DAC Climate marker adaptation score[1]	**Score 1: Significant** The activity contributes in a significant way to any of the three CGIAR climate-related strategy objectives — namely, climate mitigation, climate adaptation and climate policy — even though it is not the principal focus of the activity.
OECD DAC Climate marker mitigation score[1]	**Score 2: Principal** The activity is principally about meeting any of the three CGIAR climate-related strategy objectives — namely, climate mitigation, climate adaptation and climate policy — and would not have been undertaken without this objective.
OECD DAC Gender equity marker score[2]	**Score 1A: Gender accommodative/aware** Gender equality is an objective, but not the main one. The Initiative/project includes at least two explicit gender specific outputs and (adequate) funding and resources are available. Data and indicators are disaggregated by gender and analyzed to explain potential gender variations and inequalities.
Website link	https://www.cgiar.org/initiative/low-emission-food-systems/

[1] The Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC) markers refer to the OECD DAC Rio Markers for Climate and the gender equality policy marker. For climate adaptation and mitigation, scores are: 0 = Not targeted; 1 = Significant; and 2 = Principal.

[2] The CGIAR Gender Impact Platform has adapted the OECD gender marker, splitting the 1 score into 1A and 1B. For gender equality, scores are: 0 = Not targeted; 1A = Gender accommodative/aware; 1B = Gender responsive; and 2 = Principal.

These scores are derived from Initiative proposals, and refer to the score given to the Initiative overall based on their proposal.

EXECUTIVE SUMMARY

The CGIAR Research Initiative on Low-Emission Food Systems, known as Mitigate+, fosters development of low greenhouse gas (GHG) emissions in food systems in ways that do not threaten food production but support commitments by the Initiatives' target countries to meet their NDCs toward the Paris Agreement climate targets using a food systems approach and five Work Packages. During this second year of the Initiative's operations, it focused on ramping up its activities and operationalizing its partnerships so as to achieve all of its End of Initiative outcomes (EOIOs) in four target countries: China, Colombia, Kenya, and Vietnam.

This year was marked by remarkable progress, as the number of the Initiative's knowledge products increased by 61 percent over its first year. Similarly, it developed 13 innovations in 2023, twice as many as in the previous year. Mitigate+ is committed to good governance and the objective of social and gender equity in food systems. For this purpose, the initiative structured the Gender, Youth and Social Inclusion Strategy 2023-2024, that seeks to improve efficiencies in all food value chains while also promoting social inclusion.

In 2023, Work Package 1 (Planning for food systems transformation) advanced a Food Systems Climate Intervention Planning (FOODCLIP) toolbox. This included developing profiles for our four target countries using FAOSTAT data. Collaboration efforts with the International Institute for Applied Systems Analysis (IIASA) and WorldFish (WF) strengthened analysis of marginal abatement cost curves (MACC) to assess the economics of climate change mitigation options in fish foresight modeling. Staff of Mitigate+ engaged stakeholders in visits to countries and participating in global events, such as the UN Climate Change Conference (COP28), where the Initiative organized an event on collaborating with the private sector on innovative GHG emission reduction strategies.

Work Package 2 (Data, evidence, and tools for food systems transformation) focused on improving data transparency and stakeholder capacity for efficiently monitoring GHG emissions. It established partnerships with the Colombian Ministry of Environment and Sustainable Development and ProColombia to develop and implement a National Monitoring, Reporting, and Verification (MRV) protocol. The integration of this protocol into Colombia's Zero-Deforestation Agreements received support from the ministries of commerce and agriculture, which paved the way for securing financial support to pilot its implementation. The protocol emphasizes integrating existing digital innovations essential for effective traceability in supply chains.

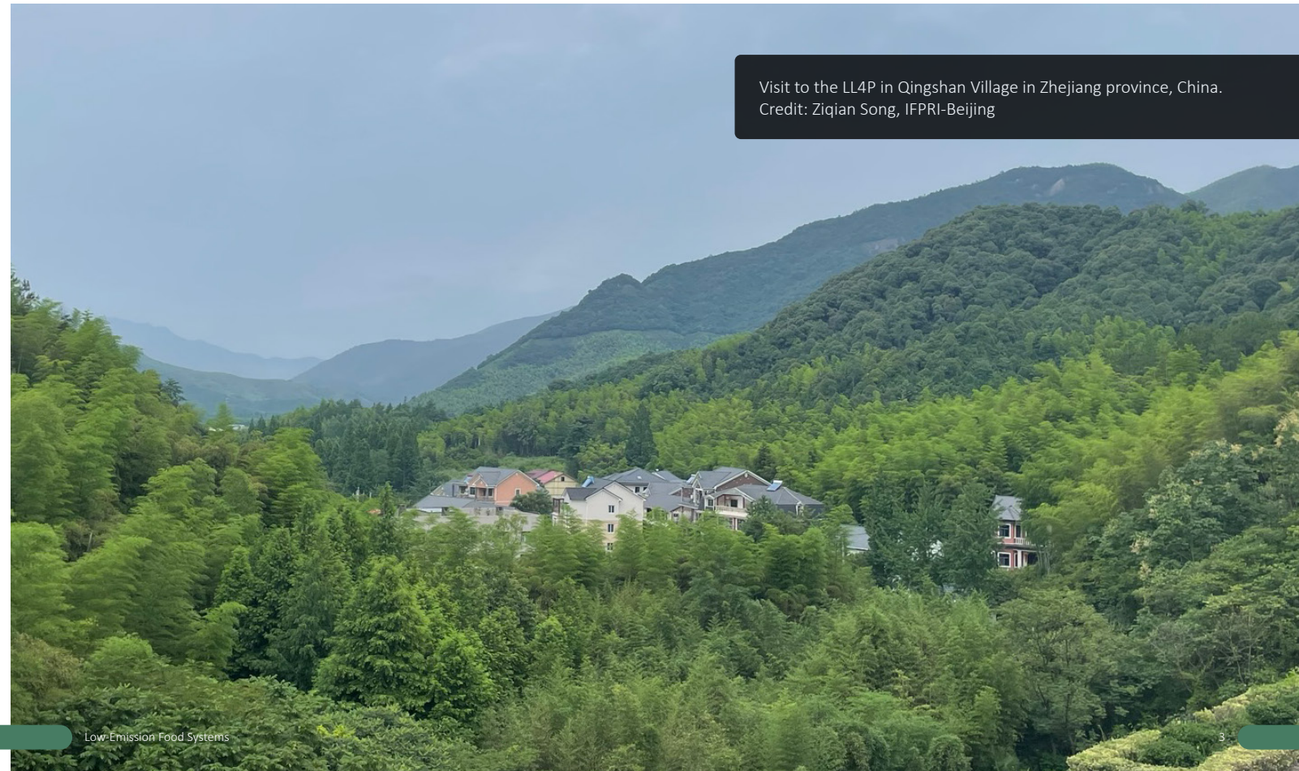
In China, the Work Package 3 team worked with Qingshan village to define its role as a Low-Emission Food Systems "Living Lab for People" (LL4P) platform. This model serves not only for participatory action research but also as a pilot for a "Low-Carbon Future Village." In Kenya, the LL4P reached significant milestones by formalizing an agreement with the Kaimosi Agricultural Training Centre (ATC) of the Nandi County government. Participatory action research was the transversal approach for all four LL4P.

Work Package 4 brought together stakeholders from the food system and governmental and non-governmental actors to repurpose technologies and innovations. This helped lay the foundation to enable institutions to turn research into integrated solutions advancing the CGIAR's climate change mitigation goals[1] and the UN Sustainable Development Goals (SDGs). In Colombia, strategies were developed to scale agroforestry systems for cocoa and silvo-pastoral systems for livestock. In Kenya, technologies in the rice sector were assessed for their contributions to reducing GHG emissions and increasing productivity.

Additionally this year, we strengthened our commitment to establishing networks and connections with negotiators from the UN Framework Convention on Climate Change (UNFCCC) and its Secretariat. Work Package 5 organized events at the Bonn Climate Conference and COP28, promoting awareness about low-emission food systems. Our partners at Rationale Advisors developed the UNFCCC engagement strategy with our team and analyzed submissions on the Sharm El-Sheik joint work on implementation on agriculture and food security. With Work Package 5 support, Initiative scientists contributed to the CGIAR's position paper on a food systems approach to climate action and endorsed inclusion of food systems in the outcome of the first Global Stocktake of the Paris Agreement.

	2022	**2023**	2024
PROPOSAL BUDGET	$9.88M	**$11.18M**	$11.94M
APPROVED BUDGET [2]	$6.76M	**$7.89M** [3]	$5.18M [4]

[1] climate change mitigation' is taken to mean mitigating the adverse effects of climate change
[2] The approved budget amounts correspond to the figures available for public access through the Financing dashboard.
[3] This amount includes carry-over and commitments.
[4] This amount is an estimation of the 2024 annual budget allocation, as of the end of March 2024.

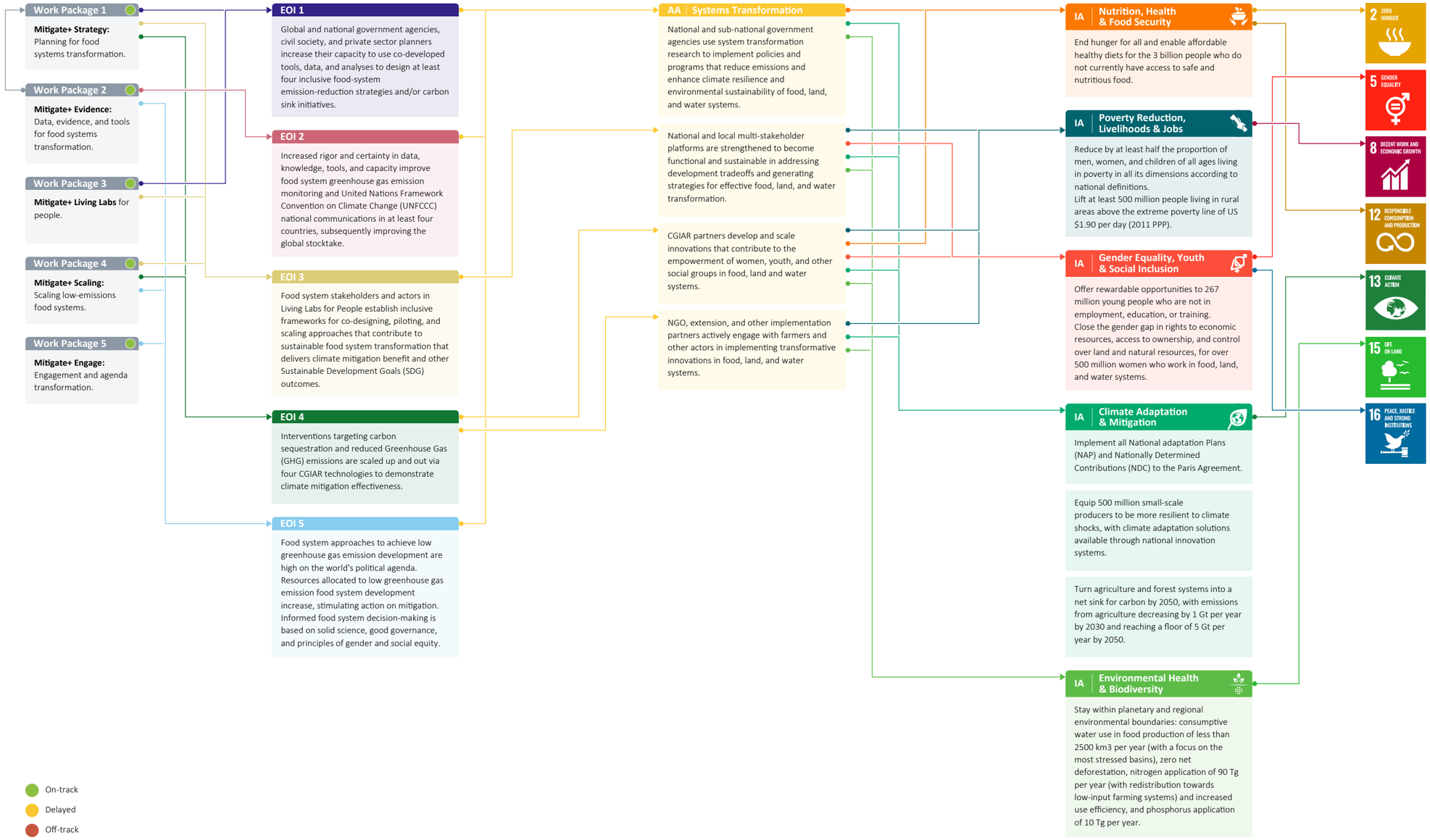


Visit to the LL4P in Qingshan Village in Zhejiang province, China.
Credit: Ziqian Song, IFPRI-Beijing

Section 2: **Progress on science and towards End of Initiative outcomes**

Initiative-level theory of change diagram

This is a simple, linear, and static representation of a complex, non-linear, and dynamic reality. Feedback loops and connections between this Initiative and other Initiatives' theories of change are excluded for clarity.



EOI	End of Initiative outcome
AA	Action Area
IA	Impact Area
SDG	Sustainable Development Goal

Note: A summary of Work Package progress ratings is provided in Section 3.

Laura Cramer of ILRI (second from the left) moderates a session at the GLF Nairobi 2023 Hybrid Conference with Lydia Kimani of the Kenya Private Sector Alliance, Elizabeth Adobi Okwuosa from the Kenya Agricultural and Livestock Research Organization and M+ work package 3 lead Chris Martius.
Credit: Ma. Eliza J. Villarino/Alliance of Bioversity and CIAT

Summary of progress against the theory of change

The Initiative on Low-Emission Food Systems (Mitigate+) fosters development of food systems that reduce greenhouse gas (GHG) emissions in ways that do not threaten food production but support the commitments of the Initiative's four target countries to meet the 2016 Paris Agreement on climate. This Initiative employs a food systems approach. In 2023, it focused on setting the stage for achieving all its End of Initiative outcomes (EOIO) in China, Colombia, Kenya, and Viet Nam.

Outputs published by Mitigate+ researchers in 2023 included peer-reviewed articles (21); a book (1); reports, manuals and working papers (63); policy/research briefs (7); blog posts (30); and posters, presentations, and videos (25); 67 percent of these products focus on the four target countries and 27 percent are global in scope.

Of a dozen young scientists awarded scholarships in 2023 under the Climate, Food and Farming, Global Research Alliance Development Scholarships (CLIFF-GRADS) Program, a joint program of the Initiative and the Global Research Alliance on Agricultural Greenhouse Gases, five have completed, and seven are nearing completion. Further funding this year was allocated to seven new students. The teams from Monitoring and Evaluation (MELIA) and Work Package 5 are implementing a study to understand gender barriers and identify strategies to make this program more inclusive. We conducted 19 short-term training programs for 862 individuals (335 women) that strengthened their capacities in agricultural data management and sustainable food system transformation. The Initiative also supported a program of the African Group of Negotiators Expert Support (AGNES) on climate governance and a GenderUp Facilitator Training in India. We also supported four short-term training courses on agricultural transformation processes in Colombia and facilitated stakeholder dialogues in Viet Nam. Thirty three percent of the Initiative's capacity sharing events received co-funding from Viet Nam's Ministry of Agriculture and Rural Development and Nong Lam University, from China's Zhejiang University, and from Colombia's Pontificia Universidad Javeriana.

EOIO 1: We developed country profiles of China, Colombia, Kenya, and Viet Nam. These profiles provide a comprehensive and evidence-based overview of national land use, agricultural production, diets, and food system emissions. The profiles also explore possible pathways for the countries to reduce their GHG emissions while enhancing food security, nutrition, livelihoods, and the environment. Several of the Initiative's Work Packages are using these country profiles as starting points and baselines for their research.

In Kenya, we generated further evidence on low-emission pathways in managing livestock manure, reducing food loss and waste, and reducing deforestation. We participated in the 2023 Global Landscapes Forum to discuss promising pathways for transforming food systems toward low-emission pathways. Work Packages 1 and 2 collaborated in sharing findings of an assessment of reforestation strategies, led by the French Agricultural Research Centre for International Development (CIRAD), and a review of evidence of food system emissions and transition pathways with Wageningen University and Research.

EOIO 2: Mitigate+ directly helped to update the nationally determined contributions (NDC) in Colombia, Kenya, and Viet Nam. Kenya and Viet Nam are actively working to reduce GHG emissions in line with their climate change strategies. Viet Nam is making significant progress toward its long-term goals, while Kenya has prioritized its agriculture, food, and land use sectors to achieve a low-carbon, climate-resilient development pathway. Colombia's updated NDC aligns closely with its goal of achieving carbon neutrality by 2050, aiming for a 51 percent reduction in GHG emissions by 2030 compared to 2014 levels. We developed a Measuring, Reporting and Verification (MRV) framework for monitoring deforestation emissions from Colombia, which will serve the Zero Deforestation Agreements (ZDA) and other sectors and contribute activity data to national inventories. We supported the formulation of a 2023–2024 work plan for the Green Climate Fund's "CSICAP" project, aligning project objectives with national goals. We also supported the methodological structuring of four projects: a Korean Agency Cooperation project "KolFACI-OPTIMO"; a USDA project "Fertilize Right"; a "GHG Monitoring in Poultry Systems" project funded by the Poultry Grower Federation in Colombia; and Colombia's national "Biocarbon" initiative. Our Initiative also helped design GHG emission monitoring protocols and supported data collection on Tier 2 emission factors for rice, livestock, and poultry.

Capacity-building events were implemented collaboratively with the Biocarbon Project, training national authorities from the Colombian Ministry of Agriculture and Rural Development and AGROSAVIA on GHG emissions. We supported a training program on sustainable low-emission cocoa production systems and workshops on livestock and rice emission factors, along with a seminar on reducing GHG emissions in the poultry sector for a broader audience. In Kenya, ongoing work includes engaging with partners at the national level to discuss pathways for low-emission food-system transformation and improving MRV systems, especially for the livestock sector.

To advance research on low-carbon food systems in China, the Initiative led surveys to analyze the cost-effectiveness of GHG emission mitigation measures in the dairy industry and a life cycle assessment of mitigation technology potential in dairy enterprises. This report identifies major GHG emission sources and assesses the potential of different emission mitigation technologies.

EOIO 3: The framework for the Living Labs for People (LL4P) is being applied in the target countries to support locally driven innovation processes, including work to strengthen governance and co-produce knowledge that addresses power imbalance. Working with local partners led by Zhejiang University, the LL4P is conducting participatory action research to help illuminate pathways to low-emission food systems in Qingshan Village, a "Low-Carbon Future Village" pilot site selected by the government of Zhejiang Province, China. A participatory rural innovation (PRI) approach has been proposed for the LL4P in Colombia, whereby producers identify problems and define solutions and innovation routes to build low-emission and sustainable food systems.

Our conceptualization of the LL4P in Colombia recognizes low-emission food system development as part of broader efforts. This endeavor is part of efforts to foster peace and sustainability in an area heavily affected by internal armed conflict. To ensure local buy-in and institutional stability of the LL4P, Colombia, Kenya, and Viet Nam have adopted a "local host" approach, with an agreement signed with the Kaimosi Agricultural Training Center of the Nandi County government in Kenya, and Agrosolidaria Montañita and the University of Nong Lam identified as potential hosts in Colombia and Viet Nam, respectively. In China, Qingshan village was recognized by the government as a long-term collaborative research site, further enabling the implementation of LL4P there. In Kenya, we established new partnerships and strengthened existing ones with stakeholders engaged in foodsystem transformation activities within the LL4P. Progress was made to establish an advisory board for guiding and managing the LL4P activities.

EOIO 4: The Initiative reviewed an array of potential policy incentives that could enhance the adoption and upscaling of sustainable practices by farmers in low-income countries. A stakeholder meeting was held to assess the scalability of selected technologies/innovations in Nairobi. Four innovations — Improved Livestock Breeds and Feeds (ILBF), Integrated Aquaculture Practices (IAP), Biogas Technology (BT), and Alternative Wetting and Drying for rice (AWD) — were chosen based on their alignment with national and local development plans, GHG mitigation potential, and ability to deliver SDG co-benefits.

The Initiative is exploring geographic overlaps in mitigation and peace building activities and has initiated a partnership with the Kenya Institute for Public Policy Research and Analysis (KIPPRA). In Colombia, sustainable land use systems (SLUS) contribute to peace building by providing sustainable income sources and enhancing social cohesion. We identified enabling factors for farm-level transitions to SLUS in Colombia and proposed policy designs to boost SLUS adoption in conflict areas.

We developed a framework and scoring system to evaluate an innovation's scalability. We also adapted a tool, Scaling Scan, that integrates analysis of climate change and gender and social inclusion when evaluating the scaling potential of innovations.

EOIO 5: To position our work in the world's global agenda, we published 30 blogs, participated in and helped organize international events (COP28, the Bonn Climate Conference), held bilateral meeting with key actors to showcase our research, and carried out several webinars. The Initiative was able to strengthen engagement activities that led to building networks in key groups that can support agenda-setting work. This includes the CGIAR core group tracking UNFCCC negotiations and developing position papers, the SSJWA coordination group and the community of food systems transformation researchers and practitioners.

The Initiative also launched a gender, youth, and social inclusion (GEYSI) strategy for 2023-2024 to address the foundations of gender inequality and unequal power relations. This involved providing guidance on the position and future aims of GEYSI-enhanced climate mitigation research. The MELIA team designed a qualitative evaluation to determine the contributions of the Initiative to observed impacts at different levels in the target countries, for which fieldwork will be done in 2024.

Progress by End of Initiative Outcome

EOIO 1: Capacity and support for food system greenhouse gas emission reduction strategies.

- Food systems GHG emission profiles for all four countries.
- Brief on opportunities for a low-emission transformation of food systems.
- GHG emission assessment methods, data sources and reporting processes in Viet Nam.
- Supported an international forum on low carbon agrifood systems transformation in Beijing, China.
- Trade-off analyses of food loss and waste reduction and GHG emissions in food supply chains.

Low-Emission Food Systems participation in World Agri-Food Innovation (WAFI) Conference Beijing, China.
Credit: WAFI Conference

EOIO 2: Better data for food system GHG emission monitoring.

- Web-based version of the digital system for rice activity monitoring and reporting (RiceMo).
- Targeting CGIAR food systems emission data for policy-making and GHG emission reporting: Viet Nam's Ministry of Agriculture and Rural Development is adopting a strategy for implementing the Rice Production Activity Monitoring and Reporting System (RiceMore).
- Achieving improved capacity of governments, civil society, and private sector partners: the Government of Kenya utilizes marginal abatement cost curves to analyze economic costs and trade-offs in dairy farms with support from the Livestock and Climate and Low-Emission Food Systems Initiatives.
- Review of NDCs from the perspective of food systems for Colombia, Kenya, and Viet Nam.
- MRV framework developed for monitoring deforestation emissions from Colombia, which is being piloted by the National Federation of Coffee Growers of Colombia and Expertise France.

EOIO 3: Inclusive approaches for low-emission food system transformation in Living Labs for People.

- Stakeholders of the Initiative's Living Labs for People are gaining the capacity and information to assess, plan, and implement sustainable food system solutions. LL4P is a space for locally driven co-development of innovations and co-production of knowledge for sustainable, low-emission food systems, engaging 21 researchers, training over 200 stakeholders, and partnering with 6 universities and 4 government agencies.
- Co-established a Community of Practice to advance research on multi-stakeholder platforms (MSP) and advise CGIAR on MSP work.
- Participatory system mapping exercises in China and Kenya to help illuminate stakeholders' mental models, system understanding, and relationships, and to understand factors affecting the low-emission food system transition, as well as to empower participants of LL4Ps.
- Citizen juries foster public participation in decision-making related to the future of food systems in Colombia.
- A political ecology approach to the co-production of knowledge: politicizing low-emission innovations for food systems transformation and application of the framework in Colombia and Kenya for food system transformation.
- The normative conceptual framework of LL4P represents a novel innovation to advance CGIAR's effort toward locally driven co-development of innovations and solutions with effective governance modes capable of addressing inequality and power imbalance.

EOIO 4: Scaled up CGIAR low-emission technological solutions.

- By advancing use of state-of-the-art analytics, tools, and evidence, stakeholders identify and scale CGIAR technologies and innovations, illustrated by implementation of a sustainability strategy for the Cocoa Chain in Caquetá and Cesar in Colombia: Path toward climate action and peace building.
- Mitigate+ Scoring Workshop to successfully evaluate the scalability of innovations for reducing food system GHG emissions while achieving SDG co-benefits in Kenya.
- Adaptation of the Scaling Scan tool to better address climate change and gender considerations.
- Enhancing comprehension of policy incentives driving smallholder adoption of climate-smart agricultural practices.
- Multi-stakeholder Dialogue on Carbon Markets in Agriculture in Viet Nam.
- Assessment of biophysical, social, and economic potential to develop a low-emission carbon project contributing to peace in the departments of Caquetá and Cesar, aimed at scaling out sustainable cacao production.

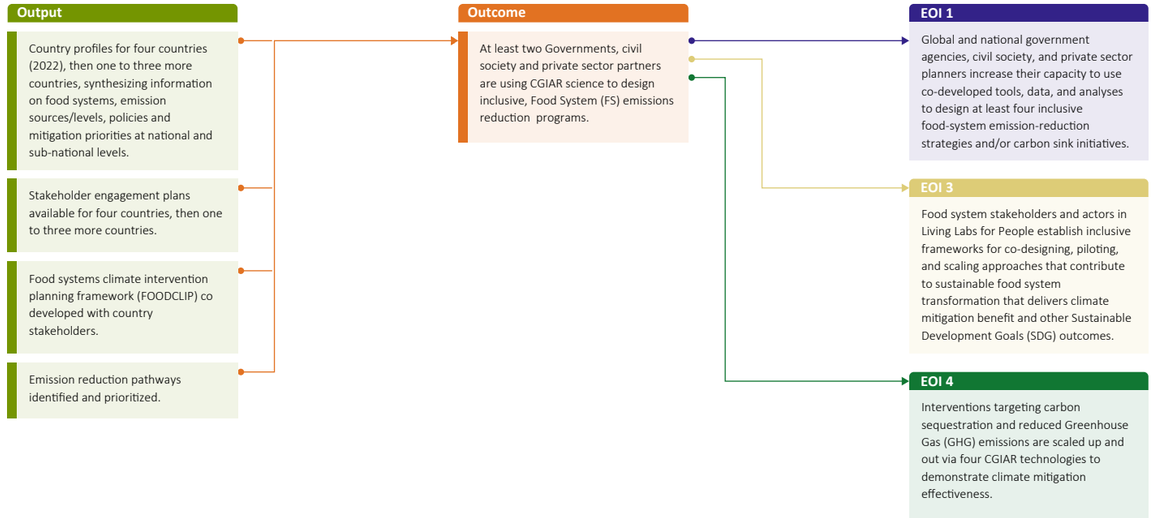
EOIO 5: Increased awareness of food system approaches to achieve low greenhouse gas emission development.

- 30 blog posts
- 8 webinars
- Contributed to organizing in-person events at the Bonn Climate Conference and COP28 as well as webinars to raise awareness of the Initiative's work.
- Ramped up engagement activities that led to building networks in key groups that can support agenda-setting work. Established relationships with negotiators and the UNFCCC Secretariat.
- Ensured the contribution of Initiative scientists to the CGIAR position paper on a food systems approach to climate action and a joint submission endorsing the inclusion of food systems in the outcome of the first global stocktake of the Paris Agreement.

Section 3: **Work Package progress**

WP1: Planning for food systems transformation

On track



Work Package 1 progress against the theory of change

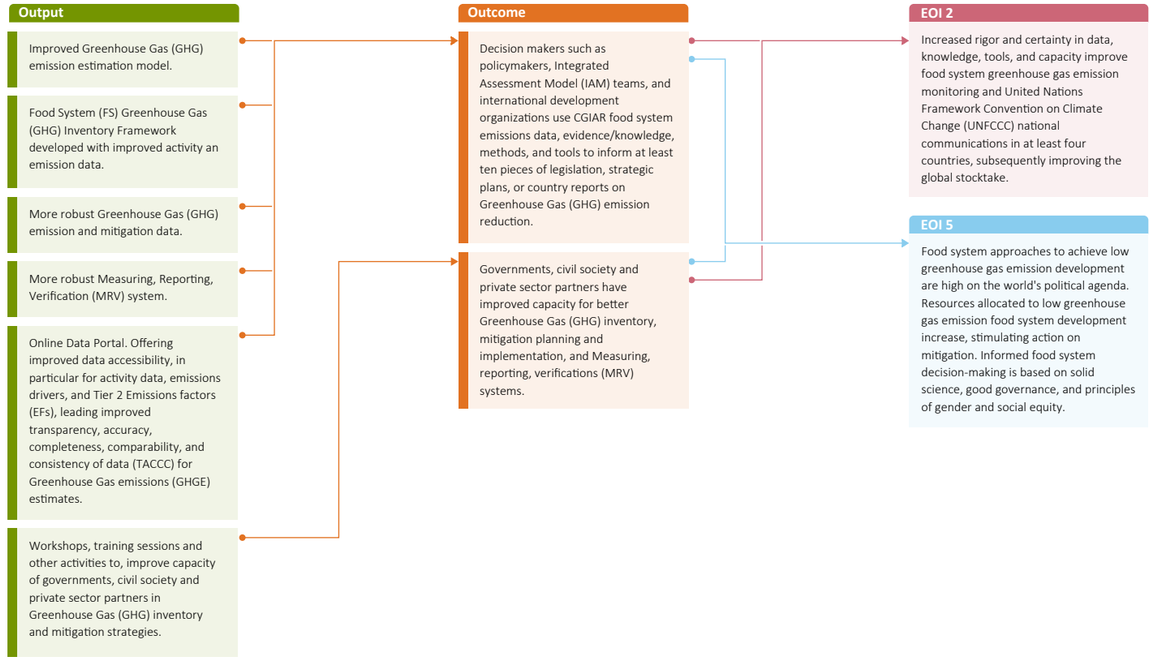
In each of its four target countries, the Mitigate+ team closely collaborated with national governments to prioritize and plan for low-emission food systems. Key efforts in 2023 included developing country profiles for China, Colombia, Kenya, and Vietnam, analyzing GHG emissions in food systems, and a global analysis outlining opportunities for a low-emission transformation of food systems. Additionally, progress was made in analyzing the cost of GHG emissions reduction using Marginal Abatement Cost Curves. The team's global outreach included participation in events such as the Global Landscapes Forum in Kenya, the World Food Innovation Summit in China, and an impactful event during COP28, in Dubai. This outreach work is fostering collaboration on innovative GHG emission reduction strategies and financing with the private sector.

The team led and planned a strategy for understanding how political and socioecological processes impact mitigation efforts in food systems. Much of the year was dedicated to developing a database, finalizing and publishing the country profiles, and producing associated policy summaries (Infobriefs to inform decision-makers) for Colombia, Kenya, and Vietnam. Global consultations were held, shedding light on the state of national planning for GHG emission reduction in food systems and identifying next steps for strategy development in 2024. Country profile data are being used by other Work Packages to help them produce their deliverables.

In Kenya, a workshop sought feedback on food system GHG emissions, mitigation pathways, and integration into Kenya's NDCs. The event emphasized the importance of accurate data, questioned the limits of the food system concept, highlighted private sector engagement, and stressed a holistic approach aligned with broader development goals. In China, consultations were held with the World Food Innovation Summit. In Viet Nam, the Initiative's participation in a workshop at Nong Lam University in Ho Chi Minh City engendered consultations that improved the Initiative's country profile.

WP2: Data, evidence, and tools for food systems transformation

On track



Work Package 2 progress against the theory of change

The Work Package 2 team conducted a thorough analysis of the NDCs for China, Colombia, Kenya, and Vietnam, generating comprehensive reports that identify strategies for reducing GHG emissions in food systems. The review synthesized the scientific basis, data, and analytics behind NDC targets, identified the missing data gaps and suggested additional mitigation options and their abatement potential for possible update of the countries' NDCs. This Work Package also developed a framework for a bottom-up approach to estimate country-level GHG emissions, incorporating activity data and specialized models. Data are being collected in all four Mitigate+ countries to quantify food system GHG emissions, identify mitigation options and determine their mitigation potential. The challenges faced in obtaining accurate data highlighted the need for improving information collection.

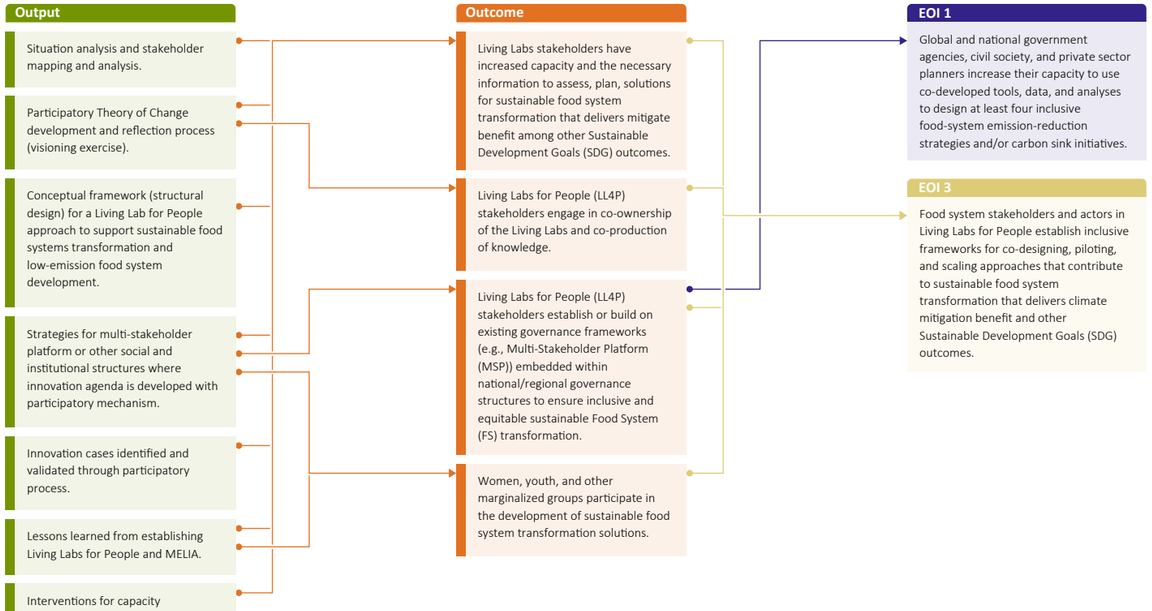
In China, the team partnered with the Chinese Academy of Agricultural Sciences to quantify the carbon footprint and economic performance of milk production. Similar progress was made in Kenya, which developed a Tier-2 approach for methane emissions from dairy livestock. In Colombia, in collaboration with governmental and non-governmental actors, the Measuring, Reporting and Verification (MRV) protocol for deforestation associated with agricultural supply chains was developed to enhance the national GHG inventory. With the leadership of the protocol, Mitigate+ contributed to the country's "Zero Deforestation Agreements," which, through transparent monitoring tools and financial approaches, seeks to reduce emissions in the Agriculture, Forestry, and Other Land Uses (AFOLU) sector.

In Viet Nam, efforts focused on engaging with digital systems for monitoring rice activity data and conducting a scoping study on rice-shrimp systems with sustainable and low-emission practices. In the Mekong River Delta, work continues to develop the Rice Production Monitoring and Reporting system to promote standardized recording for low-emission practices. Proposals for farmer focused MRV frameworks addressing nitrous oxide emissions contribute to transparent monitoring and sustainable practices.

The multifaceted approach of Work Package 2 and the specific milestones achieved in each country in 2023 underscore substantial progress in enhancing data collection methodologies, engaging stakeholders, and implementing innovative strategies fostering sustainable, low-emission food systems in the near future.

WP3: Living Labs for People

On track



Work Package 3 progress against the theory of change

In 2023, Living Labs for People (LL4P) made great strides in all four countries. This was facilitated by close collaboration with the country teams, research partners and stakeholders throughout the process.

In China, Qingshan Village, in Zhejiang Province, was identified as an LL4P site and selected by the government as a pilot 'Low Carbon Future Village'. The team made significant progress in research, capacity sharing, and collaborative efforts with local stakeholders and the government, contributing to the effort to enhance the role of the village as a "Future Village" and "Low (Zero) Carbon Village."

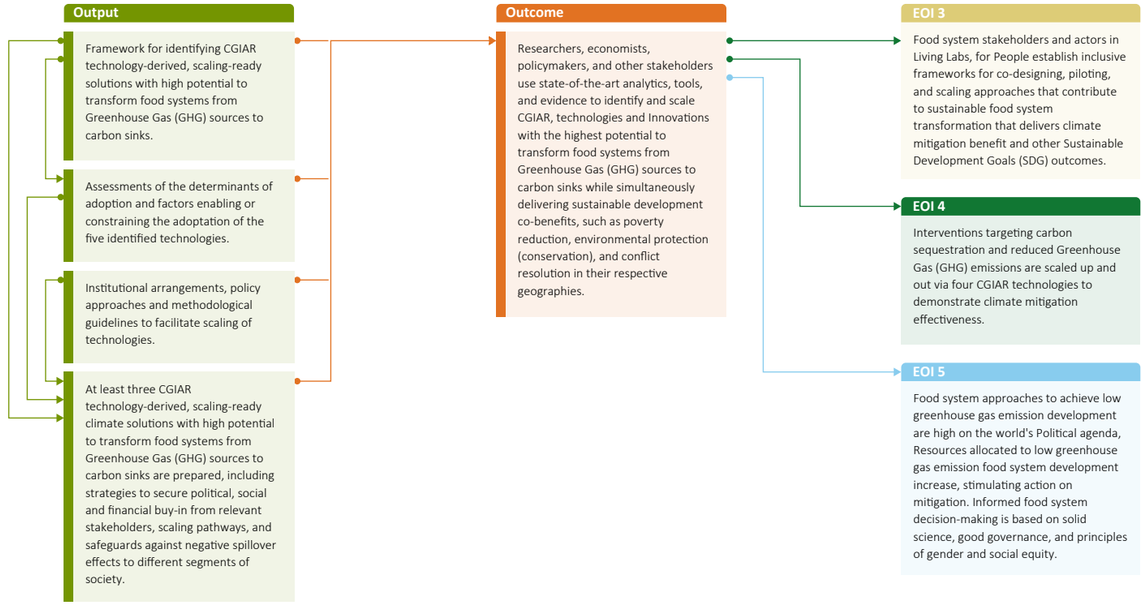
The LL4P in Kenya made significant progress by signing a host agreement with Kaimosi Agricultural Training Center. The team's many activities helped to conceptualize the LL4P in Colombia and to conduct a situational analysis of the area. To ensure that the LL4P met the needs of stakeholders, the team identified a potential host, conducted participatory rural appraisal, stakeholder mapping, and identification of existing mitigation and adaptation efforts and projects.

In Viet Nam, an assessment of stakeholder interests and needs for capacity sharing with Mitigate+ was conducted and a participatory workshop was convened to determine the site for the LL4P. Building on the site selection work in 2022, the site selected was expanded beyond Can Tho to encompass the whole Mekong Delta so as to meet the needs of the local government and stakeholders.

The progress made in 2023 laid the foundation for transformative, country-specific strategies that seek to identify context-specific innovations through a participatory approach that will help establish a transformation of low-emission food systems through the LL4P. The emphasis on inclusivity and equity positions the LL4Ps as dynamic hubs for locally driven innovation and systemic change. The focus in 2024 will shift to continuing and strengthening training based on identified needs, ensuring the holistic development of the LL4Ps as key contributors to the transformation of sustainable and equitable food systems.

WP4: Scaling low-emission food systems

On track



Work Package 4 progress against the theory of change

Work Package 4 made significant advances toward the Initiative's objectives, focusing primarily on generating the enabling environment for scaling innovations to reduce GHG emissions. We have closely collaborated with stakeholders to emphasize the potential of CGIAR-related technologies for mitigating the effects of climate change and helping to meet NDCs by 2025 and 2030.

In Kenya, following a scaling framework, the team has conducted workshops with the climate-smart agriculture multistakeholder platform. These sessions have been instrumental in assessing the mitigation potential of four technologies implemented at scale. In partnership with CIMMYT, we are developing scaling strategies based on these assessments.

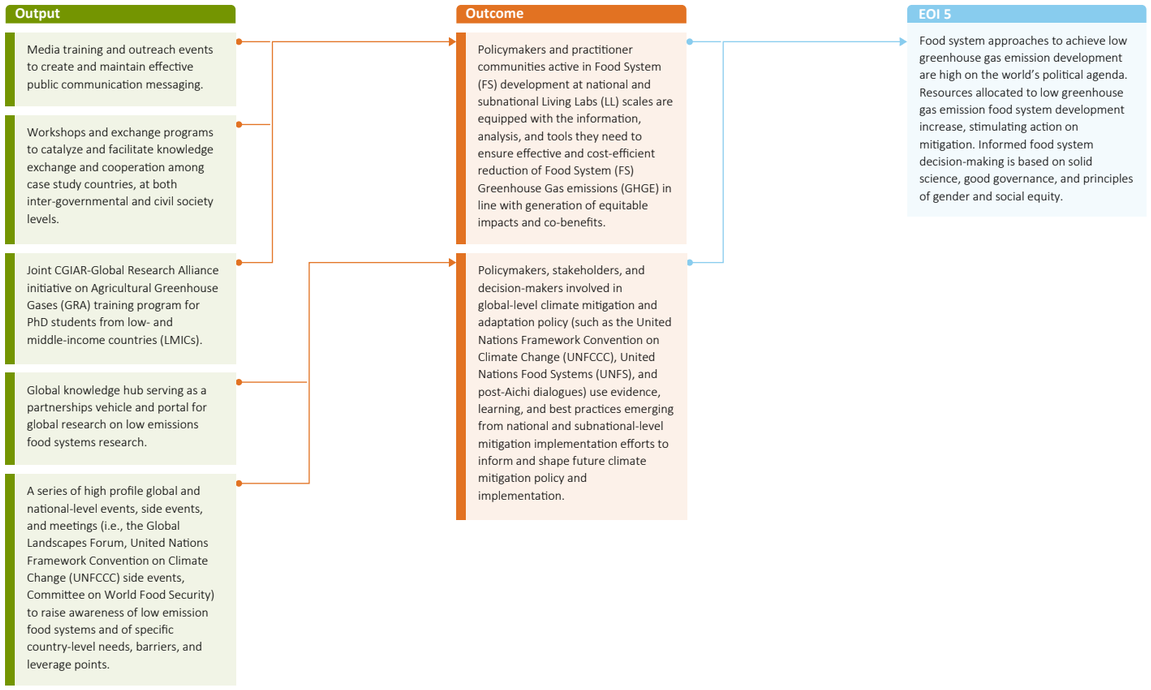
In Colombia, the Initiative collaborated with AgriLAC Resiliente on the sustainable cocoa challenge. These efforts led to various outputs, including a portfolio of business models, training materials, and engagement with policymakers and investors. Moreover, collaborating with AgriLAC Resiliente has enabled us to develop value-chain strategies for scaling zero-deforestation cacao production, along with roadmaps for funding zero-deforestation interventions within Colombia's dairy sector. Additionally, Work Package 4 pursued the development and registration of an innovative project aimed at scaling sustainable cacao production under a policy instrument targeting green business models in conflict-affected municipalities.

In Viet Nam our team assessed the role of integrated rice and fisheries for reducing food system GHG emission.

Meanwhile, our team in China is examining China's role in reducing Brazilian deforestation stemming from soybean consumption. We contributed by enhancing the third edition of the scaling scan tool in collaboration with Work Package 3. This tool explicitly integrates climate change mitigation objectives, gender and social responsibility checks, and environmental safeguards. This ensures a comprehensive yet efficient assessment of innovation scalability for climate change mitigation while minimizing adverse effects. This tool will be used to develop scaling strategies for silvopastoral systems, low-emission rice and improved livestock breeds and feeds for 2024. The scaling advancements achieved in 2023 provide a robust foundation for expanding innovations, significantly contributing to low-emission food systems.

WP5: Engagement and agenda transformation

On track



Work Package 5 progress against the theory of change

At the annual Bonn Climate Conference, the Initiative took the lead in organizing an in-person event entitled "Towards net-zero food systems: how can low-emission development strategies help achieve food security and economic growth?" During COP28, in Dubai, UAE, the Initiative organized two events within the Food and Agriculture Pavilion: (i) "How non-market approaches could look on the ground", and (ii) "The role of youth in capacity building and policymaking for climate action in the Global South." It also co-organized an official side event, "Shifting the Paradigm: Towards Just, Equitable Low-Emission Food Systems", that analyzed the potential of an agroecological paradigm shift with perspectives from science, the Rio Convention, member states, and Indigenous communities. Mitigate+ organized eight webinars exploring zero-deforestation supply chains in conflict-affected settings, participated in the UNFCCC technical expert review and engaged in other UNFCCC processes.

Active efforts were made to build networks, including engagement with the CGIAR core group tracking UNFCCC negotiations, including the Sharm el-Sheikh joint work on implementation of climate action on agriculture and food security (SSJWA) coordination group, and a WhatsApp community of researchers and professionals in food systems transformation. Throughout the year, this Work Package built relationships with negotiators and staff of the UNFCCC Secretariat and will continue engaging these stakeholders in the climate policy space in 2024.

In partnership with Rationale Advisors, documents were produced and circulated internally and externally, including the UNFCCC engagement strategy and an analysis of submissions on the SSJWA. The team played a vital role in the Initiative scientists' contributions to the CGIAR position paper on a food systems' approach to climate action and to a joint submission endorsing the inclusion of food systems in the outcome of the first Global Stocktake of the Paris Agreement.

Through the CLIFF-GRADS program with which we team up, 12 PhD students received scholarships for training in GHG mitigation, 5 have completed their research stage and 7 are about to finish. New scholarships have already been awarded to fund 7 new students, who will begin their research in 2024.

Work Package progress rating summary

WORK PACKAGE	PROGRESS RATING & RATIONALE
1	**Progress rating** Progress was made on three outputs; the remaining "FOODCLIP" toolbox is expected to be achieved in 2024.
2	**Progress rating** Progress was made on five outputs; the remaining "Online Data Portal" is expected to be achieved in 2024.
3	**Progress rating** Progress was made on all seven outputs.
4	**Progress rating** Progress was made on all four outputs
5	**Progress rating** Progress was made on four outputs; the remaining "Global knowledge hub" is expected to be achieved in 2024.

Definitions

On track

- Annual progress largely aligns with Plan of Results and Budget and Work Package theory of change.
- Can include small deviations/issues/delays/risks that do not jeopardize success of Work Package.

Delayed

- Annual progress slightly falls behind Plan of Results and Budget and Work Package theory of change in key areas.
- Deviations/issues/delays/risks could jeopardize success of Work Package if not managed appropriately.

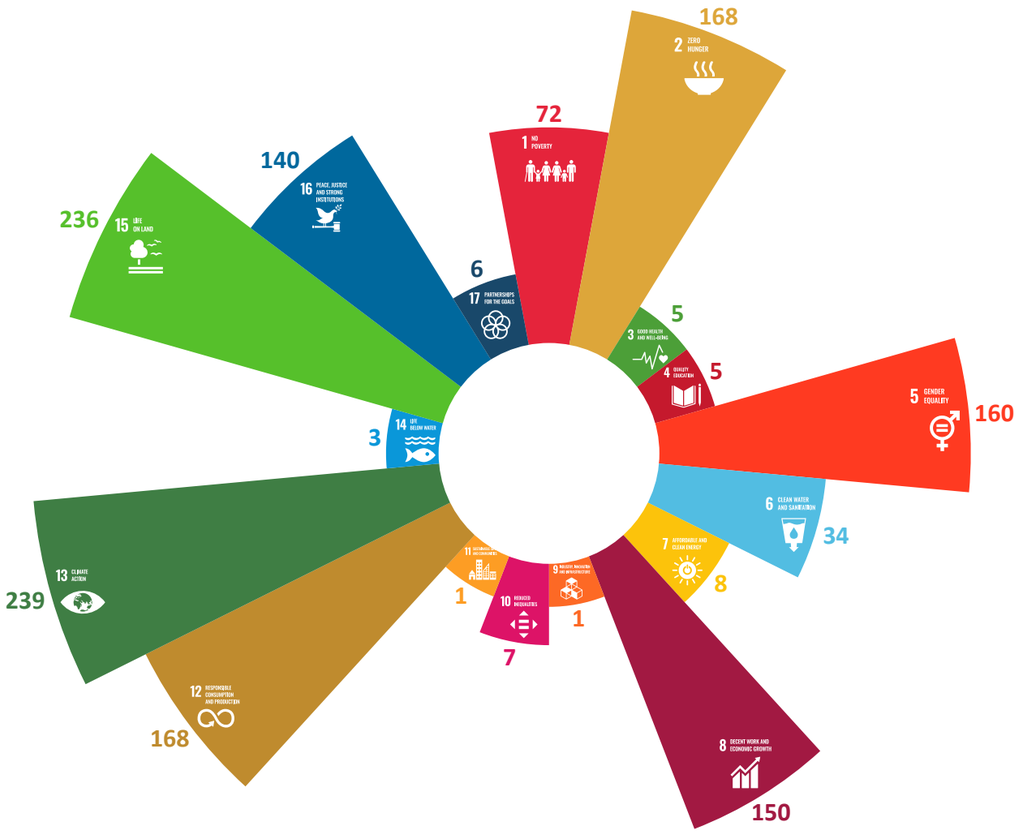
Off track

- Annual progress clearly falls behind Plan of Results and Budget and Work Package theory of change in most/all areas.
- Deviations/issues/delays/risks do jeopardize success of Work Package.

Section 4: **Key results**

This section provides an overview of results reported by the CGIAR Research Initiative on Low-Emission Food Systems in 2023. These results align with the CGIAR Results Framework and Low-Emission Food Systems' theory of change. Source: *Data extracted from the* CGIAR Results Dashboard *on 29 March 2024*.

Contributions to the UN Sustainable Development Goals



The above figure highlights the Initiative's contribution to achieving the SDGs. As shown, our work has contributed to achieving 15 SDGs, with most of our efforts contributing to achieving SDGs 13 and 15.

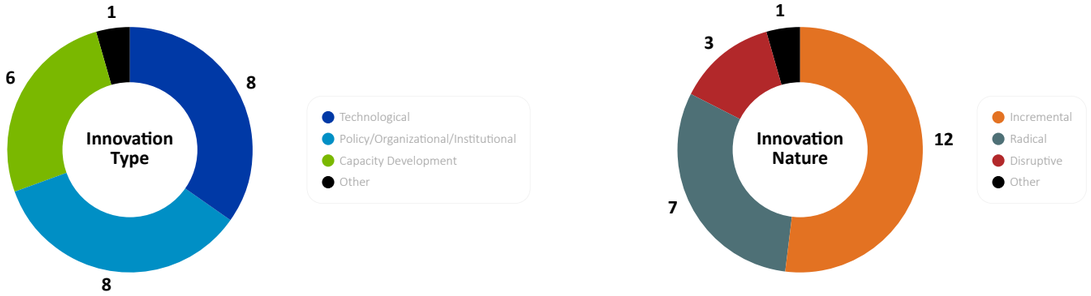
Percentage of reported results tagged to CGIAR Impact Areas

Principal: The result is principally about meeting any of the Impact Area objectives, and this is fundamental in its design and expected results. The result would not have been undertaken without this objective.
Significant: The result has made a significant contribution to any of the Impact Area objectives, even though the objective(s) is not the principal focus of the result.
Not targeted: The result did not target any of the Impact Area objectives.

Number of innovations by readiness level

Of the innovations developed by the Initiative, most have an advanced readiness level. Five innovations are being tested under semi-controlled conditions, four are prototypes, four are being tested in uncontrolled conditions, and one is considered a proven innovation. The latter is Scaling Readiness, an evidence-based approach to co-design, implement and monitor scaling strategies for innovation teams and innovation portfolio managers, which Mitigate+ participated in developing with the Diversification in East and Southern Africa Initiative. Our innovations with the highest scaling readiness include an MRV framework for monitoring deforestation emissions in Colombia and an automated water level sensor with SMS notifications for Vietnamese rice farming. Both innovations have reached the stage of uncontrolled testing.

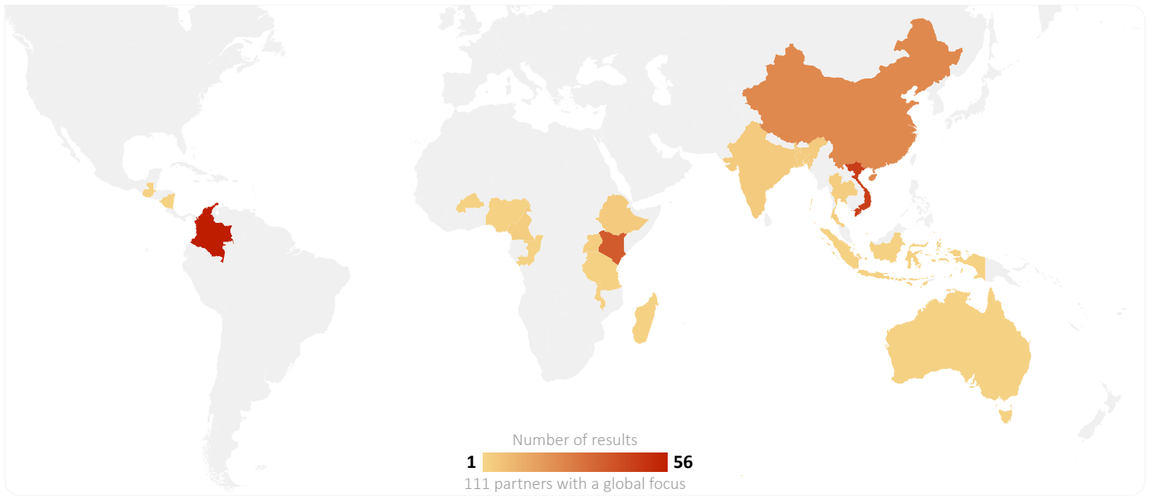
Innovations by type and nature



Of the eight innovations reported in 2022, four have maintained the same readiness level in 2023, two have increased their readiness levels, and two were discontinued. Most of the Initiative's innovations are related to policy and organizational or institutional innovations.

Number of results by country

Data here represents an overview of reported results in 2022 and 2023. One result can impact multiple countries and can therefore be represented multiple times.



The country with the most results from Mitigate+ in 2023 was Colombia, followed by Vietnam, Kenya, and China. As mentioned in Section 2, 27 percent of the Initiative's 2023 outputs are global in scope.

Overview of reported results

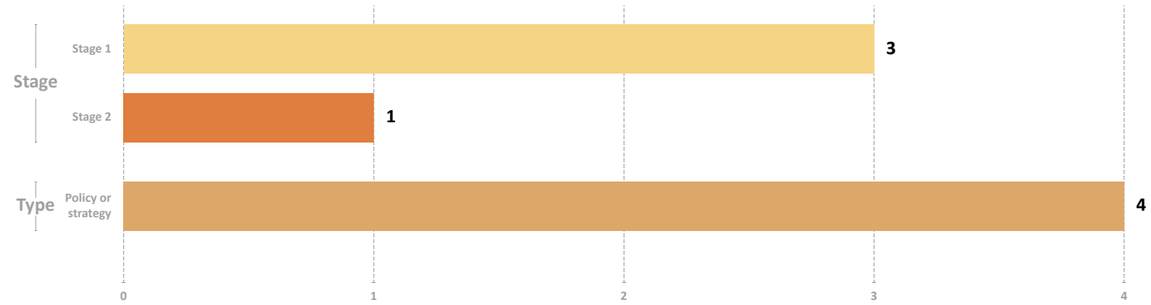
Outputs	
Knowledge product	142
Other output	48
Capacity sharing for development	24
Innovation development	23

Outcomes	
Policy change	4
Innovation use	1
Other outcome	1

Most of the Initiative's outputs in 2023 were knowledge products (143) along with a high number — 23 — of innovations developed. Our outcomes were focused on influencing policy changes in our four target countries.

Number of policies by stage and by type

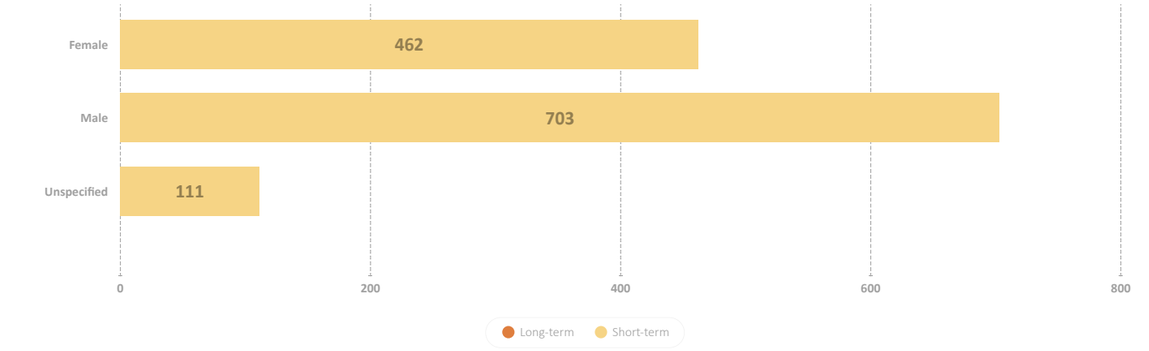
Data here represents an overview of reported results in 2022 and 2023. One result can impact multiple countries and can therefore be represented multiple times.



Most of the Initiative's outcomes related to policy change are in an advanced stage, with the most common type generated being policies or strategies.

Number of individuals trained by CGIAR

Data here represents an overview of reported results in 2022 and 2023. One result can impact multiple countries and can therefore be represented multiple times.



Training is an important activity for this Initiative. We supported long-term training in 2022 but stopped this type of training in 2023. Over time, most of our support has been on short-term training, with the number of trainees greatly increasing from 2022 to 2023. During its two years of operation, the Initiative has trained 637 women, representing 38 percent of all its trainees.

Section 5: **Partnerships**

Partnerships and Low-Emission Food Systems' impact pathways

Mitigate+ progress in 2023 was significantly facilitated by strategic partnerships in each of its target countries, which benefited from collaborations with key organizations chosen for their experience, complementary skills, and widespread support for the Work Package theory of change.

In Kenya, a partnership with AGNES incorporated a food systems approach into a workshop for African leaders, supporting the continent's progress in meeting the SDGs. Substantial research on livestock-related emissions was developed in collaboration with the French Center for International Agricultural Research and Development (CIRAD) and the Wageningen Food and Biobased Research organization of Wageningen University and Research. The Initiative's implementation of LL4P in partnership with Kenya's Kaimosi Agricultural Training Centre and the University of Eldoret ensured local commitment and active participation.

Aligned with Colombia's national objectives, Mitigate+ aims to build global models and to quantify GHG emissions. The Initiative collaborated with IIASA and the German Research Center for Geosciences (GFZ Potsdam) to monitor the impact of agricultural practices on carbon emissions, contributing to a nuanced understanding of emissions sources. IIASA also carried out research on the SDGs and climate change mitigation in Colombia, addressing global challenges with local impact. The Initiative participated in a global comparative study on the UNFCCC's REDD+ process, providing valuable information on forest data and collaborating with WP3 in collaboration with the Center for International Forestry Research (CIFOR). Additionally, the identification of local partners led to cooperation with Javeriana University, Michigan State University, NGOs, and government entities, which implemented LL4P in Colombia. Research on citizen juries was carried out with the University of Marburg, highlighting the transformative potential of sustainable food systems.

In China, IESDA-CAAS and the China National Rice Research Institute researched GHG emission reduction strategies and identified unique opportunities in the country. . Furthermore, this partner's experience in the Chinese agricultural sector promotes life-cycle assessment in dairy companies. Cooperation with academia was fundamental in structuring and implementing LL4P, with Zhejiang University connecting the research with local actors and government agencies. Also, the University of Notre Dame led efforts to establish a community of practice for multistakeholder platforms, contributing to effective governance structures in different countries.

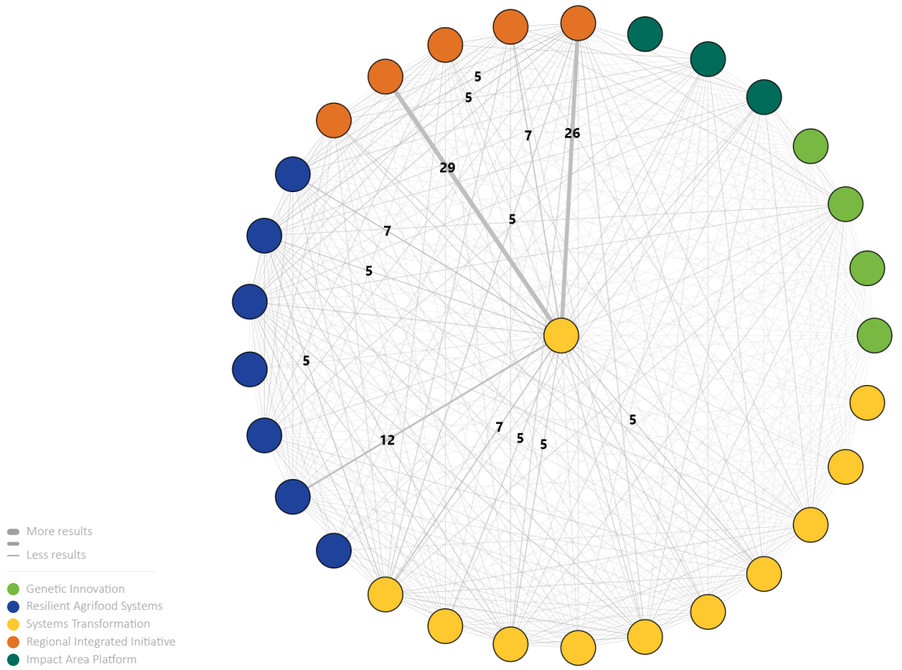
To ensure that research efforts align with rice-shrimp systems and digital monitoring of rice activities, the team in Vietnam partnered with An Giang University. To achieve success of LL4P in the country, a partnership was established with Nam Long University and the Health and Agricultural Policy Research Institute to organize workshops and participate in a collaborative assessment of the aquatic food system in Can Tho. Strategically, the Initiative's choice of partnership with Wageningen Economic Research advanced understanding of how financial instruments align with the economic landscape. Additionally, Wageningen Food and Biobased Research provided expertise in economics research and modeling on food loss and waste and global scales.

As a cross-cutting milestone of the Initiative, the contributions provided by the partnership with Rationale Advisors directed our engagement in the UNFCCC processes. Additionally, the University of Galway administers the CLIFF-GRADS program, constituting the capacity building component that is funding the knowledge building of young researchers contributing to Mitigate+.

Kevin Chen, China country lead and senior researcher fellow discussing with local stakeholders, (IESDA-CAAS), and the Zhejiang University the implementation of the LL4P in Qingshan Village in Zhejiang province. Credit: Mitigate + China team

Section 6: **CGIAR Portfolio linkages**

Low-Emission Food Systems' internal portfolio network



Connections are sized by the number of reported results. Collaborations where only one result was reported with a linkage between two Initiatives are excluded.

Portfolio linkages and Low-Emission Food Systems' impact pathways

Low-Emission Food Systems actively participated and collaborated with various other CGIAR Initiatives in 2023, fostering synergies and advancing the Initiative's objectives. Collaborations were initiated with the Initiative on National Policies and Strategies office in Colombia, and these will continue in 2024 to follow up on commitments made. In Vietnam, the team collaborated with the Asian Mega-Deltas (AMD) Initiative in building a multistakeholder dialogue on developing a regulatory framework for carbon markets in agriculture.

Mitigate+ demonstrated extensive collaboration in various initiatives within Work Package 3, including strengthening the implementation of LL4P in Kenya's Nandi County through a participatory workshop on a theory of change for low-emission food-system transformation with the Livestock and Climate (LC) initiative. In conjunction with the AMD Initiative, efforts are being made to integrate GHG emissions' calculations into carbon credit applications, encouraging stakeholders to adopt low-emission agricultural practices and participate in the carbon market. With the Nature-Positive Solutions Initiative, we jointly organized a series of webinars on food systems' transformation and its implications for CGIAR. A Community of Practice on Multi-Stakeholder Platforms (MSPs) was established with the Agroecology and NEXUS Gains Initiatives.

Work Package 4 collaborated with CGIAR Initiatives, including AgriLAC Resiliente and National Policies and Strategies, on developing sustainability strategies in the cocoa supply chain in Colombia. Additionally, Mitigate+ collaborated with the SLUS project in Colombia to reduce emissions from agricultural and livestock production systems while also promoting peace.

During COP28, the team co-organized an official side event with the Agroecology Initiative titled "Shifting the paradigm: Towards just, equitable low-emission food systems." The event analyzed the potential of an agroecological paradigm shift with perspectives from science, the Rio Convention, member states, and Indigenous communities.

Sandra Durango, postdoctoral fellow, presenting the the MRV Protocol in Peru for the Cacao Sector.
Credit: Oscar Diaz

Section 7: **Adaptive management**

RECOMMENDATION	SUPPORTING RATIONALE
Improve coordination among the CGIAR centers that are part of the Mitigate+ Initiative, transversely aligning activities and priorities. Likewise, improve communication between Work Packages at the country level through the organization of events with the teams and actors in each of the 4 countries.	In 2023, the work plan was structured around food systems and GHG emissions' mitigation in target countries, with a focus on country-specific needs. Lessons learned emphasized the crucial role of country leaders in planning, as their understanding of local conditions and external factors is essential. This approach guides the coordination of expertise toward meeting country-specific needs while ensuring alignment with the broader research Initiative.
Join efforts to develop a country-specific narrative on LL4P with local partners. It is essential to raise the profile of LL4Ps by leveraging the CGIAR global platform to highlight them as a promising and replicable model with governance, co-production and attention to inclusion and social outcomes at its core.	In 2023, LL4Ps proved to be effective models for showcasing low-emission practices in small community food systems. However, their success is not being sufficiently promoted within CGIAR outreach platforms. This is crucial not only to highlight individual LL4P achievements but also to organize events and village visits, as the team saw in the case of LL4P-China, to bring the results of scientific findings to public entities, thereby fostering strategic synergies and tangible results.
Integrate the activities of all Work Packages in China around the LL4P in Qingshan Village, with the aim of joining efforts to develop a pilot village with low-carbon emissions (zero) and food security and to promote work in carbon accounting.	The China team views LL4P as the central axis of the Initiative's work in that country. Qingshan is planned to become a "Zero-Carbon Village of the Future", bringing together the work of all the Work Packages. Activities of the Work Packages need to be aligned and focused on meeting the needs of each country.
Ensure that CIFOR is sufficiently funded to lead and accelerate implementation of LL4P in Viet Nam.	By 2024, to avoid operational limitations, it is proposed to ensure that CIFOR captures most of Work Package 3 funds on accelerating implementation of LL4P, keeping Work Package 3 funds for IRRI and WorldFish to a minimum, covering only the time and expenses of trips of the main personnel.
Focus the results of the Initiative on national plans (GHG inventories, NDCs, government plans). In Colombia, seek to disseminate results and unify the efforts of multiple Initiatives to give greater scope to the recommendations for GHG inventories.	During 2023, progress was made in producing and disseminating the MRV protocol and implementing pilots in different production sectors. Exploration of government-level articulation must continue, taking advantage of the expertise and focus of other Initiatives that operate in Colombia, such as the "Fertilizar Derecho" and CSICAP (Climate-smart initiatives for climate change adaptation and sustainability in prioritized agricultural production systems) projects, giving more scope to the recommendations for GHG inventories and thus delivering a more complete information package.

Section 8: **Key result story**

Colombia begins testing Mitigate+-designed protocol to monitor, report and verify deforestation risk

Field GHG data collection on livestock and rice systems Casanare, Colombia. Credit: Miguel Antonio Romero Sanchez, CIAT

The CGIAR Initiative on Low-Emission Food Systems, or Mitigate+, has developed a protocol for monitoring, reporting, and verifying the risk of deforestation from the production of key agricultural commodities in Colombia. Government ministries have endorsed the implementation of the protocol to realize the commitments under the country's zero-deforestation initiatives. The National Federation of Coffee Producers of Colombia is piloting the protocol, with results due in July 2024.

Agriculture, forestry, and other land uses (AFOLU) contribute significantly to total greenhouse gas (GHG) emissions in Colombia. Implementing a system that can monitor, report, and verify (MRV) deforestation and thus emissions from AFOLU is challenging; doing so at the farm level is particularly complex. Yet having such a system is necessary to realize the objectives of zero-deforestation initiatives in Colombia.

An MRV protocol has been developed to address this challenge. Using the protocol will reduce the uncertainty surrounding calculations in national GHG inventories due to deforestation and contribute to expanding natural conservation areas in production zones among various agrifood value chains.

The Mitigate+ MRV protocol uniquely guarantees transparency in monitoring deforestation risk and facilitates adherence to established zero-deforestation agreements. It also fosters inclusion by promoting the involvement of rural women, youth, ethnic minorities, and other rural dwellers in the processes. Designed to enhance public-private cooperation, the protocol seeks also to strengthen the technical capacities for monitoring, reporting and verifying environmental resources, to attract green investments in the Colombian agrifood sector, and to support Colombia in meeting its international commitments on climate action and biodiversity conservation.

The protocol builds on solutions developed by the Alliance of Bioversity International and CIAT for monitoring deforestation, such as Terra-i and GeoFarmer, for collecting information like polygons and activity data. This makes it robust and cost-effective.

To facilitate the protocol's support for zero-deforestation agreements, Mitigate+ has established partnerships with the Colombian Ministry of Commerce, Industry, and Tourism, as well as with ProColombia, the organization responsible for promoting tourism and foreign investment in Colombia. The ministry considers such deployment a priority in relation to exports.

The Low-Emission Food Systems Initiative led the efforts to establish the above strategic alliances. One of our team members sits on an inter-institutional roundtable focused on due diligence issues related to the European regulation for value chains in Colombia and has successfully advocated for the inclusion of our protocol in these discussions. She was pivotal in arranging the implementation of a project piloting the protocol within the coffee sector.

Mitigate+ has also had discussions with the Colombian Ministry of Agriculture and Rural Development to identify financing mechanisms and to outline a roadmap for piloting the MRV protocol nationwide. The protocol has been proposed for use in developing a "deforestation-free meat" label for Colombia.

The full implementation of the protocol is expected to benefit a wide array of actors nationwide. These include tens of thousands of producers — both men and women — as well as researchers, extension agents, policymakers, and non-governmental organizations. The National Federation of Coffee Growers of Colombia is piloting the protocol, with funding coming from the European Union. Results of the pilot are due in July 2024.

> The MRV protocol we designed for monitoring deforestation in Colombia ensures transparent, efficient, and inclusive processes. It catalyzes national efforts, mitigating climate impact and fostering conservation within agro-productive landscapes — a transformative leap toward a greener future for the country.
>
> Sandra Guisela Durango Morales, a postdoctoral fellow in the Multifunctional Landscapes program of the Alliance of Bioversity and CIAT and a Mitigate+ scientist

Primary Impact Area

Other relevant Impact Area targeted

Geographic scope

Regions: Latin America and the Caribbean (LAC)

Country: Colombia

Front cover photo

Field GHG data collection on livestock andrice systems in Casanare, Colombia.
Credit: Miguel Antonio Romero Sanchez, CIAT

Back cover photo

Visit to Qingshan Village in Zhejiang province LL4P- China.
Credit: Ziqian Song, IFPRI-Beijing

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