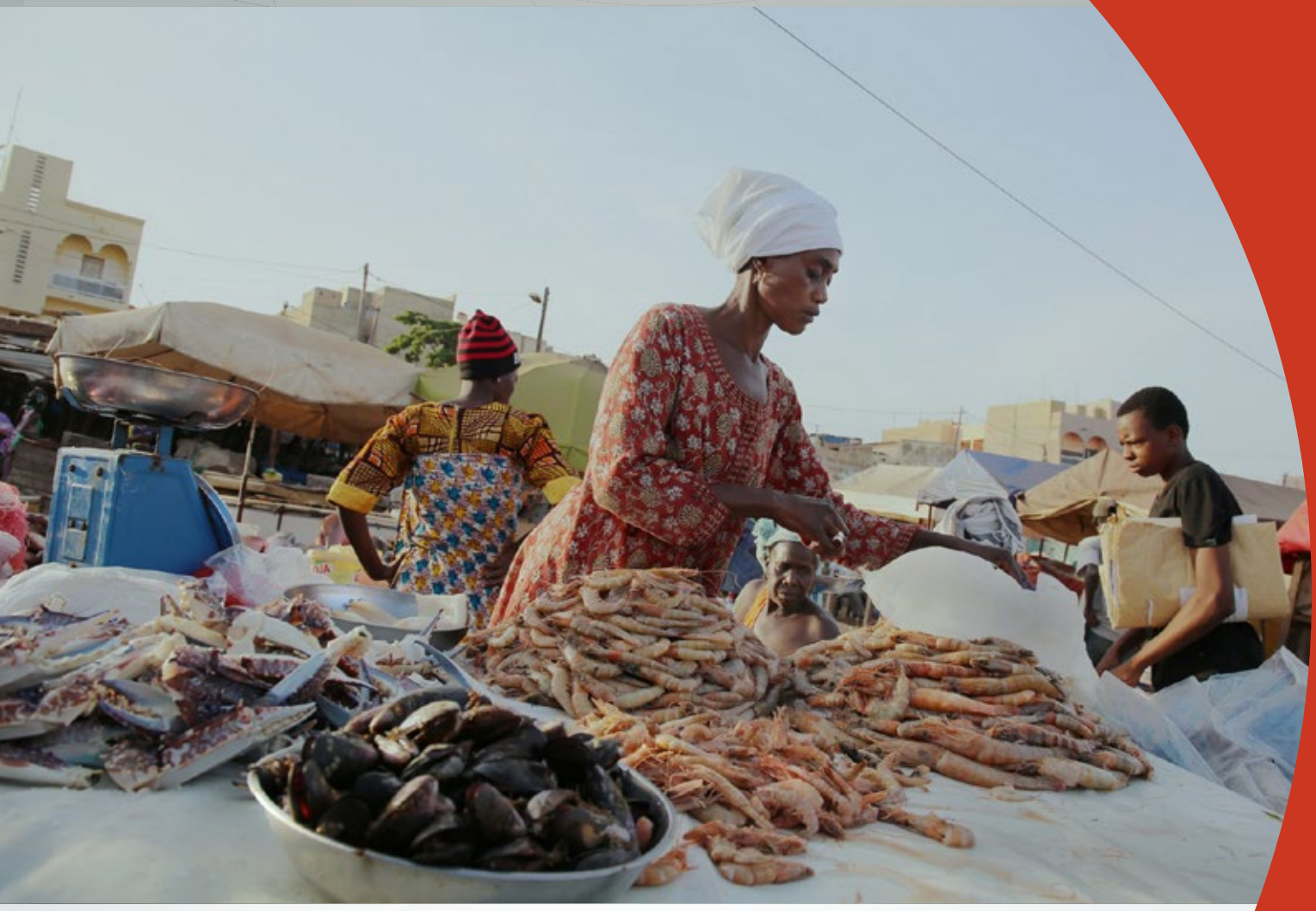
CGIAR

INITIATIVE ON
Resilient Cities



Resilient Cities through Sustainable Urban and Peri-urban Agrifood Systems

ANNUAL TECHNICAL REPORT 2022

CGIAR Technical Reporting 2022

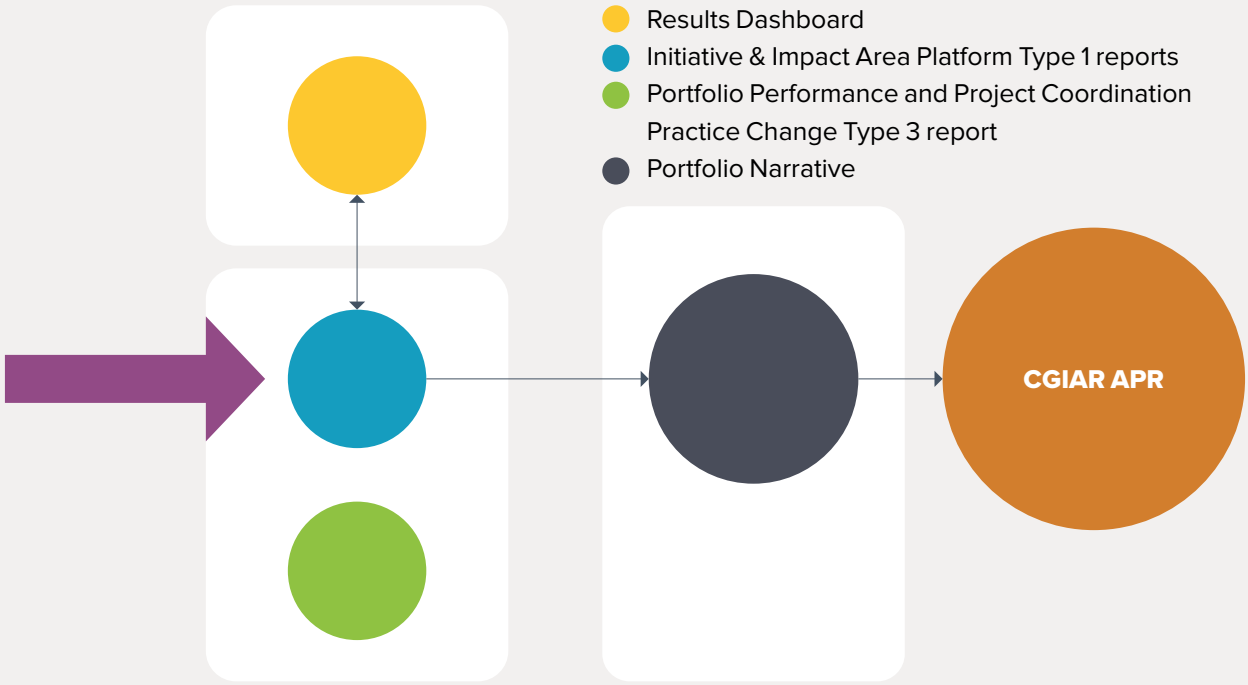
CGIAR Technical Reporting has been developed in alignment with the CGIAR Technical Reporting Arrangement.

This Initiative report is a Type 1 report and constitutes part of the broader CGIAR Technical Report. Each CGIAR 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 and Impact Area Platform reports, with quality assured results reported by Initiatives and Platforms 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 Technical Report constitutes a key component of the CGIAR Annual Performance Report (APR).



US$	2022	2023	2024
Proposal Budget from initial submission	US$5,000,000	US$10,000,000	US$10,000,000
Approved 2022 Budget	US$4,059,120	TBC	TBC

2022 Disbursement Target based on Approved FinPlan

Section 1 Fact sheet

Initiative name	Resilient Cities Through Sustainable Urban and Peri-Urban Agrifood Systems
Initiative short name	Resilient Cities
Action Area	Resilient Agrifood Systems
Geographic scope	**Regions:** East and Southern Africa; Latin America and the Caribbean; South Asia; Southeast Asia and the Pacific; West and Central Africa **Countries:** Bangladesh; Ethiopia; Ghana; Kenya; Peru; the Philippines; Sri Lanka
Start date	Jan. 4, 2022
End date	Mar. 31, 2025
Initiative Lead	Simon Heck – s.heck@cgiar.org
Initiative Deputy	Silvia Alonso – s.alonso@cgiar.org
Measurable three-year End of Initiative outcomes (EOI-Os)	**EOI-O 4:** At least 4 million consumers benefit from nutrition programs that use evidence-based UPU food environment and consumption toolkits, including approaches to increase women's decision-making power and to improve diet quality and nutritional status.
	EOI-O 1: Municipal authorities and their public and private sector partners in at least six cities adopt evidence-based approaches, tools, and business models for planning, implementing, and monitoring investments in a circular bioeconomy and/or strategies to mitigate environmental and human health risks.
	EOI-O 3: At least 10,000 small-scale producers in UPU zones can access and utilize improved technologies, skills, know-how, and management tools for safer, more sustainable, and more efficient vegetable, livestock, and fish production
	EOI-O 5: Urban planners and stakeholders participating in global networks of more than 200 cities representing over 400 million consumers use, promote, and improve research and innovation tools and approaches developed by research, training institutions, and civil society to accelerate UPU agrifood system.
	EOI-O 2: At least 10,000 local MSMEs in food processing, marketing, and agrifood service sectors can access and utilize business development toolkits, improved technologies, knowledge, and skills, with strong participation by women and youth.

OECD DAC Climate marker adaptation score*	**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*	**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 Gender equity marker score*	**Score 1: 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/16-resilient-cities-through-sustainable-urban-and-peri-urban-agrifood-systems/

*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.
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.

Urban farming in Kathmandu, Nepal.
Photo credit: Tom van Cakenberghe/IWMI

Section 2 Initiative progress on science and towards End of Initiative outcomes

Peri-urban agriculture on the outskirts of Hanoi.
Photo credit : CIAT/GeorginaSmith

The Resilient Cities Initiative is on track and the activities conducted over 2022 align with the theory of change. A lot has been accomplished in the first year of the Initiative. At least 15 knowledge products have been produced, based on, among others, baseline and scoping studies that have been done. Critical information necessary to meet the Initiative's outcomes has been generated. Examples of activities conducted and tools developed in 2022 are (i) a comprehensive climate investment analysis across 15 countries, capturing market, regulatory, and institutional factors that will be necessary to offer advisory services for start-ups and business scaling; (ii) profile assessments of food markets in three cities to help identify priority areas for research towards strengthening informal markets as sources of safe and healthy diets; (iii) scoping studies and situation analysis on urban and peri-urban food production for knowledge transfer of most efficient technologies; (iv) strengthening the capacity of youth in engaging in safer and productive urban and peri-urban food production systems; (v) an inventory of food environment and diet assessment tools of relevance to urban settings; (vi) investigations on livestock keeping as part of food systems in urban settings; (vii) starting the development of urban food environment, diet and nutrition profiles for countries in the Initiative; and (viii) testing the validity of an artificial intelligence phone application to measure nutrient intake.

The Initiative has also worked on several innovations. These include an Unstructured, Supplementary Service Data (USSD) application to enable ease of access to healthy seedlings; and the Urban Food Environment and Diets (UFED) toolkit – an inventory of dietary assessment and food environment methods, as well as a capacity development program for women food vendors operating in informal markets. The Initiative has produced different knowledge products, including various peer-reviewed research papers, and has

Urban gardens in Cali, Colombia.
Photo credit: Juan Pablo Marin García

provided contributions to the revision of the World Health Organization (WHO) guidelines on risk assessment of water reuse, as well as to the evidence base regarding how institutional food markets can be managed. Additionally, a Circular Bioeconomy Innovation Hub involving 15 organizations (private waste companies, ministries, universities and other stakeholders) has been launched in Ghana, which constitutes the selected Initiative key result story for 2022. Through the hub, knowledge is generated and shared among stakeholders on how organic waste can be transformed into safe compost and co-compost, dry fuel, biochar, biogas, and on how aquaculture can thrive in symbiosis with wastewater treatment plants in urban settings.

The Initiative has engaged several stakeholders and partners including the World Bank, universities, cities, different Initiatives, non-governmental organizations and community-based organizations in six countries. In this first year of the Initiative, a strong focus has been placed on positing the Initiative within global dialogues and initiatives focused on urbanization and food systems. Together with the World Bank, the Initiative has established an Urban Food System Community of Practice so that the profile of urban food systems research and investments is raised within the World Bank. The Initiative has been an active member of the Milan Food Policy Pact, which has helped strengthen our engagement with some of our target cities. The Initiative has had dialogue with several international stakeholders interested in the future of urban food systems to identify priority areas for work, and in particular research gaps that the Initiative should be addressing. These include, among others, the EAT forum, the UN Food Systems Summit Alliance and the C40 global city network.

Memoranda of Understanding have been negotiated with city governments in three countries (Nairobi, Dhaka and Quezon city, in the Philippines) to define the contribution of CGIAR research to the implementation of urban food system strategies as defined by the cities, and to facilitate the required technical work across the Initiative's work packages.

In Addis-Ababa, Resilient Cities is collaborating with the One Health Initiative to integrate the food system assessments conducted by both Initiatives in the city, as well as developing a common approach for in-country stakeholder engagement. The Initiative is cognizant that the future generation needs to be aware of the urbanization challenges ahead, and has thus engaged students and young entrepreneurs in Lima on a "resilient cities challenge", to increase engagement of youth in urban food system activities. Further, the Initiative has identified as a key priority and is successfully engaging youth in safe production and marketing of fresh produce and increasing awareness, access and use of healthy seedlings in cities.

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

Nutrition, Health, and Food Security

Poverty Reduction, Livelihoods, and Jobs

Gender Equality, Youth, and Social Inclusion

Climate Adaptation and Mitigation

Environmental Health and Biodiversity

Teams from CGIAR's three Action Areas — System Transformation, Resilient Agrifood Systems and Genetic Innovation — worked to develop an improved set of Action Area outcomes in October 2022. Since this was near the end of the reporting cycle for 2022, it was decided not to update the theories of change based on these new Action Area outcomes.
The exception to this is Genetic Innovation — for this Action Area, as the new outcomes had already been widely discussed among the relevant Initiatives, and with its advisory group of funders and other stakeholders, the decision was made to update their outcomes in time for the 2022 reporting cycle.

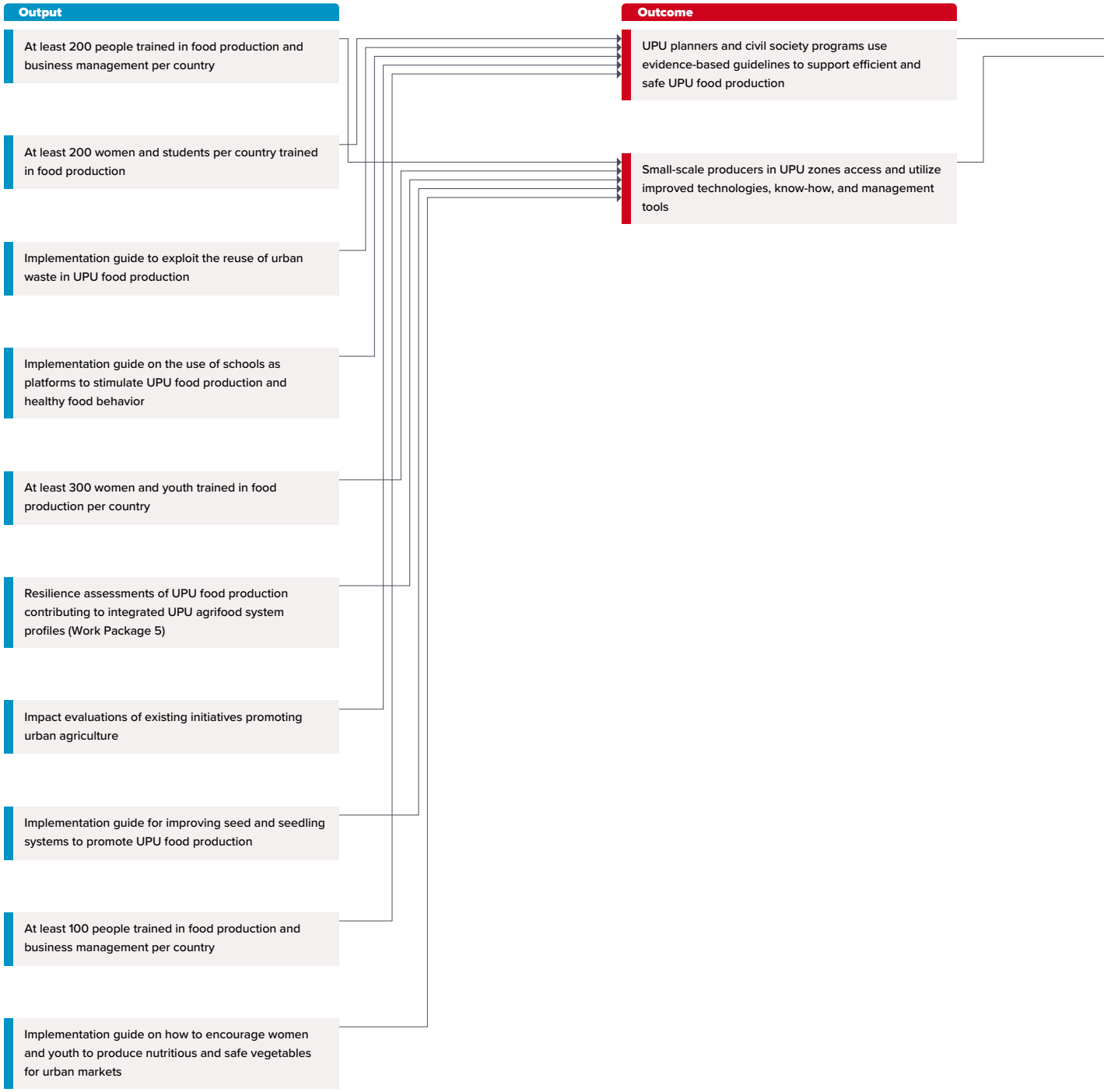
Progress by End of Initiative outcome

EOI-O 4 **At least 4 million consumers benefit from nutrition programs that use evidence-based UPU food environment and consumption toolkits, including approaches to increase women's decision-making power and to improve diet quality and nutritional status.**	An inventory of food environment and diet assessment tools is currently being compiled and planning is under way for the design of a decision-making tool for UPU policymakers and researchers to prioritize combinations of tools, based on the nutrition needs of their target population and resource availability. Desk reviews are also in progress to synthesize evidence on food environments and diets in urban areas of the Resilient Cities focus countries and identify gaps.
EOI-O 1 **Municipal authorities and their public and private sector partners in at least six cities adopt evidence-based approaches, tools, and business models for planning, implementing, and monitoring investments in a circular bioeconomy and/or strategies to mitigate environmental and human health risks.**	Through Work Package 3, the Initiative works through two complementary impact pathways: The first impact pathway is based on: (i) advisory services; (ii) capacity development; and (iii) support of the Resource Recovery and Reuse (RRR) investment climate analysis targeting the verification and transferability of previously identified and tested Controlled Environment (CE) technologies and business models in different countries and contexts. In Year 1, the Work Package started a comparative investment climate analysis across and beyond all key countries (n=15) to capture market, regulatory, and institutional factors for our advisory services for start-ups and business scaling. The analysis is done in close collaboration with Nature+ and links to the CE innovation hub for capacity-building established in Ghana by Work Package 3 and Work Package 5. The work is progressing well. The second impact pathway targets drivers for transformative institutional and individual change toward the adoption of food safety practices within crop and livestock value chains; for example, where crops are irrigated with wastewater. The analysis involves new staff and PhD students and has only started in Year 1.
EOI-O 3 **At least 10,000 small-scale producers in urban and peri-urban (UPU) zones can access and utilize improved technologies, skills, know-how, and management tools for safer, more sustainable, and more efficient vegetable, livestock, and fish production.**	Situation analyses have been undertaken on various aspects of UPU production in three cities with more ongoing to enable informed decisions on delivery of improved technologies, strengthening capacity and engaging youth in safer, more productive UPU systems. Based on some of these scoping studies, improved technologies for vegetable production, revolving around high-quality seedling systems, are being evaluated with farmers, youth groups, commercial propagators, and tertiary education institutes for their impact, acceptability, and potential uptake with good progress made.

EOI-O 5 **Urban planners and stakeholders participating in global networks of more than 200 cities representing over 400 million consumers use, promote, and improve research and innovation tools and approaches developed by research, training institutions, and civil society to accelerate UPU agrifood system.**	Together with the World Bank, the Initiative has established the "Urban Food System Community of Practice" within the World Bank as a mechanism to inform World Bank managers and their clients of advances in urban food system research. Several entry points have been identified in new and planned World Bank urban food system projects, such as in Nairobi. The Initiative negotiated Memoranda of Understanding with three cities that define the contributions of CGIAR research to the implementation of urban food system strategies in each case. In Lima, the Initiative has started a collaboration with the Incubagraria entrepreneurship facility at the Universidad Nacional Agraria La Molina where we are implementing a "resilient cities challenge" for students and young entrepreneurs. In Nairobi, the Initiative is providing technical training on food system monitoring as part of the City's food system strategy. The Initiative has contributed research findings and perspectives to global city network forums.
EOI-O 2 **At least 10,000 local MSMEs in food processing, marketing, and agrifood service sectors can access and utilize business development toolkits, improved technologies, knowledge, and skills, with strong participation by women and youth.**	Market assessments have started in three cities (Dhaka, Lima, and Metro Manila) that will help identify priority areas for research. Such assessments could be expanded to other cities over the coming years, subject to interest and resources. Development of a women-oriented business skills capacity development program for food retailers operating in urban informal markets (e.g., street vendors, kiosks) has been initiated and the pilot-test of the program is planned to start in two cities in 2023.

Section 3 Work Package-specific progress

Work Package 1:
Enabling sustainable production of nutritious foods in (peri-) urban zones



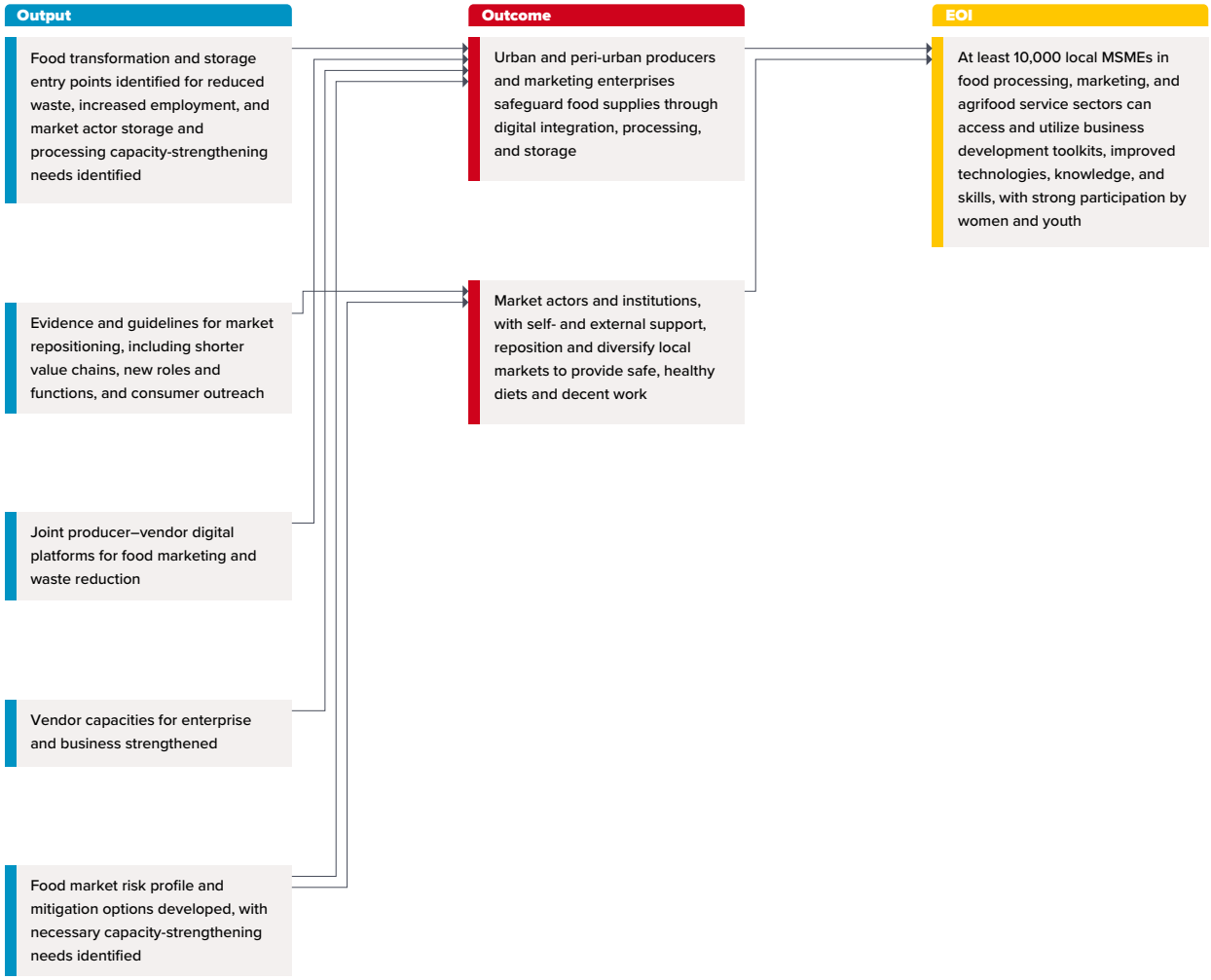
EOI

At least 10,000 small-scale producers in UPU zones can access and utilize improved technologies, skills, know-how, and management tools for safer, more sustainable, and more efficient vegetable, livestock, and fish production

Work Package 1 progress against the theory of change

Activities were implemented according to the theory of change and research questions focusing on Nairobi, Addis Ababa, Dhaka, and Manila. Several scoping studies were initiated as planned, with a number concluded during 2022, with others progressing into 2023, to enable an understanding of the situation in the targeted cities of each scoping study. These studies will enable informed decisions on the next stages. Healthy seedling systems formed a key area of work. Scoping studies in three cities identified entry points to further promote the production and marketing of healthy seedlings. Increasing the awareness, availability, access to, and use of healthy planting material in UPU areas is seen as a critical factor to improving vegetable productivity and production, as well as safety and nutritional value. Attention has also been drawn to the potential benefits of developing a USSD application that will enable ease of access to healthy seedlings. A study on the UPU Agriculture Program (NUPAP) in the Philippines described how the government has supported urban agriculture in Metro Manila. A baseline study of 1,366 households in Dhaka — conducted in collaboration with the Dhaka Food Systems project of FAO and Wageningen University — showed much interest in urban gardening but lack of knowledge/skills, lack of inputs, and insect pests/diseases were important challenges faced by urban gardeners. Activities on recycling of urban waste for UPU agriculture have been planned in coordination with Initiatives currently under way, primarily in Nairobi. A study on the food safety of fruit and vegetable grown in urban Dhaka is ongoing. A situation analysis of youth involvement in UPU in Nairobi will aid the engagement of youth.

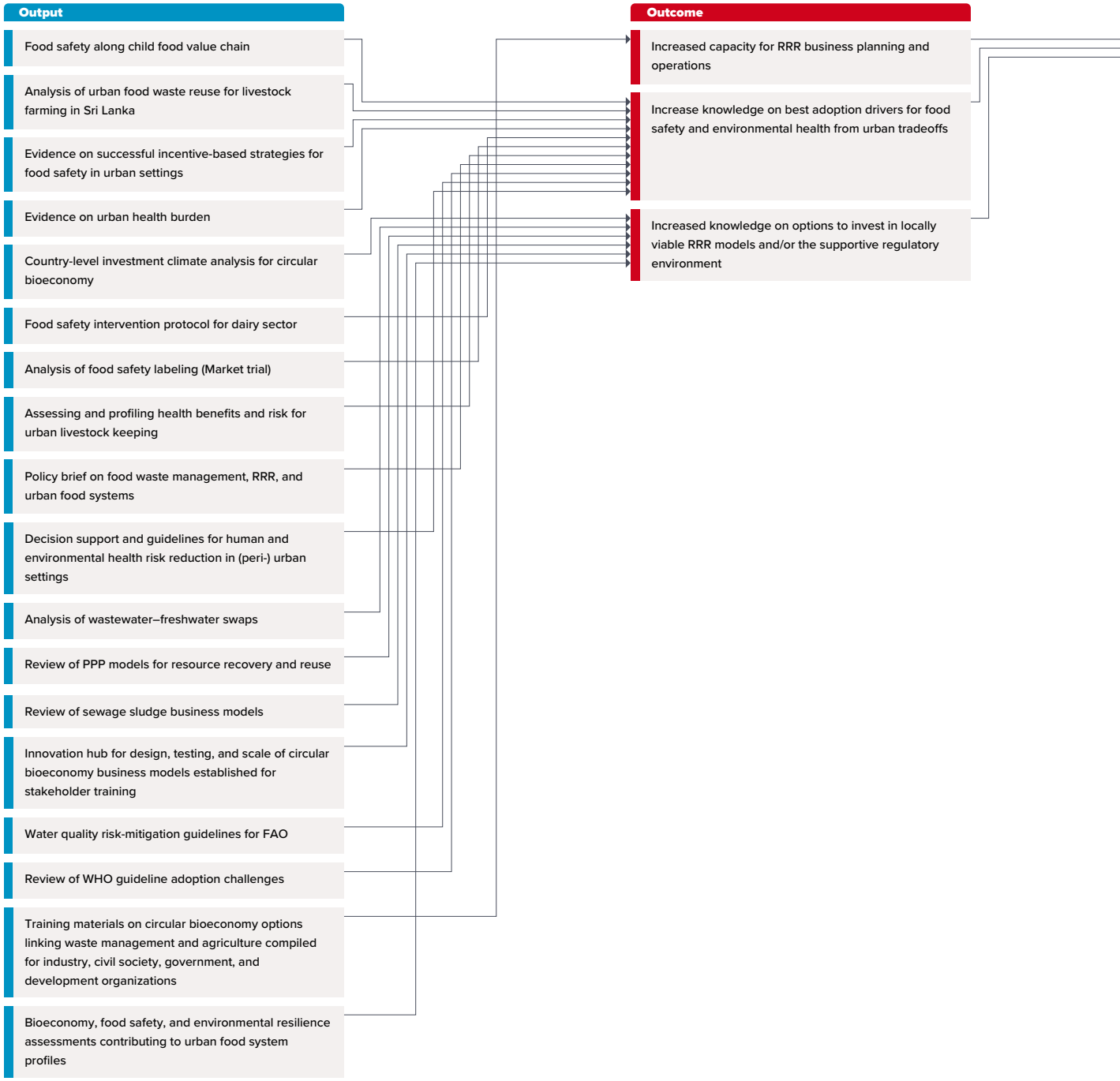
Work Package 2:
Building inclusive and sustainable food markets and safeguarding supply chains



Work Package 2 progress against the theory of change

Work Package 2 aims at strengthening the capacity of urban food systems, with emphasis in the informal food sector, to increase their ability to be sources of healthy, safe, and nutritious food. We have conducted profile assessments of food markets in selected target cities (Metro Manila, Dhaka, and Lima), with a focus on understanding food flows, market conditions, vendor practices and attitudes, food storage capabilities, and waste management, as well as food safety hazards. These assessments will now guide the identification of gaps and challenges to be addressed for achieving more efficient markets. We have also systematically identified learning gaps among informal market actors, especially women and youth in Metro Manila and Nairobi that have guided the development of a capacity-strengthening program for strengthening food businesses, combining face-to-face training with mentoring and peer-to-peer support to upgrade women and youth entrepreneurial business skills and increase vendors' ability to sell safe products and contribute to healthy food environments. Food safety and healthy food continue to be on the agenda of national and local governments, and feedback from the Initiative and partners about these issues will be key policy contributions in the coming year. The Initiative has also made contributions to the evidence base on how institutional food markets — social programs and school feeding programs, for example — can stimulate short value chains through sourcing a part of food supply from local production, based on work in Lima. The experience in Lima with farmers' markets has also contributed to understanding better how these types of markets can stimulate short food supply chains. A proposed output on assessing how food markets can contribute to increased urban resilience will not be delivered as part of Work Package 2 but will be combined with the country and city food resilience assessments to be conducted as part of Work Package 5 of the Initiative.

Work Package 3:
Strengthening circular bioeconomy, food safety, and the urban environment



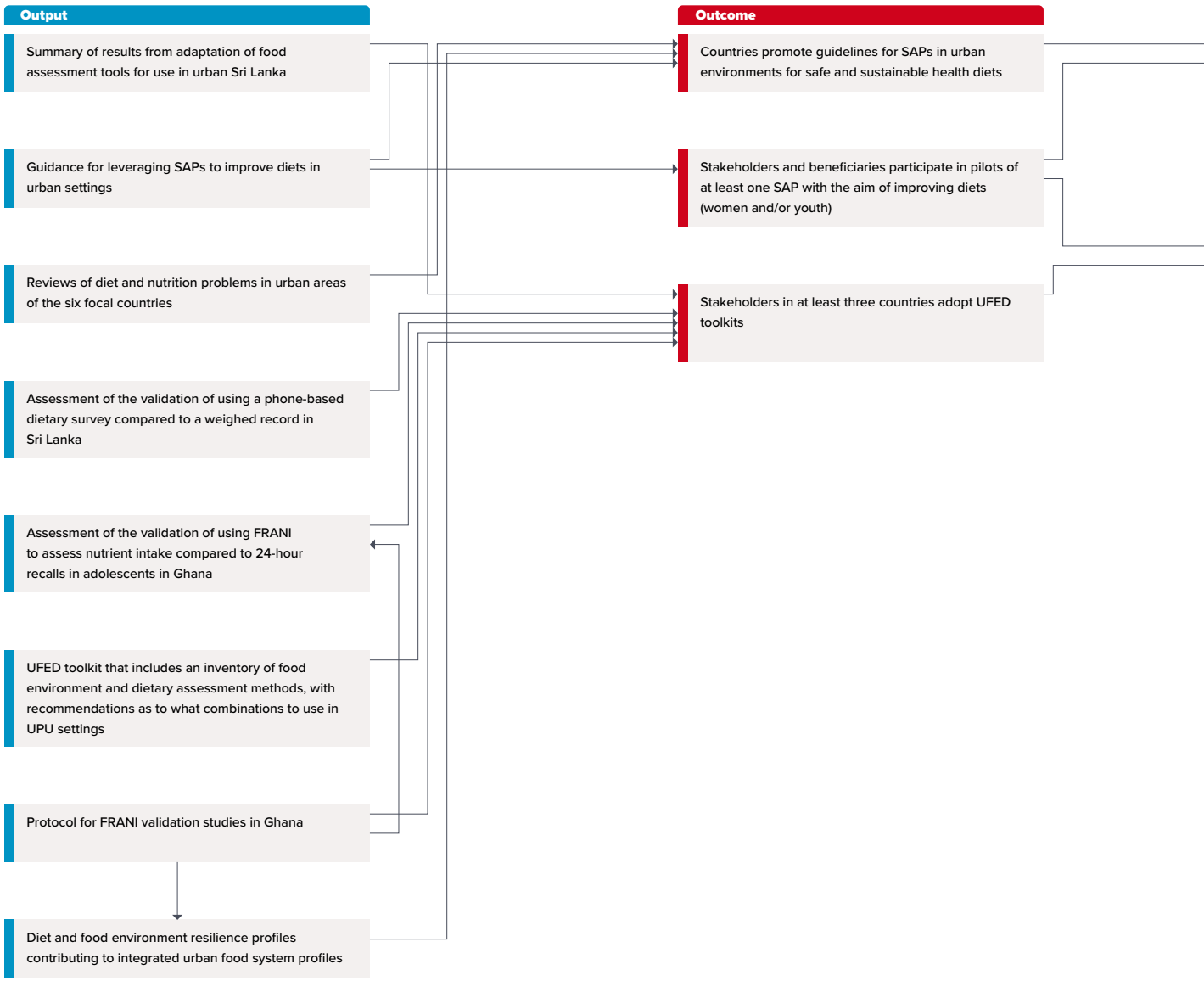
EOI

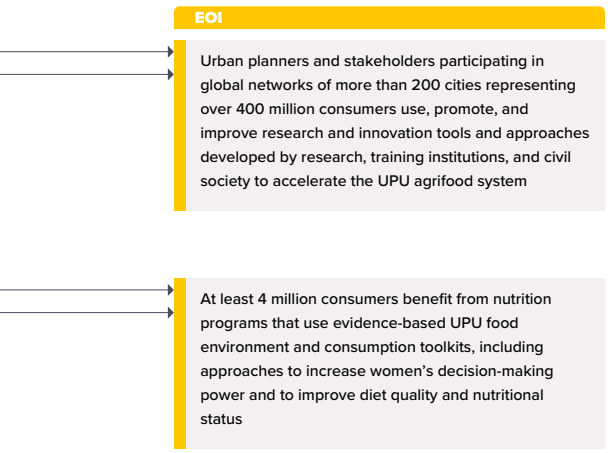
Municipal authorities and their public and private sector partners in at least six cities adopt evidence-based approaches, tools, and business models for planning, implementing, and monitoring investments in a circular bioeconomy and/or strategies to mitigate environmental and human health risks.

Work Package 3 progress against the theory of change

Noteworthy theory of change progress can be reported in view of the End of Initiative outcome to support municipalities and their public and private sector actors through an analysis of investment options, the enabling business environment, lessons learnt from circular bioeconomy based public-private partnerships (to be published in 2023), and the delivery of several papers and a T20 policy brief on food waste reduction and reuse. In view of water reuse related risk assessments and mitigation, a critical analysis of the related WHO guidelines with suggestions for guideline improvement was published. A lessons-learnt review on behavior change success stories is under way. Urban food systems health risks are being investigated, with an emphasis on livestock-keeping in urban settings. Studies have started in Addis Ababa and will be over time expanded to other cities among the Initiative's focus countries. The theory of change assumptions are holding. The main research questions so far are based on comparative cross-country studies to understand drivers and obstacles of transformative change (like the adoption of circular innovation or risk mitigation options) in different socioeconomic, regulatory, institutional capacity, and educational contexts. This new knowledge will feed into the capacity development (see Work Package 5 CE innovation hub) and advisory services targeted.

Work Package 4:
Improving food environments and consumer behavior for nutrition



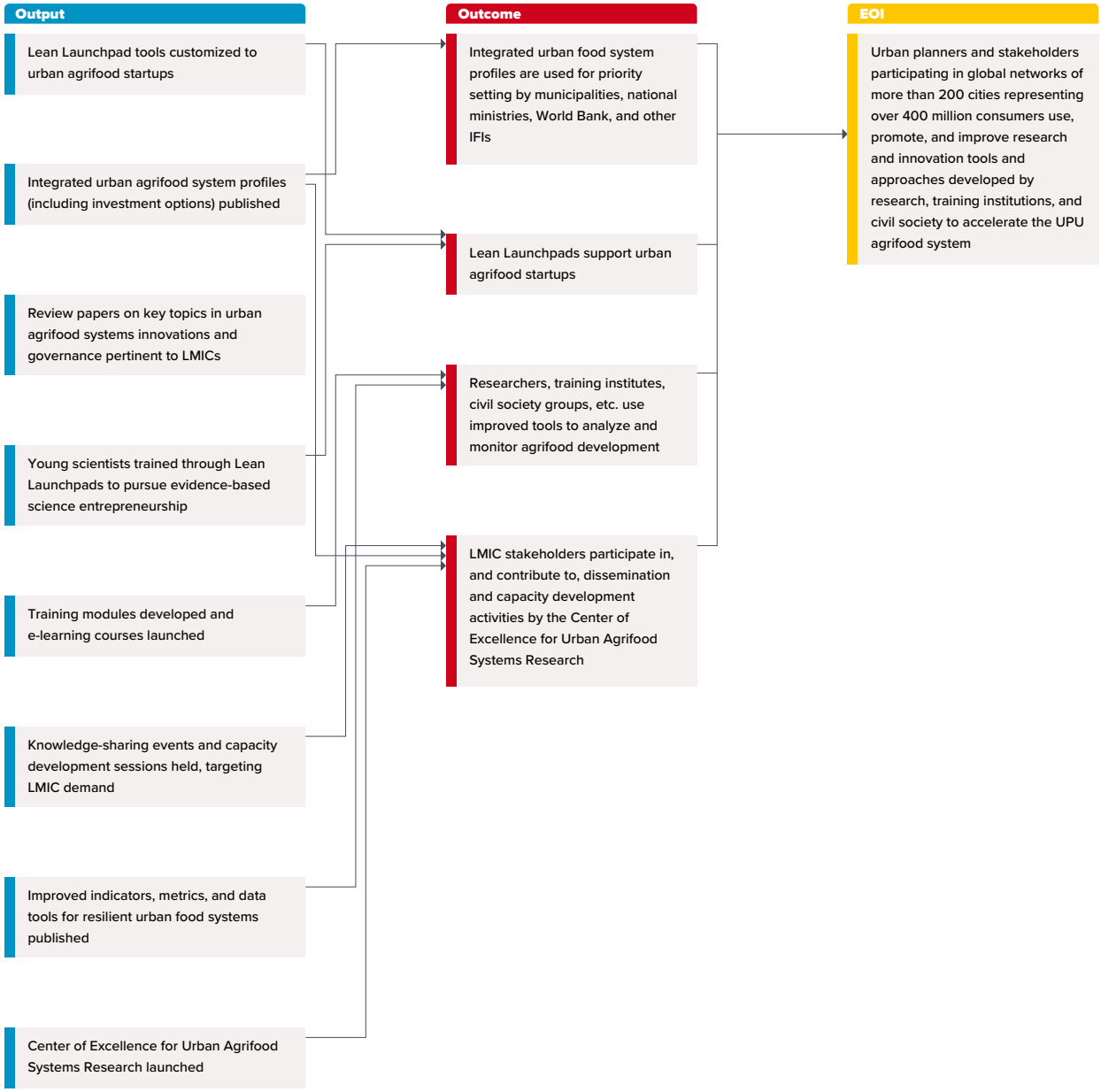


Work Package 4 progress against the theory of change

Work Package 4 progressed well on achieving the outputs outlined in the theory of change, which revolved around four main workstreams. The first focused on reviews of diet and nutrition issues, and programs and policies to address these in eight countries (Ghana, Kenya, the Philippines, Peru, Ethiopia, Bangladesh, Rwanda, and Sri Lanka). These will be used to develop urban food environment, diet, and nutrition profiles for each country (output 4.2.1) and inform future research activities. The second involved working with the University of Ghana to test the validity of an Artificial Intelligence phone application to measure nutrient intake (output 4.1.3) and feasibility of using a nudging feature to improve diets (output 4.1.5) among adolescents in Accra.

Development of the UFED toolkit, an inventory of dietary assessment and food environment methods with recommendations in urban settings (output 4.1.1) began in 2022. This included conceptual work and planning as well as adapting food environment assessment tools for urban environments in Sri Lanka in collaboration with the University of Peradeniya. This work involved mapping urban retail outlets and transect walks and the preparation of questionnaires for data collection (output 4.1.4). Finally, stakeholder meetings are guiding the planning of a nutrition-sensitive social protection workshop in June 2023 in Nairobi which will feed into guidance for leveraging social assistance programs to improve diets in urban areas (output 4.3.1).

Work Package 5:
Strengthening the evidence base and research and innovation capacities for UPU agrifood system governance and growth



Work Package 5 progress against the theory of change

Good progress has been made in the integrative Work Package 5 that emphasizes capacity development, knowledge sharing, and strengthening linkages with planning and policy processes. The focus in Year 1 has been on strengthening and updating partnerships with priority municipalities and their regional and global networks to provide research and technical capacity support as they expand their urban food system strategies. Memoranda of Understanding have been agreed with Nairobi, Dhaka, and Quezon City (Metro Manila) that will facilitate the uptake of Initiative research and technical training across all work packages. A new and important global partnership has been forged with World Bank, and we jointly launched the "Urban Food System Community of Practice" that provides CGIAR with an avenue for delivering science and technical support for the design and implementation of the increasing number of World Bank urban food system projects. A specific, hands-on collaboration has been agreed in the case of Nairobi. The Initiative takes a pluralistic approach to capacity development. In Ghana, we have launched a Circular Bioeconomy Innovation Hub (see key result story) building on previous CGIAR work. In Nairobi, we are providing technical training on food system monitoring as part of the city's food system strategy and by customizing global sets of indicators developed by the Mila Urban Food Policy Pact. In Lima, the Initiative has started a collaboration with the Incubagraria entrepreneurship facility at the Universidad Nacional Agraria La Molina where we are implementing a "resilient cities challenge" for students and young entrepreneurs. The Initiative has made good practice on developing a high-visibility series of "urban food system profiles" in key countrie s, starting in Bangladesh, which will be published in 2023. Similarly, the Initiative is co-authoring with the World Bank a *Food Systems for an Urban Planet* lead publication that will be available in 2023 as a *Future of Food* publication.

Work Package progress rating

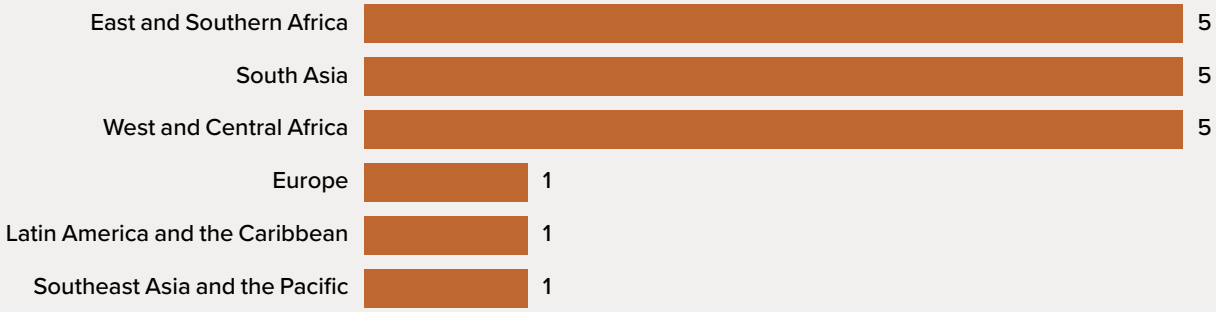
WORK PACKAGE	TRAFFIC LIGHT / RATIONALE	
1		• Annual progress largely aligns with the Plan of Results although with a number of activities slightly behind or delayed; most of these deviations will be addressed and accommodated in 2023 without jeopardizing the success of the Work Package 1 progress.
2		• The initial assessments and consultation with local stakeholders confirm the relevance of the Work Package 2 and its proposed areas of emphasis. • Initial assessments have been completed or are in latest phases. We are initiating discussions to design interventions to be implemented in 2023.
3		• Nearly all planned activities took place and over 80% of all deliverables crystallized. The remaining ones are in print.
4		• Work Package 4 has made significant progress towards the outputs outlined in the theory of change according to the planned timeline.
5		• Good progress on establishing collaboration with key cities that have embarked on new urban food system strategies. Capacity development and entrepreneurship hubs launched. Some delays with publications.

KEY		
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 jeopardise 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 jeopardise 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 jeopardise success of Work Package

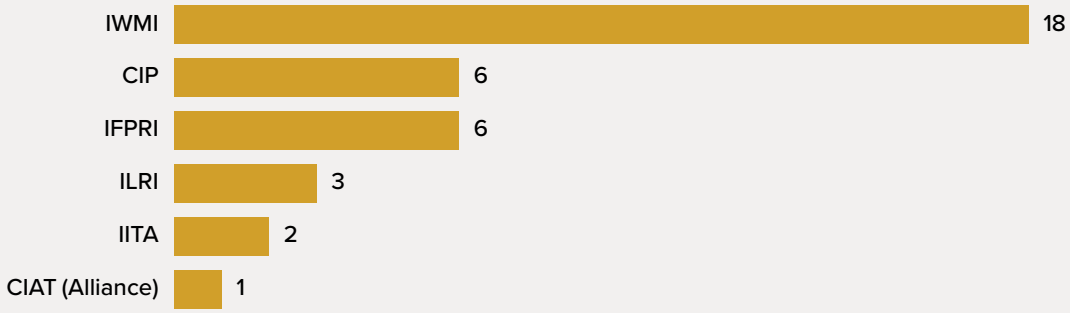
Section 4 Initiative key results

This section provides an overview of 2022 results reported by Resilient Cities. These results align with the CGIAR Results Framework and Resilient Cities' theory of change. Further information on these results is available through the CGIAR Results Dashboard.

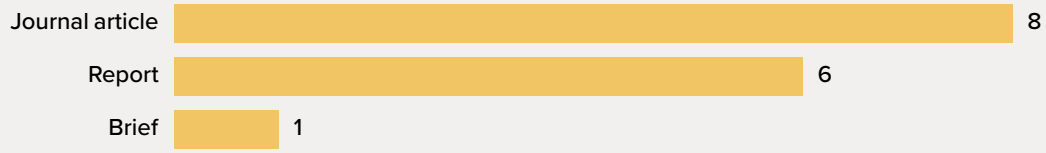
Results by region



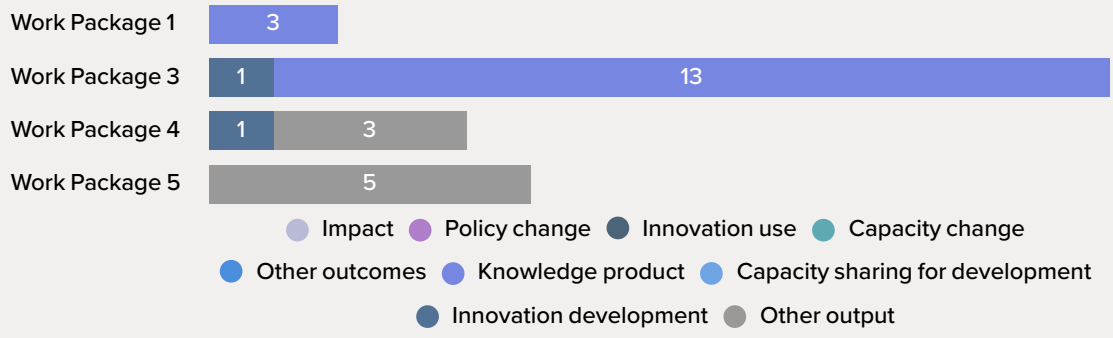
Contributing CGIAR Centers



Knowledge products by category



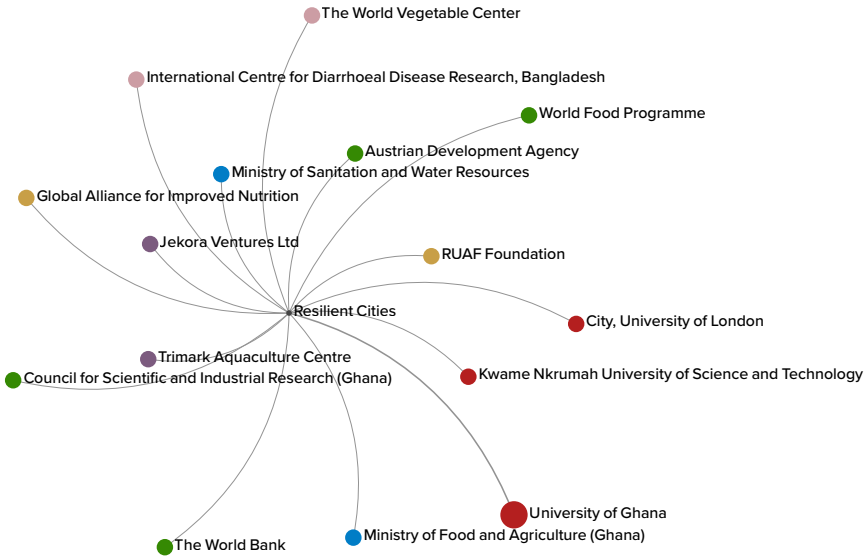
Results by Work Package



Results by country

The Initiative has started activities in six countries simultaneously. The focus of the activities differs by country, and it is driven by the in-country needs and priorities. Several outputs derived from 2022 activities are in the final stages of production, expected to be made available in CGSpace within the first half of 2023. An assessment of youth involvement in UPU will guide their future engagement in the Initiative. Meanwhile, interaction with tertiary education institutes/universities is creating awareness and capacity in youth on safe production of vegetables and the potential for agribusiness development, such as in the production of healthy seedlings, which is proving successful (Work Package 1); market assessments launched in three cities to identify research priorities to strengthen markets' efficiency and sustainability toward being spaces for healthy and safe food choices. We have completed assessment of learning gaps for women-oriented entrepreneurship programs for retailers in informal markets and streets (Work Package 4), (Work Package 5). Work Package 3 in collaboration with Work Package 5 made most progress in the set-up of the Circular Economy Innovation Hub in Ghana which involves private waste companies, ministries, universities, and other stakeholders to demonstrate CE innovations and build capacities in resource recovery and reuse.

Section 5 Impact pathway integration – External partners



Partners typology	# of partners	% of partners
Research organizations and universities (National) (Universities)	3	17.6%
Government (National)	2	11.8%
NGO (International) (General)	2	11.8%
Private company (other than financial)	2	11.8%
Research O&U (International) (General)	2	11.8%
All other categories	4	23.5%

Top five institution types

All other categories · Government (National) · NGO (International) (General) · Not applicable · Private company (other than financial) · Research O&U (International) (General) · Research O&U (National) (Universities)

Note: CGIAR Centres are excluded from the analysis. Partners and edges are sized by the number of results. Labels are shown for the partners involved in the most results.

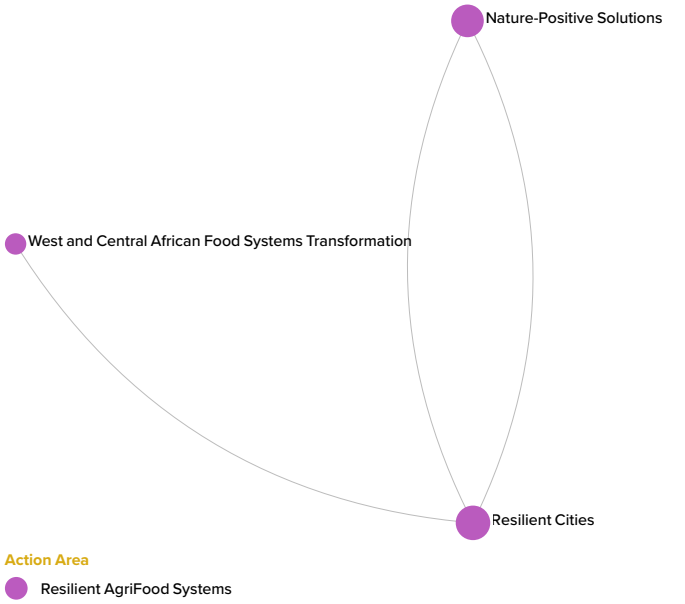
Partnerships and Resilient Cities' impact pathways

Some important highlights on partnerships are: the Initiative has signed a Memorandum of Understanding with Nairobi City County Government and initiated engagement with two additional cities; we have launched a Community of Practice with the World Bank to raise the profile of urban food systems research and investments across the international community; the Initiative has been invited to become a member of the Milan Urban Food Policy Pact; and it has engaged in dialogue with a large range of international stakeholders interested in the future of urban food systems, including EAT Forum, the UN Food System Summit Alliance where the Initiative leads the Research and Innovation Task Force, and the C40 global city network.

The Initiative has built sustained collaborations with local universities in Resilient Cities' focal countries with the University of Ghana (Ghana), Universidad Nacional Agraria La Molina (Peru), Jomo Kenyatta University (Kenya), and the University of Peradeniya (Sri Lanka). These partnerships include ongoing research efforts with professors at these universities and engaging their students and enumerator teams in-country. This work deepens the connections of Resilient Cities in the focal countries and serves to build capacity in-country in conjunction with local experts.

Fifteen organizations formally accepted to co-convene the CE Innovation Hub in Ghana, by adding their resources and/or using it for capacity development. These organizations are from the public institutions (e.g., Ministry of Sanitation and Water Resources, and Ministry of Food and Agriculture), private organizations/MSMEs (e.g., Clean Team, Safisana, Jekora Ventures Limited), NGOs (e.g. Catholic Relief Services, MDP), two university-based centers (Regional Water and Environmental Sanitation Center (Kumasi), Institute for Environment and Sanitation Studies (Accra), and international research organizations (IFDC, IWMI).

Section 6 Impact pathway integration – CGIAR portfolio linkages



Name	Action Area	Total connections	Total results
Resilient Cities	RAFS	3	8
Nature-Positive Solutions	RAFS	2	7
West and Central African Food Systems Transformation	RAFS	1	1

Note: Initiatives and the connections are sized by the number of results. The table includes the given Initiative's top connections and is sorted by Total Results. The network and summary table include all connections for the given Initiative, as well as the connections between the given Initiative's connections (i.e. the ego network)

Portfolio linkages and Resilient Cities' impact pathways

The Resilient Cities initiative linked with the Nature-positive Solutions (NPS) and in part with the Regional Initiative for West and Central Africa (WCAFST) in the set-up of the Circular Bioeconomy (CBE) Innovation Hub in Ghana and the analysis of business models and the enabling environment for the CBE. The linkages were supported by the involvement of the same experts but also the complementary focus of the Initiative, like Resilient Cities' work on circularity in urban areas and NPSs in rural areas. WCAFST added the regional rooting and stakeholder support, creating a triple-win situation. Additional engagements were established with the One Health Initiative to integrate the food system assessments in cities, starting in Addis Ababa. We have also explored opportunities for food safety and nutrition assessments in markets in cities, in collaboration with the SHiFT initiative.

Section 7 Adaptive management

RECOMMENDATION	SUPPORTING RATIONALE
More research on possible externalities of urban food production (Work Package 1).	Stakeholders in Dhaka expressed concern that urban food production could create problems with mosquitos and intensify competition over scarce water resources. There are also concerns about food safety when vegetables are produced using contaminated soil and water. Work Package 1 will address these concerns by: (i) conducting a food safety assessment of vegetables produced in urban areas; (ii) experimenting with soilless production systems to reduce the risk of contamination; and (iii) monitoring the effect of gardening technologies on mosquito populations and water use and linking with Work Package 3/IWMI which developed with FAO and WHO recommendation for safe wastewater use.
Do not assess the impact of the Philippines Urban and Peri-Urban Agriculture Program (NUPAP) (Work Package 1).	The formative study of the NUPAP program showed that the program does not conduct large-scale training or promotion of urban gardening, but rather supports existing initiatives ad hoc. This would not be suitable for impact evaluation as it would be difficult to attribute impact to NUPAP while we can also not easily identify a control.
Not to confuse stakeholders with the different initiatives' mandates, objectives, and global programs.	Even if we avoid mentioning the individual CGIAR Centers, national stakeholders can be confused by the complexity of the programs of the different new initiatives, of which eventually only a small section will be of local relevance. We should try harder to focus in meetings on the value we can offer the local participants (based on their demand), avoiding delimitations between the different initiatives.
More extensive adaptation of Farmer Business School (FBS) methodology for food vendor capacity-strengthening.	The group format and module-based learning approach of the FBS requires a more radical overhaul given the findings of market assessments this year. They indicate the lack of vendor organizations and lack of vendor availability for participating in face-to-face learning sessions. Stronger emphasis will be given in the methodology to mentoring and coaching and to peer-to-peer learning, and to explore the contribution of successful role models for "inspirational" guidance.
Removal of output on diet-related NCDs (Work Package 4).	"How can existing nutrition modeling tools be extended to identify optimal strategies or combinations of interventions that lower diet-related NCDs in low-income UPU populations?" After reflection, this planned output has been recommended to be dropped due to budgetary limitations.

Section 8 Key result story

Key stakeholders of the January 2023 engagement meeting for the innovation hub in Ghana. Photo credit: Maxwell Twumasi (IWMI-Ghana)

A Circular Bioeconomy Innovation Hub using co-ownership for sustainable impact facilitation launched in Ghana

To mitigate the negative effects of urbanization on resource use and environmental pollution, 15 key actors in the waste-sanitation-agriculture interface joined efforts to set up a Circular Bioeconomy Innovation Hub in Ghana. Based on a decade of CGIAR research, the hub links ministries, universities, science, and private sector, to offer their infrastructure and knowledge for building capacity in circular bio-solution for school students to professionals. Using co-ownership principles, the hub builds on jointly defined objectives and workplans.

The challenges of increasing urbanization in terms of food security and resource use, governance, and adequate waste management are growing with the urban populations. How can the negative urban footprint be mitigated? How can we reduce the mountains of food waste and safeguard the peri-urban environment? In response, the **CGIAR Initiative on Resilient Cities** has facilitated a Circular Bioeconomy Innovation Hub in Ghana linking key stakeholders from the public and private sector, research, and education. Under the leadership of the International Water Management Institute (IWMI), the Innovation Hub builds on a decade of CGIAR research on RRR from technology development to business modeling, the implementation of Public-Private Partnerships, and commercialization of recovered resources. The Hub can showcase, for example, how organic waste is transformed into safe compost and co-compost (with fecal sludge), dry fuel (briquettes), biochar or biogas, or how aquaculture can be a thriving business in symbiosis with wastewater treatment plants. Knowledge sharing ranges from

hands-on training in biomass transformation and valorization, business development, the analysis of the enabling environment, demand exploration, and marketing. The capacity-building program is not only targeting young professionals of micro-, small-, and medium-sized enterprises (MSMEs), but also the public sector, and has programs for schools looking at what households can contribute to a circular bioeconomy.

To ensure broad buy-in for a sustainable implementation, and increase its outreach, the Hub is running on co-ownership principles. Based on scoping and screening exercises involving 24 key stakeholders from various sectors, so far 15 organizations have formally accepted to co-convene the hub, by adding their resources and/or using it for capacity development. These organizations are from public institutions (e.g., Ministry of Sanitation and Water Resources, and Ministry of Food and Agriculture), private organizations/MSMEs (e.g., Clean Team, Safisana, Jekora Ventures Limited, MDF Training & Consultancy), NGOs (e.g., Catholic Relief Services), two university-based Centers (Regional Water and Environmental Sanitation Center, Kumasi), Institute for Environment and Sanitation Studies, Accra) and international research organizations (International Fertilizer Development Center (IFDC) and IWMI). The creation of this platform of co-conveners allows the linking of efforts of key organizations in the promotion of practical examples on how to implement and scale circular bioeconomy options in a local or regional context. Following the African proverb "If you want to go fast, go alone. If you want to go far, go together" the approach links demand (agriculture) and supply (waste management) and moves away from the overly technical focus of most circular initiatives. Finally, the Hub will also support accompanying research on its components including cropping trials with different waste-derived soil fertility enhancing resources.

The Hub is coming at the right time. Stakeholders seek support for fostering circular innovations and the buy-in exceeds our most optimistic expectations. The Hub also helps Ghana's Government in the commercialization of research and innovation, as shown in the interest of Ghana's Ministry of Environment, Science, Technology, and Innovation (MESTI), where the Hub supports the Ghana Commercialization Partnership Program, linking it to key related players like GIZ, the European Union, the World Bank, local embassies, etc.

"First tangible outcomes become apparent: Sri Lanka's Waste Management Authority asked us to join them as knowledge partner in establishing a second Innovation Hub in Sri Lanka where the authority is starting an officially accredited vocational training school for the whole country at a local resource recovery center."

Pay Drechsel, Circular Bioeconomy lead of the Initiative at IWMI Colombo

COVER PHOTO: Fatou Diouf is a fish seller at the Grand Yoff market in Dakar, Senegal. She specializes in shrimp, fish and squid. She sells her product every day for the last 15 years using bags of ice to keep her daily product fresh. She often attends online webinars to improve her business acumen and has gained the title as an "Agent Technique des Peche et de l'Aquaculture" from the "Centre National de Formation des Techniciens de Peche et de l'Aquaculture. Photo credit: M. Cooperman/IFPRI

We would like to thank all funders who supported this research through their contributions to the CGIAR Trust Fund.

LINKS TO IMPACT AREAS

Primary Impact Area: Climate adaptation and mitigation or environmental health and biodiversity

GEOGRAPHIC SCOPE

Country/ies: West Africa

KEY CONTRIBUTORS

Contributors: IWMI and local partners