CGIAR Initiative on Foresight

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).

- Results Dashboard
- Initiative & Impact Area Platform Type 1 reports
- Portfolio Performance and Project Coordination Practice Change Type 3 report
- Portfolio Narrative
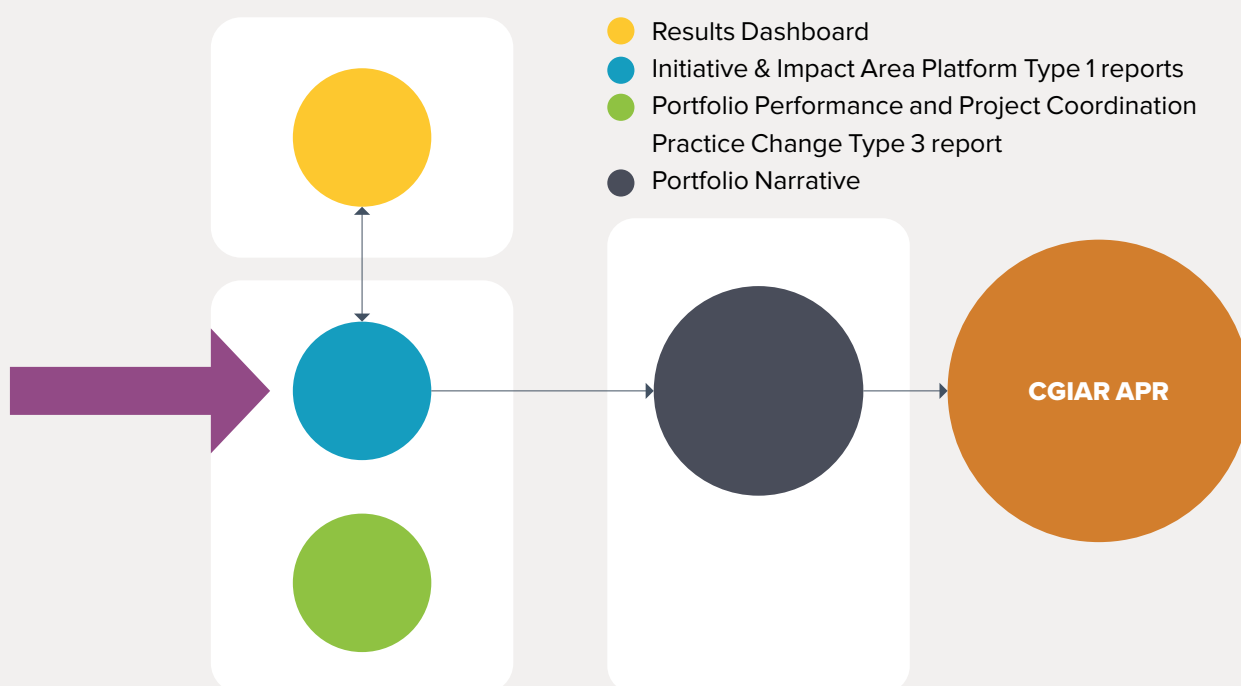
US$	2022	2023	2024
Proposal Budget from initial submission	US$8,400,000	US$9,333,333	US$10,266,665
Approved 2022 Budget	US$6,702,605		

2022 Disbursement Target based on Approved FinPlan

Section 1 Fact sheet

Initiative name	Foresight and Metrics to Accelerate Food, Land, and Water Systems Transformation
Initiative short name	Foresight
Action Area	Systems Transformation
Geographic scope	**Regions targeted in the proposal:** East and Southern Africa; South Asia **Countries targeted in the proposal:** Bangladesh; Brazil; China; India; Indonesia; Kenya; Malawi; Nepal; Rwanda; South Africa; Zambia
Start date	Apr. 1, 2022
End date	Mar. 31, 2025
Initiative Lead	Keith Wiebe – k.wiebe@cgiar.org
Initiative Deputy	Elisabetta Gotor – e.gotor@cgiar.org
Measurable three-year End of Initiative outcomes (EOI-Os)	**EOI-O 1: Better-informed global and regional decision-making** Global and regional partners contribute to and use foresight analysis to inform their decisions about investments to transform food, land, and water systems in ways that improve nutrition, livelihoods, equity, climate adaptation and mitigation, and environmental outcomes. **EOI-O 2: Better-informed national policy choices** Governments in at least six countries contribute to and use foresight analysis to better reflect climate and other risks in policy dialogues and decision-making, including policies and investments designed to make food, land, and water systems more resilient, while recognizing synergies and tradeoffs with other goals relating to nutrition, livelihoods, equity, and the environment. **EOI-O 3: Improved access to foresight tools and data** National, regional, and global partners in at least six countries and two regions contribute to and have access to state-of-the-art foresight tools, data, and systems-level metrics that identify major drivers and impacts on food, land, and water systems at national, regional, and global levels under alternative future scenarios. **EOI-O 4: Strengthened national foresight capacity** National partners in at least six countries where foresight capacity is still nascent, and other partners as appropriate, gain enhanced knowledge, aptitude, and skills with foresight tools, data, metrics, and analysis relevant to food, land, and water systems, through access to innovative training and delivery platforms and through collaborative research.

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 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/foresight/

*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.

Managing resources for multiple
objectives in Java, Indonesia
Photo credit: Aulia Erlangga/CIFOR

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

Members of the CGIAR Foresight Initiative compare scenario results at a workshop in Naivasha, Kenya. Photo credit: Keith Wiebe/IFPRI

Overall summary of progress against the theory of change

The Foresight Initiative (FI) is working with decision-makers and their technical advisors to better understand future challenges to food systems, interactions across multiple scales, tradeoffs between goals, and options for achieving goals, with the overall objective of informing food system choices today to improve outcomes in the future. In 2022, we made strong progress in five key areas.

First, FI is **engaging with partners** at national, regional, and global levels to understand their concerns, capabilities, and goals related to food systems. In 2022, this included partnering with the African Network of Agricultural Policy Research Institutes (ANAPRI), based in Zambia, and its member institutes in 16 countries, which are typically connected in an advisory capacity to

Ministries of Agriculture in those countries. We also partnered with research institutes with wider policy mandates, such as the Kenya Institute of Public Policy Research Analysis (KIPPRA) and the Zambia Institute for Policy Analysis and Research (ZIPAR), which are connected to those countries' Ministries of Finance and Planning. This engagement also includes dialogue with development partners such as the Bill and Melinda Gates Foundation (BMGF), the United States Agency for International Development (USAID), the Food and Agriculture Organization of the United Nations (FAO), the Asian Development Bank (ADB), the World Bank, and others.

Second, FI is **strengthening capacity** of partners to understand, use, and develop foresight tools. In 2022, this included enhancing access to and

Vegetable traders at Wakulima
Market in Nairobi, Kenya.
Photo credit:Sven Torfinn/Panos Pictures

transparency of data and modeling tools through updated documentation and rich metadata as a step toward open access, as well as development and delivery of in-person and online training programs on economy-wide (general equilibrium) modeling and agriculture-sector-focused (partial equilibrium) modeling. These training programs are being developed and delivered first to our partners in ANAPRI as the foundation for joint research focusing on their expressed needs and will then be made available more widely.

Third, FI is **improving data and tools** to conduct state-of-the-art analysis of future food system challenges and opportunities with our partners. In 2022, this included updating modeling tools to the latest climate projections from the Intergovernmental Panel on Climate Change. The team also worked on strengthening tools to model future scenarios relating to climate variability and extreme events, land use, water use, dietary change, pests, and pathogens, and their impacts related to Nutrition, Poverty, Gender and Inclusion, Environment, and Climate. We are doing this jointly with partners in developing countries and with leading global research institutions (including Wageningen University, the International Institute of Applied Systems Analysis (IIASA), Oxford University, and the Massachusetts Institute of Technology (MIT)), as well as with other CGIAR Initiatives (including National Policies and Strategies (NPS), Diversification in East and Southern Africa, Market Intelligence, Digital Innovation, and others).

Fourth, FI is **conducting joint research with partners** to inform decision-making by national governments and their development partners. This includes diagnostic studies of agrifood systems in the focus countries and analyses of the impacts of the conflict in Ukraine on prices, income, and food security in 19 low-income countries (Diao et al. 2022, Arndt et al. 2023; see also Mottaleb et al. 2022); of the impacts of climate change on the frequency of extreme events in Southern Africa (Thomas et al. 2022a and 2022b); and of the impacts of climate change and socioeconomic

factors on ecosystem services, nutrition, and health outcomes (Smith et al. 2022, Enahoro et al. 2023), among others.

Finally, FI is **communicating results** of joint analysis through ongoing engagement with governments and other partners as part of an iterative process to inform decision-making about the future of food systems through enhanced knowledge, trust, and ownership by partners of foresight analysis and findings.

The Foresight Initiative also encountered several challenges in 2022. One of these relates to **managing scope**. Foresight as an *activity* covers a vast scope, and indeed the entire CGIAR portfolio of Initiatives conducts foresight in various ways on particular topics related to the future of food systems. The Foresight Initiative focuses on links across diverse thematic areas, interactions across scales, and tradeoffs between goals and Impact Areas, over a period of several months to several decades into the future. As it is impossible to cover everything everywhere, the Foresight Initiative necessarily focuses on interactions and tradeoffs among certain topics, goals, and geographies — to the exclusion of others. This involves managing our own expectations as well as those of our partners while being responsive to partners' demands.

These and other areas of progress, challenge, and response are described further in Sections 3 to 8 below.

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.

Work Package 1: Megatrends affecting food, land, and water systems at global and regional scales

Work Package 2: Addressing regional and national challenges and priorities

Work Package 3: Enhancing access, transparency, and use of tools, data, and metrics

Work Package 4: Enhancing foresight skills and making learning actionable

EOI

Better-informed global and regional decision-making – Global and regional partners contribute to and use foresight analysis to inform their decisions about investments to transform food, land, and water systems in ways that improve nutrition, livelihoods, equity, climate adaptation and mitigation, and environmental outcomes

EOI

Better-informed national policy choices – Governments in at least six countries contribute to and use foresight analysis to better reflect climate risk in policy dialogues and decision-making, including policies and investments designed to make food, land, and water systems more resilient, while recognizing synergies and tradeoffs with other goals relating to nutrition, livelihoods, equity, and the environment

EOI

Improved access to foresight tools and data – National, regional, and global partners in at least six countries and two regions contribute and have access to state-of-the-art foresight tools, data, and systems-level metrics that identify major drivers and impacts on food, land, and water systems at national, regional, and global levels under alternative future scenarios

EOI

Strengthened national foresight capacity – National partners in at least six countries where foresight capacity is still nascent, and other partners as appropriate, gain enhanced knowledge, aptitude, and skills with foresight tools, data, metrics, and analysis relevant to food, land, and water systems, through access to innovative training and delivery platforms and through collaborative research

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.

AA — Systems Transformation

National and subnational government agencies use system transformation research to implement policies and programs that reduce emissions and enhance climate resilience and environmental sustainability of food, land, and water systems

AA — Systems Transformation

Private sector actors invest in business practices or models that promote sustainable and inclusive food systems and consumption of sustainable healthy diets, especially among nutritionally vulnerable population groups

AA — Systems Transformation

Global funding agencies and national governments use research evidence in the development of strategies, policies, and investments to drive sustainable transformation of food, land, and water systems to meet multiple CGIAR Impact Area targets

AA — Systems Transformation

CGIAR partners develop and scale innovations that contribute to the empowerment of women, youth, and other social groups in food, land and water systems

IA

Lift at least 500 million people living in rural areas above the extreme poverty line of US$1.90 per day (2011 PPP)

IA

End hunger for all and enable affordable healthy diets for the 3 billion people who do not currently have access to safe and nutritious food

IA

Close the gender gap in rights to economic resources on, access to ownership of, and control over land and natural resources, for more than 500 million women who work in food, land, and water systems

IA

Stay within planetary and regional environmental boundaries: consumptive water use in food production of less than 2,500 km3 per year (with a focus on the most stressed basins), zero net deforestation, nitrogen application of 90 Tg per year (with a redistribution toward low-input farming system) and increased use efficiency, and phosphorus application of 10 Tg per year

IA

Turn agriculture and forest systems into a net sink for carbon by 2050, with emissions from agriculture decreasing by 1 Gt per year by 2030 and reaching a floor of 5 Gt per year by 2050

SDG
1 NO POVERTY

SDG
2 ZERO HUNGER

SDG
5 GENDER EQUALITY

SDG
6 CLEAN WATER AND SANITATION

SDG
7 AFFORDABLE AND CLEAN ENERGY

SDG
8 DECENT WORK AND ECONOMIC GROWTH

SDG
10 REDUCED INEQUALITIES

SDG
12 RESPONSIBLE CONSUMPTION AND PRODUCTION

SDG
13 CLIMATE ACTION

SDG
15 LIFE ON LAND

Progress by End of Initiative outcome

EOI-O 1 **Better-informed global and regional decision-making — Global and regional partners contribute to and use foresight analysis to inform their decisions about investments to transform food, land, and water systems in ways that improve nutrition, livelihoods, equity, climate adaptation and mitigation, and environmental outcomes.**	FI is making progress toward this EOI outcome via: engagement with development partners, FAO, ADB, the Independent Science for Development Council (ISDC), the Food Systems Countdown Initiative, the Foresight4Food Initiative, and others; collaboration with strategic technical partners outside CGIAR, including the Agricultural Model Intercomparison and Improvement Project (AgMIP) network, Oxford University, and MIT; enhancements to data and models (including updating climate model results and productivity assumptions); synthesis briefs on the state of foresight knowledge on multiple aspects of food, land, and water systems; and new analyses of drivers and changes in supply and demand and their impacts on the five CGIAR Impact Areas.
EOI-O 2 **Better-informed national policy choices — Governments in at least six countries contribute to and use foresight analysis to better reflect climate and other risks in policy dialogues and decision-making, including policies and investments designed to make food, land, and water systems more resilient, while recognizing synergies and tradeoffs with other goals relating to nutrition, livelihoods, equity, and the environment.**	FI is responding to demands for foresight analysis related to climate and other risks and making significant progress. First, working with the NPS Initiative and partners, we contributed to government dialogues on food system impacts of the Russia-Ukraine conflict in at least three countries (Kenya, Malawi, and Nigeria). With the NPS Initiative, we also provided foresight analysis of Kenya's new national development plan to the government. There is demand for similar analysis in other focus countries. Finally, country diagnostic studies are underway that will provide foresight analysis to national governments in our focus countries. *(Note: A slight change in the wording of EOI outcome 2 is suggested in Section 7.)*
EOI-O 3 **Improved access to foresight tools and data — National, regional, and global partners in at least six countries and two regions contribute to and have access to state-of-the-art foresight tools, data, and systems-level metrics that identify major drivers and impacts on food, land, and water systems at national, regional, and global levels under alternative future scenarios.**	FI is making progress toward this EOI outcome through improved accessibility of tools and data via development of a Foresight portal website, model documentation, access to new data and metrics, and novel ways of presenting information. This includes tagging foresight material with rich metadata to allow use in search engines and to enhance the interoperability and reuse of new and existing data and metrics. The FI GitHub repository is allowing access to models and tools such as the Agrifood System Data Analysis Modeling (ADAM) framework, Ontology-based Information asset Metadata Schema, and spatial analogues. When completed, these will enhance access to foresight tools and data in the six focus countries as well as others.

EOI-O 4

Strengthened national foresight capacity — National partners in at least six countries where foresight capacity is still nascent, and other partners as appropriate, gain enhanced knowledge, aptitude, and skills with foresight tools, data, metrics, and analysis relevant to food, land, and water systems, through access to innovative training and delivery platforms and through collaborative research.

FI is making progress on this EOI outcome by working in collaboration with ANAPRI and Work Package 2 to implement in-person training on the development and use of foresight data and models for participants from 16 countries in Africa through the ANAPRI network, as the basis for joint analysis with partners in our focus countries. We are also developing online training materials to reach a wider audience.
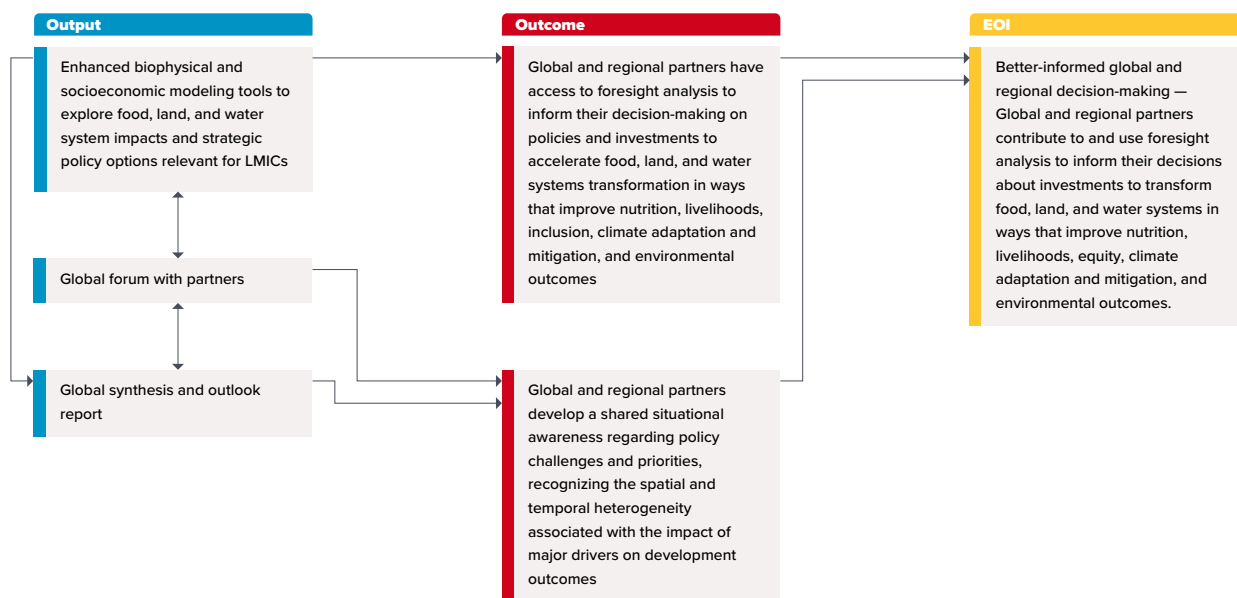
Section 3 Work Package-specific progress

Work Package 1:
Megatrends affecting food, land, and water systems at global and regional scales

Output	Outcome	EOI
Enhanced biophysical and socioeconomic modeling tools to explore food, land, and water system impacts and strategic policy options relevant for LMICs	Global and regional partners have access to foresight analysis to inform their decision-making on policies and investments to accelerate food, land, and water systems transformation in ways that improve nutrition, livelihoods, inclusion, climate adaptation and mitigation, and environmental outcomes	Better-informed global and regional decision-making — Global and regional partners contribute to and use foresight analysis to inform their decisions about investments to transform food, land, and water systems in ways that improve nutrition, livelihoods, equity, climate adaptation and mitigation, and environmental outcomes.
Global forum with partners		
Global synthesis and outlook report	Global and regional partners develop a shared situational awareness regarding policy challenges and priorities, recognizing the spatial and temporal heterogeneity associated with the impact of major drivers on development outcomes	

Work Package 1
progress against the theory of change

Work Package 1 operates at global and regional scales and identifies the major biophysical and socioeconomic trends affecting — and affected by — food, land, and water systems over the next several decades. Work Package 1 pays particular attention to interactions between Impact Areas and heterogeneity across regions, which in turn shape the complex choices faced by decision-makers in the countries that are the focus of Work Package 2.

In 2022, we engaged with key strategic partners such as ADB, BMGF, FAO, ISDC, and USAID, including during the FAO Science, Technology and Innovation Forum (Output 1.3).
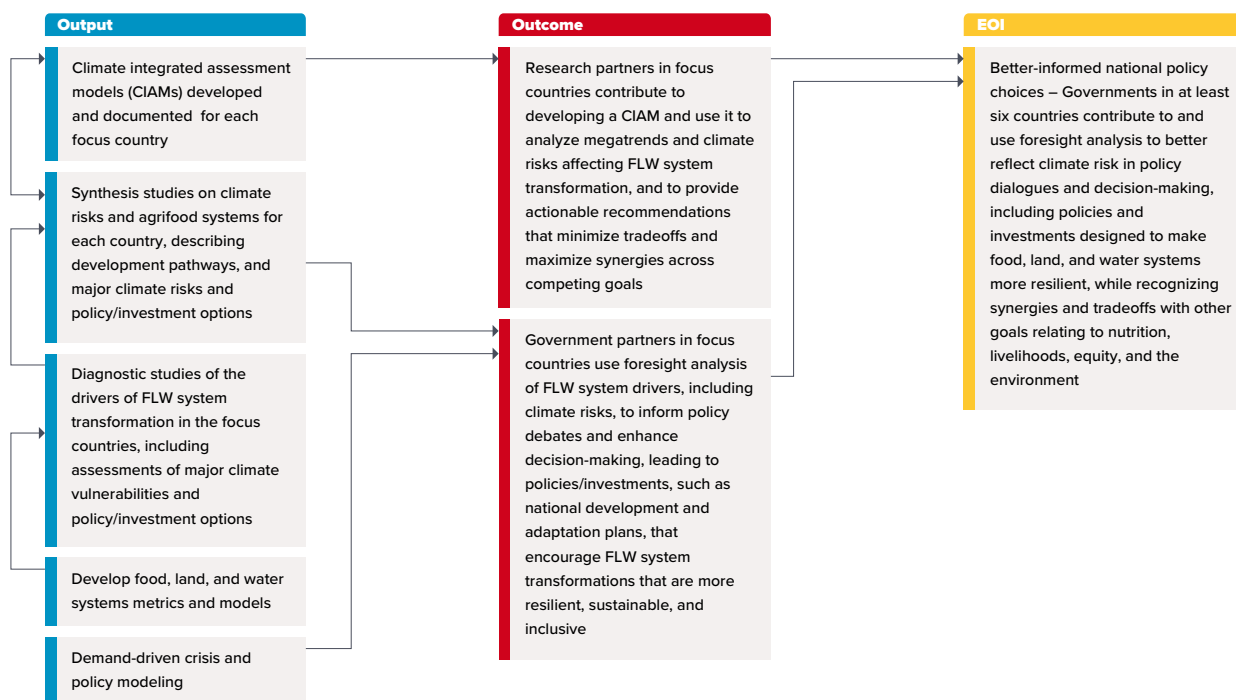
In response to demand from partners, we invested in enhancing biophysical and socioeconomic data and analytical tools, including the International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT), that enable us to examine land, water, climate, diets, pests and pathogens, and other factors more accurately. This in turn improves understanding of food, land, and water (FLW) system impacts and strategic policy options relevant for low- and middle-income countries (Output 1.2). A multi-disciplinary team of scientists from 11 CGIAR entities and several partner institutions contributed to this key output.

We also launched a series of briefs that shed light on the state of foresight analysis related to major drivers that will affect FLW systems over the next several decades. The first briefs focused on crop pests and pathogens, agrobiodiversity, and agrifood systems in Eastern and Southern Africa. This collection will feed into a global synthesis and outlook report (Output 1.1) and the End of Initiative report highlighting synergies and tradeoffs across the five CGIAR Impact Areas.

Work Package 2:
Addressing regional and national challenges and priorities

Output	Outcome	EOI
Climate integrated assessment models (CIAMs) developed and documented for each focus country	Research partners in focus countries contribute to developing a CIAM and use it to analyze megatrends and climate risks affecting FLW system transformation, and to provide actionable recommendations that minimize tradeoffs and maximize synergies across competing goals	Better-informed national policy choices – Governments in at least six countries contribute to and use foresight analysis to better reflect climate risk in policy dialogues and decision-making, including policies and investments designed to make food, land, and water systems more resilient, while recognizing synergies and tradeoffs with other goals relating to nutrition, livelihoods, equity, and the environment
Synthesis studies on climate risks and agrifood systems for each country, describing development pathways, and major climate risks and policy/investment options		
Diagnostic studies of the drivers of FLW system transformation in the focus countries, including assessments of major climate vulnerabilities and policy/investment options	Government partners in focus countries use foresight analysis of FLW system drivers, including climate risks, to inform policy debates and enhance decision-making, leading to policies/investments, such as national development and adaptation plans, that encourage FLW system transformations that are more resilient, sustainable, and inclusive	
Develop food, land, and water systems metrics and models		
Demand-driven crisis and policy modeling		

Work Package 2
progress against the theory of change

Work Package 2 operates at the country level and examines the drivers of FLW system transformation. In 2022, the focus was on Africa, with activities in South Asia beginning in 2023.

The country agrifood system diagnostic studies (Output 2.1) are underway. Historical growth analyses were completed (e.g., Rwanda, Kenya) using a new sex-disaggregated global agrifood system database (with Work Package 3). Complementary studies of agricultural growth and policy drivers are being conducted by local partners within the ANAPRI network. A capacity-strengthening program was initiated with the 16 ANAPRI research institutes (with Work Package 4). New metrics were developed, including a database on water use in the agrifood system (Output 2.4).
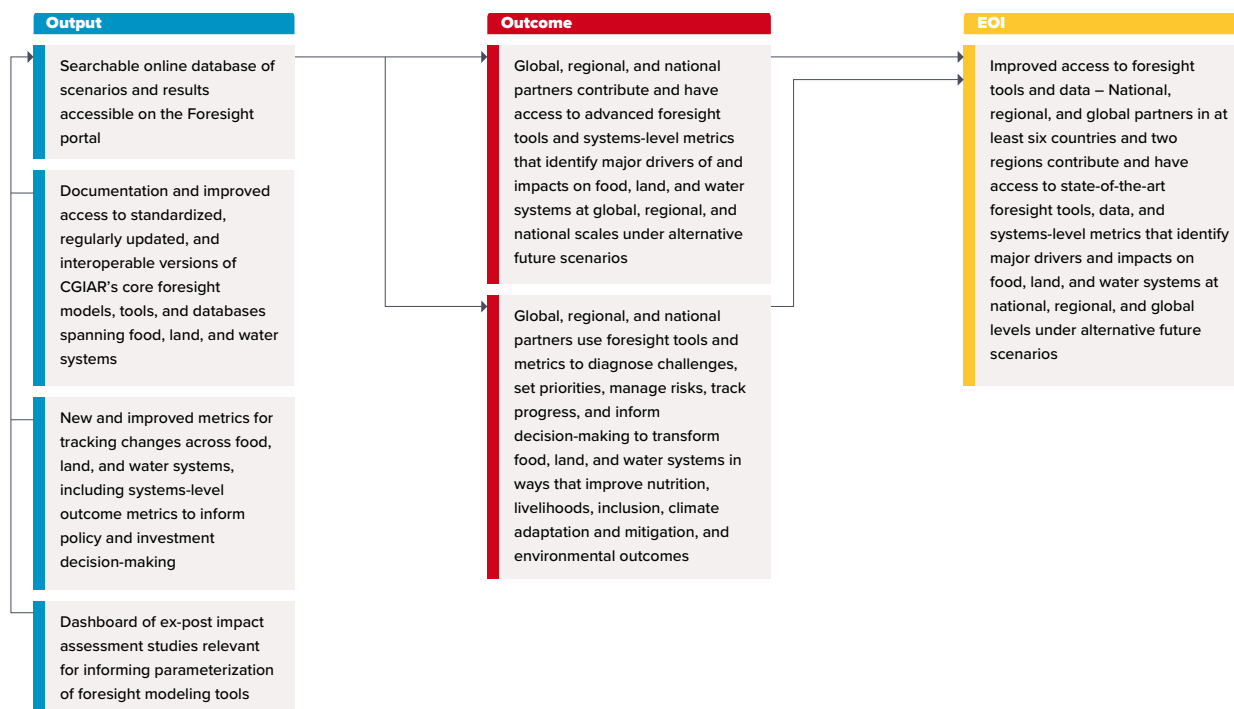
Climate integrated assessment models (CIAMs) are being developed for each focus country (Output 2.2). The models' economic databases were updated (e.g., Zambia) in collaboration with local partners (e.g., Kenya) (Outcome 2.1). Estimates of climate change's impacts on crop productivity are being updated using the latest climate projections. A prototype CIAM was piloted in Malawi, and its core livestock system component was finalized (e.g., Ethiopia). The CIAMs will be used in 2023–2024 to evaluate agrifood systems' climate vulnerability and low-carbon development pathways (Output 2.3).

The Initiative modeled the impacts of the global food crises on poverty and food security (Output 2.5) (see Section 8 Key results story). Country studies were conducted with local partners and other Initiatives (e.g., Kenya) and were summarized and published online (Outcome 2.2). Modeling tools and analysis were also provided to the NPS Initiative on Kenya's new bottom-up development plan.

Work Package 3:
Enhancing access, transparency, and use of tools, data, and metrics

Output	Outcome	EOI
Searchable online database of scenarios and results accessible on the Foresight portal	Global, regional, and national partners contribute and have access to advanced foresight tools and systems-level metrics that identify major drivers of and impacts on food, land, and water systems at global, regional, and national scales under alternative future scenarios	Improved access to foresight tools and data – National, regional, and global partners in at least six countries and two regions contribute and have access to state-of-the-art foresight tools, data, and systems-level metrics that identify major drivers and impacts on food, land, and water systems at national, regional, and global levels under alternative future scenarios
Documentation and improved access to standardized, regularly updated, and interoperable versions of CGIAR's core foresight models, tools, and databases spanning food, land, and water systems	Global, regional, and national partners use foresight tools and metrics to diagnose challenges, set priorities, manage risks, track progress, and inform decision-making to transform food, land, and water systems in ways that improve nutrition, livelihoods, inclusion, climate adaptation and mitigation, and environmental outcomes	
New and improved metrics for tracking changes across food, land, and water systems, including systems-level outcome metrics to inform policy and investment decision-making		
Dashboard of ex-post impact assessment studies relevant for informing parameterization of foresight modeling tools		

Work Package 3 progress against the theory of change

Work Package 3 focuses on enhancing access, transparency, and use of foresight related tools, models, data, and metrics, and includes the enhanced documentation of these assets.

Enhanced documentation (Output 3.1) in 2022 included descriptions of the Nexus social accounting matrixes (SAMS) for Rwanda and Zambia with Work Package 2; and a foresight model inventory, which includes a template for collecting key model-related metadata. Documentation for key foresight models and tools such as the Spatial Production Allocation Model (SPAM) and ADAM were also updated.

New and improved data and metrics, the tools to generate them, and novel ways of presentation are important for enhancing the use of foresight material for improved decision-making (Outputs 3.2 and 3.4). New data in 2022 included a database for characterization of subnational units for Nepal in a novel way that includes crop, livestock, population, and climate data for geospatial analysis. A new tool for creating spatial analogues, that are essential for climate change analysis, is now available. The Global Gridded Agricultural Gross Domestic Product (AgGDP) is another resource for spatial analysis. Two novel visualization tools, a Tableau prototype of new indicators for an agrifood system dashboard and a dashboard of ex-post impact assessment studies, explicitly focus on gender-disaggregated metrics.

We are also working on a new Foresight portal providing transparent access to foresight material, including through our new GitHub repository. Developing the new portal is taking time to ensure consistency with the CGIAR look and feel, while building on an earlier version and becoming more flexible and extensible to meet the current and future demands of the Initiative's stakeholders.

Work Package 4:
Enhancing foresight skills and making learning actionable

Output	Outcome	EOI
Documented FLW-related foresight capacity needs and tailored foresight capacity strengthening plans for partners in at least six focus countries	Global, regional, and national partners can use foresight tools and metrics themselves to diagnose challenges, set priorities, manage risks, track progress, and make more informed policy and investment recommendations affecting FLW systems	Strengthened national foresight capacity – National partners in at least six countries where foresight capacity is still nascent, and other partners as appropriate, gain enhanced knowledge, aptitude, and skills with foresight tools, data, metrics, and analysis relevant to food, land, and water systems, through access to innovative training and delivery platforms and through collaborative research
Foresight training materials and programs developed for and delivered to partners in at least the six focus countries		
Online training materials and programs on foresight modeling tools developed and delivered to interested partners	National partners in focus countries, and other partners inside and beyond CGIAR, are informed consumers of foresight analysis and can use it more effectively to inform strategic planning, decision-making processes, and impact assessments	
Strengthened and expanded Community of Practice on foresight for FLW systems, with particular focus on the needs and opportunities facing developing countries		
Knowledge management and sharing material generated		
Development of an internal evidence-based monitoring system for the delivery of results		

Work Package 4 progress against the theory of change

In 2022, Work Package 4 produced a summary description of training needs (Output 4.1), a draft modular plan for an online training program on economic simulation modeling (progress toward Outputs 4.2 and 4.3), and revival of a CGIAR Foresight Community of Practice (Output 4.4). Work Package 4 also conducted an inventory of tools ready for training (progress toward Output 4.5), developed an early prototype "radical" innovation titled "Foresight Monitoring Tool for Adaptive Management and Learning along the Theory of Change for Foresight Initiative Staff", and conducted the first round of a reporting–reflect–plan cycle (Output 4.6).

With Work Package 2, the development of training materials for in-person and online training

(Outputs 4.2 and 4.3) was combined to ensure consistency in content while allowing for multiple delivery mechanisms. Based on discussions with partners, we specified our initial target audience for the online training in its first phase more clearly, moving from an initially envisioned wider audience to one focused first on the partner institutions who are also participating in in-person training. This will allow wider participation of staff at partner institutions, beyond those who are able to join in-person training sessions, and provide opportunities for staff who have taken the in-person training to reinforce and strengthen their skills. After an initial cycle of delivery and review, online training will be offered to a wider audience.

Capacity training and foresight exposure events in 2022 had female-to-male participation rates of approximately 50% each.

Work Package progress rating

WORK PACKAGE	TRAFFIC LIGHT / RATIONALE
1	Progress was made in all output/outcome areas. Improvements in data and tools are underway and several research outputs have already been published. The Foresight Partnership Forum was postponed from December 2022 to January 2023 due to logistical reasons, but this will not affect overall progress.
2	Progress was made in all output/outcome areas in the focus countries and across many other countries for the food crisis analysis. Deliverables were widely disseminated and well-received by governments and partners. The ANAPRI partnership was only formalized in late-2022, but research and training activities have already started.
3	Most 2022 deliverables were completed, but a few were postponed to 2023. This includes launching the new Foresight portal website, which was delayed due to technical challenges. This is a high priority for early 2023 and will not significantly affect overall Initiative progress.
4	Annual progress through the deliverables aligns with Plan of Results and Budget and the Work Package theory of change, with minor delays in alignment of content for the in-person and online training programs, which will ultimately help the Work Package achieve its targeted outcomes.

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 Foresight. These results align with the CGIAR Results Framework and Foresight's theory of change. Further information on these results is available through the CGIAR Results Dashboard.
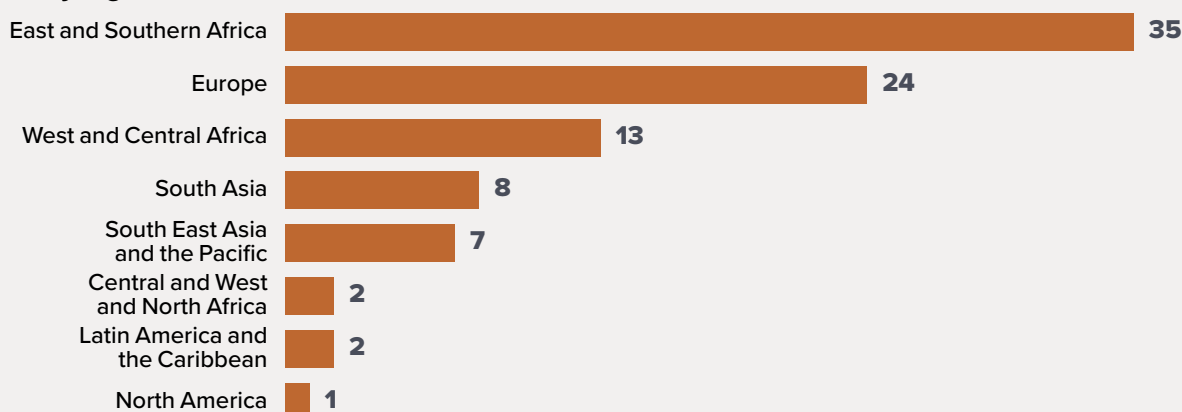
Overview

Results	Outputs					Outcomes			
134	**10** SDGs	**9** Capacity sharing for development	**17** Innovation development	**75** Knowledge products	**28** Other outputs	**2** Innovation use	**1** Policy change	**2** Capacity change	**13** Centers

Knowledge products by category

Category	Value
Brief	22
Journal article	16
Blog post	10
Presentation	7
Working paper	6
Dataset	3
Book chapter	2
Other	2
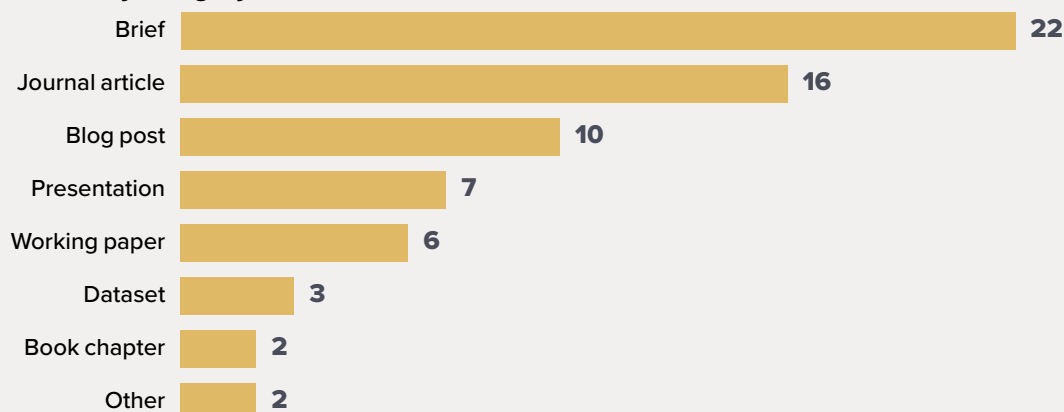
The Foresight Initiative reported 134 results in 2022, of which 75 were knowledge products. In addition, analyses of impacts of the conflict in Ukraine on food systems in 19 low-income countries (captured in 20 briefs and corresponding slide decks) were presented 36 times to national government and development partners, while the briefs have been downloaded more than 4,000 times and the slide decks have been viewed more than 7,000 times.

Results by region

Region	Value
East and Southern Africa	35
Europe	24
West and Central Africa	13
South Asia	8
South East Asia and the Pacific	7
Central and West and North Africa	2
Latin America and the Caribbean	2
North America	1

Foresight Initiative 2022 results reflect our planned regional focus, beginning in East and Southern Africa (to be followed in 2023 by South Asia). We also produced multiple outputs modeling the impacts of the conflict in Ukraine on prices, incomes, and food security in low-income countries.

Results by country

Results by gender tag

11 (8.21%)

122 (91.04%)

○ 0 — Not targeted ● 1 — Significant ● 2 — Principal
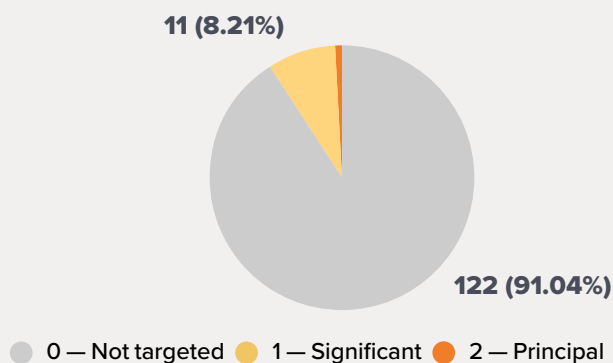
0 = Not targeted: The activity/result does not target gender equality.

1 = Significant: The activity/result contributes in significant ways to gender equality, even though it is not the principal focus of the activity.

2 = Principal: Gender equality is the main objective of the activity/result and is fundamental in its design and expected results.

Climate change tag

36 (19.46%)

93 (69.4%)

○ 0 — Not targeted ● 1 — Significant ● 2 — Principal
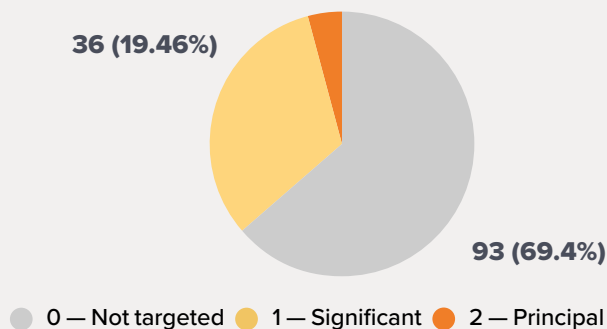
0 = Not targeted: The activity does not target climate mitigation, adaptation, and climate policy goals of the CGIAR as put forward in its strategy.

1 = Significant: The activity contributes in significant ways to either one 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.

2 = Principal: The activity is principally about meeting either one of the three CGIAR climate-related strategy objectives — namely, climate mitigation, climate adaptation, and climate policy, and would not have been undertaken without these objectives.

Much of the Foresight Initiative's work includes an explicit focus on climate change, including modeling impacts of long-term climate change and shorter-term climate variability on productivity, prices, and food security. An increasing share of our work includes an explicit focus on gender and inclusion, including model-based evaluations of employment and social protection programs targeting women in Africa.

Trainees by gender

Gender	76	73

● Female ● Male
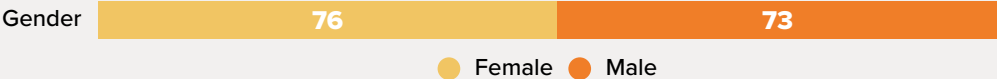
The Foresight Initiative conducted several training events in 2022 jointly with the NPS Initiative, focusing on country-level data and modeling with partners in Egypt, Kenya, Nigeria, and Rwanda.

Innovations by readiness level

Pipeline overview
Number of innovations

Level	Description	Number
9	PROVEN INNOVATION – The innovation is validated for its ability to achieve a specific impact under uncontrolled conditions	1
8	UNCONTROLLED TESTING – The innovation is being tested for its ability to achieve a specific impact under uncontrolled conditions	0
7	PROTOTYPE – The innovation is validated for its ability to achieve a specific impact under semi-controlled conditions	3
6	SEMI-CONTROLLED TESTING – The innovation is being tested for its ability to achieve a specific impact under semi-controlled conditions	1
5	MODEL/EARLY PROTOTYPE – The innovation is validated for its ability to achieve a specific impact under fully-controlled conditions	4
4	CONTROLLED TESTING – The innovation is being tested for its ability to achieve a specific impact under fully-controlled conditions	0
3	PROOF OF CONCEPT – The innovation's key concepts have been validated for their ability to achieve a specific impact	5
2	FORMULATION – The innovation's key concepts are being formulated or designed	2
1	BASIC RESEARCH – The innovation's basic principles are being researched for their ability to achieve a specific impact	0
0	IDEA – The innovation is at idea stage	1

In 2022, the Foresight Initiative submitted 12 innovations and contributed to five more developed in collaboration with other Initiatives (two with Market Intelligence, two with Rethinking Markets, and one with Excellence in Agronomy).

In addition to results formally reported as innovations, we note that innovations are taking place throughout the Initiative's activities — in engagement, in capacity sharing, in data and models, in analysis, and in communication of results.

Section 5 Impact pathway integration – External partners
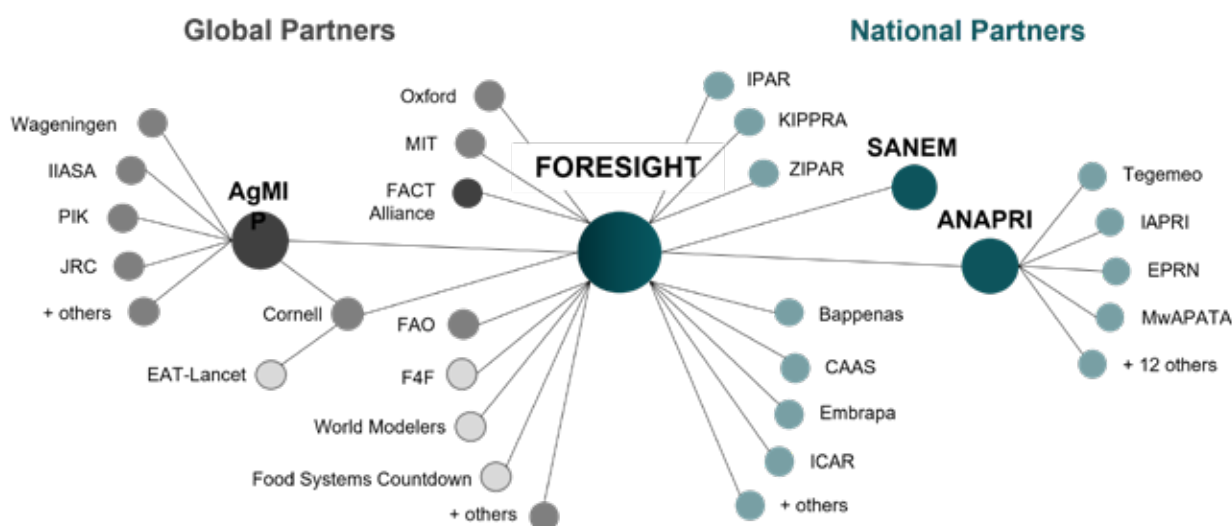
Partnerships and Foresight Initiative's impact pathways

The Foresight Initiative (FI) partners with numerous national and global research institutes and networks. At the national level, FI partners with ANAPRI, which has member centers in 16 countries. ANAPRI institutes in FI's four African focus countries are leading FI's country studies, while all member institutes are participating in FI's training program, which is supporting the establishment of a "Modeling Service Center" within ANAPRI's Secretariat in Lusaka. In 2023, a similar partnership will be initiated with the South Asia Network of Economic Modeling (SANEM). Finally, FI is developing links with technical partners in large regional economies, such as the Chinese Academy of Agricultural Science (CAAS), and with research partners in focus countries, such as ZIPAR. FI's partners have well-established relationships with focus country governments, and some are formally linked to ministries of planning and agriculture.

At the global level, FI is working with the AgMIP Global Economics group, whose members include universities and research institutes with foresight modeling expertise in the fields of agriculture, climate change, and food security. FI also partners directly with other leading universities in related fields, such as MIT and Oxford University. Working with Cornell University, FI is contributing to the EAT-Lancet 2.0 Commission, which is refining its recommendations for achieving healthy and sustainable diets. One of FI's key contributions in these collaborations, beyond tools and data, is its emphasis on developing countries within the global context. Other global projects that FI is contributing to include the World Modelers program and the Food Systems Countdown Initiative. Overall, FI's partnerships with global and national networks and research programs allows it to contribute to both global and national policy dialogue and decision-making.

Section 6 Impact pathway integration – CGIAR portfolio linkages

Portfolio linkages and Foresight Initiative's impact pathways

FI is working closely with other CGIAR Initiatives to achieve shared goals and outcomes, including:

- With the **National Policies and Strategies** Initiative and national partners in Egypt, Kenya, and Nigeria to analyze impacts of the conflict in Ukraine on prices, incomes, and food security, and to engage with decision-makers to inform policy choices; and to conduct agrifood system diagnostic studies in these same countries, as well as states in India.

- With the **Diversification in East and Southern Africa** Initiative to analyze impacts of climate change on production of major commodities in Eastern and Southern Africa, and to explore policy options to increase diversification.

- With the **Market Intelligence** Initiative to analyze the potential of different breeding investments to meet changing patterns of demand and supply under alternative future socioeconomic and climate conditions.

- With the **Digital Innovation** Initiative and other partners to develop new ways to share foresight-related data and models.

- With the **Fruits and Vegetables** Initiative and other partners to analyze the cost of healthy diets for different regions and population groups under alternative future scenarios.

- With other Initiatives through sharing of foresight-related data, tools, and staff expertise.

FI's work also complements related non-pooled (bilateral) projects, including:

- With BMGF to inform policy prioritization in selected countries and to incorporate information on climate hazards, impacts, and agricultural practices in the Adaptation Atlas.

- With USAID and BMGF to support the Rural Investment and Policy Analysis (RIAPA) Foresight and Rapid Response Modeling System (FARRMS) country impact analysis work, output indicator creation, Nexus SAM development and documentation, and to inform investment priorities for agricultural research and development.

- With the EAT-Lancet Commission to examine the impacts of future diets on health and planetary boundaries — including to improve attention to issues of concern to low-income countries.

Section 7 Adaptive management

RECOMMENDATION	SUPPORTING RATIONALE
Articulate a clearer vision for spatial analysis (Work Packages 1, 2, and 3).	Spatial analysis is essential for foresight analysis at multiple scales. Although there are numerous spatial scientists within FI's research team working on exciting applications, articulating a more coherent vision and aligning it with FI's theory of change would better integrate spatial analysis across all Work Packages.
Broaden EOI outcome 2 to reflect a fuller set of risks facing governments and food systems.	Suggested change: "Governments … use foresight analysis to better reflect climate **and other** risks…". This small change better reflects the expressed concerns and foresight analysis needs of FI's national partners.
Broaden Output 2.3 (CIAMs) to include tools for analyzing both long-term climate change and more immediate extreme events (shocks).	Output 2.3 originally focused on climate change *vulnerability and adaptation*, but there is partner interest to broaden the scope. Going forward, Work Package 2 will also use CIAMs to study climate change *mitigation* and its impacts on jobs and livelihoods. In addition, despite FI's training initiatives, not all partners are able or interested in conducting complex climate modeling. Going forward, Work Package 2 will adopt a twin-track approach that not only analyses climate vulnerability, as planned, but also uses simpler methods for "stress testing" policy options under extreme climate events.
Articulate better Output 2.5 and make it more demand driven	This output area was added during 2022 and reported on in Performance and Results Management System (e.g., the Ukraine briefs). In 2023, Work Package 2 will formalize and expand on this more demand-driven policy-oriented work area.
Combine Outputs 3.2 and 3.4 and create one new output embedding the key elements of both previous outputs and sharpening the narrative to make it more demand driven.	Output 3.2 concentrates on developing data and metrics while Output 3.4 focuses on a specific data visualization tool. Consolidating these ensures that the process of developing new data and metrics occurs in tandem with developing novel ways to present these data and metrics. In addition, an updated narrative will be developed that better captures the objective of enhanced accessibility and use of data and metrics relevant for foresight analysis.
Closely align online and in-person training materials and delivery (Work Packages 2 and 4).	In 2022, FI conducted needs assessments for its planned online and in-person training programs on foresight analysis and modeling. It became apparent that, rather than treating these as separate activities, they should complement each other. Having the online course adopt the training materials developed for the in-person course saves resources, and having the online training program available to national partners allows them to bring new staff into the in-person training program. Going forward, the online and in-person training teams will develop common training materials with distinct but complementary modes of delivery. In addition, the same materials will be used to provide a third "self-study" option to partners.

Solar power for irrigation water pumping in Haryana, India.
Photo credit: Prashanth Vishwanathan/IWMI

Section 8 Key result story

Vegetable traders at Wakulima Market in Nairobi, Kenya.
Photo credit: Sven Torfinn/Panos Pictures

Foresight analysis helps governments anticipate and mitigate impacts of the Russia–Ukraine war on poverty and food security in developing countries

The Foresight Initiative (FI) used country models from its Foresight and Rapid Response Modeling System (FARRMS) to analyze the impacts of the 2022 global crises on agrifood systems, poverty, and food security. Nineteen country studies were conducted in collaboration with local and international partners, published online, and presented in-country. Cross-country syntheses were presented in 36 public seminars. Analysis of policy options directly informed national responses and the allocation of donor funds to countries to mitigate rising food insecurity.

Russia's invasion of Ukraine in February 2022 contributed to large increases in the prices of food, fuel, and fertilizer in global markets. This prompted a widespread concern for agrifood systems, poverty, and food security in developing countries. The rapid onset of the crisis, coupled with its unique

characteristics, meant that there was little information on how specific countries and vulnerable population groups might be affected, or what policy options would be most cost-effective in mitigating the impacts. As a result, development partners looked to CGIAR and its ex-ante modeling capabilities for analysis and guidance.

The Foresight Initiative (FI) rapidly mobilized its Rural Investment and Policy Analysis (RIAPA) country data and modeling system[1] to estimate the economy-wide impacts of rising prices across different supply chains and population groups in developing countries. RIAPA is one of the tools in FI's new Foresight and Rapid Response Modeling System (FARRMS). RIAPA is specifically designed to capture national agrifood systems and their linkages to broader national and global economies and to workers and households. Like other tools maintained by the Initiative, RIAPA and its Nexus SAM databases[2] are freely available to all stakeholders. Given in-country demand for

Ukraine-related analysis, and the importance of understanding local contexts and policy concerns, FI partnered with the National Policies and Strategies (NPS) Initiative to engage local partners in their focus countries, and with IFPRI's Country Strategy Support Programs. These collaborations strengthened the modeling analysis and enhanced FI's outreach and policy engagement.

By mid-2022, the modeling team had conducted 19 country case studies assessing the impacts of the global crises on poverty and food insecurity. This analysis indicated that, across those 19 countries, 27 million people were at risk of falling into poverty, 22 million people were at risk of undernourishment, and that over 50 million people were at risk of significant deteriorations in diet quality. Agrifood systems and poverty levels were shown to be more vulnerable to rising fuel and fertilizer prices, whereas hunger and diet quality were more affected by higher food prices. This underscored the need to address rising fertilizer costs in addition to mitigating higher food import prices. The initial impact assessments were followed by more in-depth studies for 10 countries that evaluated different policy responses. The analysis showed that, while food and input subsidies are effective in mitigating immediate food insecurity, investments to improve fertilizer supply chains and farmers' fertilizer use efficiency are more cost-effective over the medium term, especially if higher fertilizer prices persisted into 2023. FI's rapid analysis assisted funding and government partners

in designing programs to help developing countries and vulnerable populations cope with the global food crisis.

FI's Russia–Ukraine crisis-related analyses led to numerous outputs. Country-specific briefs and slide decks were published in a Global Crisis series on IFPRI's website[3], and a dedicated Agrilinks webpage[4] raised awareness and disseminated knowledge products to a broader global food security community. Cross-country syntheses of the impact and policy analysis were presented in public seminars. In total, 36 presentations were made to government and international development partners, often to senior policymakers and in collaboration with the NPS Initiative and IFPRI's country programs. In addition, the briefs have been downloaded over 4,000 times and the corresponding slide decks have been viewed over 7,000 times. The cross-country impact analysis was recently published as a journal article (Arndt et al. 2023)[5].

Finally, in December 2022, FI used RIAPA to assess the combined impacts of COVID-19, the Russia–Ukraine war, and an emerging global economic slowdown. The analysis, presented at an Agrilinks webinar, highlighted the lasting effects of the global crises and the need for continued investment in agrifood systems in developing countries. Overall, FI's work in 2022 confirmed the broad demand for CGIAR's rapid foresight analysis and policy modeling.

> ❝ **The CGIAR's impact and policy modeling has been an essential input to USAID decision making processes over the past year, informing both the geographic prioritization of resources and the type of investments made to mitigate the global food crisis.** ❞
>
> **Chris Hillbruner. Division Chief, Analysis and Learning. Bureau for Resilience and Food Security, USAID**

Primary Impact Area: Poverty Reduction, Livelihoods & Jobs

Other relevant Impact Area(s): Nutrition, Health and Food Security

Which collective global targets for the relevant Impact Area(s) from the CGIAR 2030 Research and Innovation Strategy does the key result contribute to?

- Close the gender gap in rights to economic resources on, access to ownership of, and control over land and natural resources, for over 500 million women who work in food, land, and water systems.

- End hunger for all and enable affordable healthy diets for the 3 billion people who do not currently have access to safe and nutritious food.

- Equip 500 million small-scale producers to be more resilient to climate shocks, with climate adaptation solutions available through national innovation systems.

- Lift at least 500 million people living in rural areas above the extreme poverty line of US$1.90 per day (2011 PPP).

- Offer rewardable opportunities to 267 million young people who are not in employment, education, or training.

- Reduce by at least half the proportion of men, women, and children of all ages living in poverty in all its dimensions according to national definitions.

- Stay within planetary and regional environmental boundaries: consumptive water use in food production of less than 2500 km3 per year (with a focus on the most stressed basins), zero net deforestation, nitrogen application of 90 Tg per year (with a redistribution towards low-input farming system) and increased use efficiency; and phosphorus application of 10 Tg per year.

- Turn agriculture and forest systems into a net sink for carbon by 2050, with emissions from agriculture decreasing by 1 Gt per year by 2030 and reaching a floor of 5 Gt per year by 2050.

GEOGRAPHIC SCOPE

Region(s): Africa, Asia
Country/ies: Bangladesh; Cambodia; Egypt; Ethiopia; Ghana; Kenya; Malawi; Mali; Myanmar; Nepal; Niger; Nigeria; Philippines; Russian Federation; Rwanda; Senegal; Tanzania, United Republic; The Democratic Republic of the Congo; Uganda; Ukraine; Zambia

KEY CONTRIBUTORS

Contributing Initiative(s): Foresight, National Policies and Strategies
Contributing Center(s): Primary: IFPRI
Contributing external partner(s) (full names)*:

- Zambia: Antony Chapoto and Mitelo Subakanya (Indaba Agricultural Policy Research Institute (IAPRI))

- Egypt: Fadi Abdelradi (Cairo University)

- Kenya: Edwin Ombui Oseko (Ministry of Agriculture, Livestock, Fisheries, and Cooperatives)

LINK TO CGIAR RESEARCH PROGRAMS

The Nexus SAMS were produced under PIM

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COVER PHOTO: Three-year old Rosita holds a cabbage seedling to be planted in a nursery in Situ Gunung, Indonesia. Photo credit: R. Martin/CIFOR