Foresight and Metrics to Accelerate Food, Land, and Water Systems Transformation

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

Summary table

Initiative name	**Foresight and Metrics to Accelerate Food, Land, and Water Systems Transformation**
Primary Action Area	Systems Transformation
Geographic scope	Global, including • collaboration with technical partners in China, India, Indonesia, South Africa, and Brazil, among others • collaboration with focus country partners in Eastern and Southern Africa (Kenya, Rwanda, Malawi, Zambia) and South Asia (Bangladesh, Nepal), among others.
Budget	US$28,000,000

1. General information

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2. Context

2.1 Challenge statement

Two generations ago, the challenge facing agriculture was daunting but clear: the world needed to rapidly increase staple food production to meet rising demand. That challenge was largely met but new ones arose, and today the challenges facing food, land and water systems are more numerous and complex: over 700 million people still live in absolute poverty, millions more young people seek jobs every year; nearly 2 billion people suffer from moderate or severe food insecurity, while 4 in 10 adults globally are overweight or obese; gender gaps persist; natural resources are under stress; and water resources are polluted and depleted (Messerly et al 2019; Mahler et al 2021; FAO et al 2021; UNEP 2012; Our World in Data 2021). Climate change

compounds all these challenges, increases uncertainty, and means that we can no longer rely on historical experience to guide decision-making (IPCC 2021).

Addressing these interlinked challenges requires transformation of food, land, and water systems. Transformation means moving from our current state to a fundamentally different state in the future, but what is that desired future state, and what actions are needed to get there? Synergies between impacts are possible, for example between poverty reduction, improved nutrition, and increased equity. But trade-offs between policies and investments to achieve these impacts are often unavoidable, given limited resources and disparate decision-making domains, and the choices facing national governments and their development partners have become increasingly complicated (Hasegawa et al 2018; Balié 2020). What is the appropriate balance between self-reliance and global integration, for example, or between immediate welfare gains and long-term sustainability? Decision-makers at global and national levels have expressed their need for better evidence on the questions and challenges they face, which courses of action should be undertaken, and which policies and investments might minimize trade-offs and achieve collective goals (see country stakeholder consultations and regional stakeholder consultations).

These difficult questions highlight the need for cross-cutting capacity to understand system-level interactions and outcomes – across multiple spatial and political scales (from sub-national to global), across multiple time periods (from the next year to the next generation), and across multiple thematic and decision-making domains. A growing body of analysis is exploring future challenges and options to address them, but very often these studies are focused on individual commodities, challenges, locations, or time horizons, and thus miss important interlinkages. Integrated analytical approaches increasingly bring multiple domains together over longer time horizons, but these are typically focused on broad global and regional scales, with insufficient attention to the diverse concerns and needs of low- and middle-income countries (Willet et al 2019; Springmann et al 2018; Van Zeist et al 2020).

Building on these methodological advances and combining them with multi-disciplinary scientific expertise and close engagement with decisionmakers offers major opportunities for improvement. Innovative use of data, state-of-the-art analytics, and deep and ongoing dialogue with national, regional and global partners – with particular focus on poor and vulnerable populations in low- and middle-income countries – offer better insights into alternative transformation pathways that can inform choices and sharpen decision-making today. This is what the Foresight and Metrics Initiative seeks to provide.

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

Our overall vision is that national, regional, and global partners gain enhanced skills and access to state-of-the art foresight tools, data, and metrics, and contribute to and use foresight analysis to inform their decisions about policies and investments to transform food, land, and water systems in ways that improve nutrition, livelihoods, equity, climate adaptation and mitigation, and environmental outcomes.

Specific outcomes are:

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.

2. 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 trade-offs with other goals relating to nutrition, livelihoods, equity, and the environment.

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.

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.

2.3 Learning from prior evaluations and impact assessments (IA)

The design of the Initiative was informed by the following findings, among others:

- Describing a recent ISDC synthesis review of foresight and trade-off analyses, (Barrett et al 2021) noted that these tools offer CGIAR an opportunity to better prepare for alternative futures through adaptive research strategy and management, and "strongly recommend the integration of these tools into ongoing decision-making, priority-setting, and monitoring and evaluation (M&E) processes." They note, however, that these tools need to give more attention to systemic shocks, nutrition, poverty reduction, social inclusion (and the interaction of these areas with climate change and environmental health), as well technology adoption, governance, trade-offs, and unanticipated consequences of new technologies and policies.
- Recent evaluations of PIM's investments in IFPRI's country modeling (Somwaru 2021) and country programs (Hazell et al 2018) noted widespread demand by governments and international organizations, and numerous cases where modeling influenced policy, including in the Initiative's focus countries. Standardization and ongoing improvement of tools and capacity building enabled broader country coverage and quicker response to government requests.
- A 2020 review of the PIM CRP found that PIM-supported foresight work "has recognized collaborative expertise contributing to the global and regional agenda and to national legislation and regulatory reforms," and "underlined the critical role of regular foresight analysis in coordinated priority-setting both within CGIAR and with country partners" (Engel and Laanouni 2020; see also Lowder and Regmi 2019).
- A 2021 Synthesis emphasized the importance of engagement with public, private, and civil society partners in foresight and priority-setting (Holderness et al 2021).

These findings highlight the importance of better capturing systems transformation dimensions; close engagement with decision-makers; and strengthened capacity.

2.4 Priority-setting

Work Packages: Governments in developing countries lack the foresight tools and metrics that more developed countries routinely use to anticipate trends, trade-offs, outcomes, and risks. This makes decision-making more challenging, especially in a globalized world facing uncertainties. The Initiative is designed to narrow this divide and respond to the demands of our government and development partners, and CGIAR itself, for multi-scale, forward-looking, cross-cutting analysis of FLW systems (see country stakeholder consultations and regional stakeholder consultations). The Work Packages address four gaps where the divide is widening and demand is strongest: (WP1) understanding global trends and how interconnections across countries and FLW systems affect local contexts; (WP2) informing national policy choices under risks and uncertainties; (WP3) access to foresight tools and data used by developed countries; and (WP4) ability to use foresight tools and incorporate analysis into regular policy design and implementation cycles. (See sections 2.3, 2.6, and 3.1.2 for more information. Note that based on expressed demand, the Initiative focuses primarily on external partners, but we also recognize the importance of foresight in support of One CGIAR strategic planning and are open to considering a role in that effort, subject to appropriate mandates and resources.)

Analytical tools: No single model can measure and track changes in all Impact Areas across global, regional, and national scales and over the short and long run. Currently, our core global model (IMPACT) (Robinson et al 2015) focuses on agricultural production, trade, and prices over the longer term (2030+). Our core country models (RIAPA) (Thurlow 2016) add more social outcomes (poverty, inequality, employment), but focuses on the nearer term (until 2030). By bringing these tools together, the Initiative capitalizes on complementarities. However, to better capture FLW systems and trade-offs among the five Impact Areas, the Initiative must enhance these tools; harmonize model data sources; and improve linkages between them. For example, IMPACT's water and land systems components will be improved, and RIAPA will be spatially disaggregated with links to livestock models and natural resource indicators. To our knowledge, no other modeling initiatives have undertaken, or are positioned to undertake, this global-to-country model integration.

Countries: The Initiative conducts foresight analysis for all regions and countries but also identifies focus countries for more in-depth analysis and engagement with partners. Four countries were selected as **technical partners** based on four criteria, namely that they: (1) are large economies; (2) have existing foresight capabilities; (3) have expressed interest in collaborating; and (4) reflect regional diversity. Selected countries include China (CAAS), India (ICAR), Indonesia (Bappenas), and South Africa (National Treasury); we are also considering Brazil (Embrapa).

Climate change/variability was identified as a cross-cutting concern where foresight modeling is useful. Eastern and Southern Africa and South Asia were selected as focus regions, where climate change was identified as a challenge by the regional Initiatives. Six **focus countries** were selected based on five criteria, namely that they: (1) are low- or lower-middle-income countries; (2) have limited foresight capacity; (3) are focus countries for Initiatives and donors; (4) are countries where we have operational country models; and (5) are countries where we have well-established working relationships with key government agencies and/or research institutes. Selected countries include Bangladesh (SANEM), Kenya (KIPPRA), Malawi (Ministry of Agriculture; Planning Commission), Nepal, Rwanda (Ministry of Agriculture and Animal Resources; Ministry of Economic Planning and Finance), and Zambia (ZIPAR). More countries may be added based on government interest and Initiative resources.

2.5 Comparative advantage

The Foresight and Metrics Initiative team and its partners bring unique depth and breadth of expertise and experience linking foresight analysis to biophysical sciences and policy processes in developing countries, including

- Multidisciplinary, multi-institutional, and multi-geography expertise on food, land, and water systems, building on 10 years' experience working together as a foresight team Engel and Laanouni 2020; Wiebe et al 2021 GFS).
- World-class modeling capacity, combining biophysical and socioeconomic analysis in global agriculture-sector modeling together with country economy-wide modeling in combination with specific in-depth analysis on system components of interest and their interactions with global and national-level integrated modeling (Petsakos et al 2018; Kruseman et al 2020; Arndt and Thurlow 2015).
- Close links and experience working with other world-leading research institutions in food systems modeling (including PIK, Wageningen, IIASA, JRC, GTAP, MIT, Oxford, and others) (Van Zeist et al 2020; Stehfest et al 2019; Nelson et al 2018; Springmann et al 2018; Van Ittersum et al 2016) .
- Unmatched links to the core science of CGIAR across Africa, Asia and Latin America (Alene et al 2018; Enahoro et al 2019; Hareau et al 2013; Mignouna et al 2020).
- Extensive (and intensive) experience applying foresight-related modeling in national policymaking processes in Africa, Asia and Latin America, and in dialogue with funding partners in high-income countries to inform investment prioritization (Hazell et al 2018).
- Close links and experience working with Ministries of Finance, Planning, Agriculture, Land, Water, Livestock, Fisheries, and others in multiple low- and middle-income countries (e.g., Govaerts 2019).
- Experience building an expanding network of foresight practitioners and partners through capacity building, collaborative research, and policy dialogue.
- Numerous commissioned foresight analyses to inform decision-making by donors and other development partners, including for BMGF, USAID, IADB, the World Bank, FAO, and others (Rosegrant et al 2017, Wiebe et al 2021 PLOS ONE, Prager et al 2020, Sulser et al 2021 AJCN, IFPRI 2021).

2.6 Participatory design process

During the Initiative design phase, Foresight and Metrics IDT leads and members consulted with a wide range of partners through a series of structured virtual consultations and bilateral meetings, in order to ensure that the demand for Foresight tools and analysis at national, regional and global scales was understood, and to identify existing partner initiatives and proposed CGIAR Initiatives to build on and work with. The outputs from these discussions, as well as the lessons learned through continuous discussions with donor agencies during the design process (beginning with the Eschborn meeting in February 2020 and continuing through the IAG process), were used to develop our theories of change and to identify partnerships for greater impact.

On August 25, 2021, we held a stakeholder consultation with senior policy support specialists in key large regional economies (Egypt, India, Indonesia, Kenya, Nigeria, and South Africa) to learn about their experience, concerns and interests related to the use of foresight analysis to inform decision-making related to food, land, and water systems (see country consultation report). On October 27, 2021, we held a stakeholder consultation with around 60 invited participants from

around 30 research institutions, regional and international organizations, multilateral development banks, and other development partners working in our two focus regions, namely Eastern & Southern Africa and South Asia (see regional consultation report). On November 4, 2021, we met with around 30 members of the CGIAR Foresight community of practice to exchange information (see CGIAR CoP consultation report), and on November 9, 2021, we did likewise with around a dozen members of the Agricultural Model Intercomparison and Improvement Project (AgMIP) Global Economics modeling group, including experts from IIASA, JRC, PIK, Purdue University, and Wageningen University (see AgMIP consultation report). Many of these participating institutions have already sent letters of interest, with others in process (see letters of interest).

We also had multiple meetings and communications with

- representatives from national government ministries and policy support institutions in our planned focus countries;
- staff from funder agencies (including BMGF and USAID) who have expressed interest in improved foresight analysis to inform their decision-making;
- members of 10 other One CGIAR Initiatives with whom we plan to work (see consultations with other One CGIAR Initiatives); and
- as well as bilateral meetings with other prospective partners, including the Alliance for a Green Revolution in Africa (AGRA) and FAO's Subregional Office for Southern Africa.

In addition to these consultations, where applicable, information was supplemented with additional knowledge derived from other sources, including global dialogues, previous workshops, information from past and current projects, and where relevant, national action plans as well as national and regional development policies and strategies.

Participants in these various consultations provided a rich and diverse range of inputs and perspectives, but with general agreement on the following points:

- the complex and interconnected nature of food, land, and water system challenges;
- the resulting need for multiple tools, skills and perspectives to estimate future impacts of alternative courses of action and trade-offs between them;
- the need to coordinate information and action across diverse decision-makers across multiple scales;
- the need for a shared platform for data and indicators to compare across countries and learn from other experiences;
- the need for an integrated approach across sectors, not just focusing on agriculture in a silo, and
- the need for diverse capacity strengthening approaches to suit diverse needs.

2.7 Projection of benefits

The Foresight & Metrics Initiative aims to achieve impact by working with governments, international organizations, and other decision-makers to co-develop systems-level foresight analysis and metrics to improve decision-making related to investments and policy spanning food, land and water systems. Working with partners to anticipate avoidable trade-offs and identify actionable recommendations is expected to lead to (1) improved and more integrated policy action by governments, including improved outcomes across the five One CGIAR Impact Areas; (2) increased levels, better coordinated, and more cost-effective allocations of public, private and donor investments in food, land, and water systems-related research and services; and (3) enhanced ability to monitor systems-level outcomes, enabling policy makers and investors to course-correct during implementation and in response to emerging priorities and risks. The

Initiative's partner engagement strategy and focus on improving access to and training on foresight tools and analysis will increase the likelihood that impacts are sustained and scaled up over time.

Looking at projected benefits through the lens of our theory of change, the scaffolding of the Work Packages to support the above outcomes is clear. Through WP4, we build and grow institutional capacity, especially in LMICs, to engage in foresight-related activities including scenario development, modeling, and foresight-informed decision-making. Through WP3, partners and others have access to the foresight tools they need to evaluate the context and operating environment associated with their specific policy and investment ambitions. In WP2 and WP1, we work with national, regional and global partners on targeted analyses to foster shared situational awareness of systems-level challenges and inform priorities around context-specific choices with improved understanding of opportunities and trade-offs.

The following sections summarize the projected benefit indicators and the methods used for estimating each.

Core approach and methods by Impact Area

The Initiative's impact pathway is indirect because it depends on the successful implementation of policies and investments informed by foresight analysis. We first describe our assumptions about the pathway from foresight analysis to policy and investment decisions. We then describe our assumptions about the pathway from changes in policies and investments to five selected Impact Area indicators.

Quantitative evidence on the influence of foresight analysis on decision-making is scarce. Our own experience shows that development funding agencies and international organizations (including USAID, and BMGF, among others) are willing to pay for foresight analysis and direct engagement to inform their decision-making (e.g., Rosegrant et al 2017; Wiebe et al 2021 PLOS ONE; Sulser et al 2021 FPR; Prager et al 2020). Private companies – which are certainly conscious of returns on spending – have long been among the leaders in using foresight (Wiebe et al 2018), and research on the private sector's use of foresight analysis suggests that future-prepared companies outperformed the average with 33% higher profitability and 200% higher growth (Rohrbeck and Kum 2018).

The value of foresight in the context of CGIAR and its partners relates directly to foresight's utility as a prism to decompose the potential impacts of alternative future scenarios and strategic pathways in order to inform decision-making today. The SoAR report, an external evaluation commissioned in 2020 to evaluate the long-term benefits of investment in CGIAR, clearly articulates this value proposition:

> "Agricultural research is slow magic. Returns accrue over long periods — decades — and realizing the full potential from agricultural R&D requires far-sighted investments. It is also a cumulative endeavor, best done with steady and sustained investments." (Alston et al 2020)

The SoAR report estimates an average 10-to-1 benefit-cost ratio for CGIAR investments, with no sign of diminishing returns. With this potential at stake, understanding and preparing for alternative potential futures will help sustain and drive the impact of CGIAR over the long term.

Foresight is thus a key component supporting strategic planning, priority-setting, and coordination among donors, national governments, and research organizations. Through direct engagement with these partners in identifying critical challenges and exploring the impacts of alternative policy and investment strategies, the Foresight Initiative will help inform national priorities, donor contributions, and research efforts around common strategic goals and the shared, yet heterogenous agendas associated with different partners, contexts, and outcomes. Since CGIAR research is a key enabler and driver of these outcomes and foresight helps identify pathways toward desired futures, we necessarily take a portfolio approach and estimate projected benefits of the Foresight Initiative as a fractional component of CGIAR organizational outcomes.

What contribution does foresight make to these outcomes? This is impossible to know with precision, but for the purpose of this exercise, we assume that the proposed US$30 million budget for the Foresight Initiative over the next three years represents approximately 3% of the total anticipated One CGIAR pooled funding budget of approximately US$1 billion over the same period. As the Foresight Initiative is specifically designed to improve integration and effectiveness of policy and research investments by One CGIAR and national, regional and global partners, we see this 3% as a reasonable (and conservative) weighting for the Initiative's contribution to overall food, land, and water system-level outcomes across the five One CGIAR Impact Areas.

The second step of our projection of benefits is to estimate the impacts of changes in policies and investments on five selected Impact Area indicators. In contrast to the previous step, here we can draw on prior foresight studies that have explored the impacts of alternative policy and investment strategies using well-established methodologies.

Foresight analysis commissioned by USAID to inform the CGIAR portfolio (Rosegrant et al 2017) explores the impacts of a variety of different investment scenarios using the IMPACT system of models. The most comprehensive of these scenarios (COMP) assumes a set of complementary investments by research organizations, national governments and development partners in agricultural research, soil and water management, and improved market access in developing countries totaling approximately US$25 billion per year (2005 dollars). In 2030, among other impacts, this translates to an estimated US$105 billion increase in the total value of agricultural production in low- and middle-income countries (LMICs) relative to a reference case without increased investment, or a benefit-cost ratio of approximately 4.2 to 1. (Note this is just one of multiple impacts of the COMP scenario, which also include changes in income, resource use, greenhouse gas emissions, and food security.)

Though this scenario is substantially greater than the anticipated One CGIAR budget, it serves as a proxy for an effective global policy landscape that promotes more substantial investment by national governments and development partners along with improvements in overall economic efficiency of resource allocation. We compute the percentage change in the value of production under the COMP scenario relative to the reference scenario in 2030. For the purposes of the present exercise, we use this value (roughly 1.9%), for each breadth variable, as a proxy for the percentage change that could be achieved by using foresight among other approaches to identify and information prioritization of the most cost-effective policy and investment strategy. (These same scenarios supported the analysis commissioned by the CGIAR System Management Office in 2021 to better understand and communicate the potential impact of the future One CGIAR portfolio as part of the system-level projected benefits exercise (Prager and Kruseman 2021).

We thus posit that 3% of the projected 1.9% increase in the value of production attributable to the COMP investment scenario in 2030 (i.e., 3% of US$105 billion or ~US$3.15 billion), as well as

corresponding percentage changes in other indicators, is attributable to the impact associated with the Foresight Initiative.
In the following sections we provide additional detail on the projected benefits for each indicator arising from the present Initiative. It is important to note that:

- The projections below transparently estimate reasonable orders of magnitude for impacts which could arise as a result of the impact pathways set out in the Initiative's Theories of Change. Initiatives *contribute* to these impact pathways, along with other partners and stakeholders.
- For each Impact Area, projections consider breadth (numbers reached), depth (expected intensity of effect per unit) and probability (a qualitative judgement reflecting the overall degree of certainty or uncertainty that the impact pathway will lead to the projected order of magnitude of impact).
- Projections will be updated during delivery to help inform iterative, evidence-driven, dynamic management by Initiatives as they maximize their potential contribution to impact. Projected benefits are not delivery targets, as impact lies beyond CGIAR's sphere of control or influence.

Nutrition, health and food security (# people meeting minimum dietary energy requirements)
This is a widely used indicator at the core of the One CGIAR mission, and is projected in the IMPACT model by evaluating changes in production and prices of around 60 food commodities in relation to dietary energy requirements in around 160 countries. This value can be readily derived from the Rosegrant et al. (2017) study and is similarly reflected by Prager and Kruseman (2021). We extract the 2030 population at risk of hunger variable from the IMPACT results. Globally, the COMP scenario results in about 183.5 million fewer people at risk of hunger relative to the reference scenario in 2030. The assumed 3% Foresight Initiative contribution to this value is thus estimated to be 5.5 million people.

Poverty reduction, livelihoods and jobs (# people assisted to exit poverty)
Agriculture's contributions to economic growth in developing countries have been so dramatic that agricultural economic methods are evolving to better reflect the rapid rates of growth in agricultural income (Martin 2019). The improved agricultural R&D contribution to income expected with One CGIAR and complementary investments results not only from growth in agriculture but also from a corresponding off-farm GDP multiplier associated with the agrifood system.

Estimation of people exiting poverty linked to the Foresight Initiative begins with growth in the value of agricultural production in 2030 across all commodities projected in the COMP scenario in Rosegrant et al. (2017). We then incorporate regionally weighted growth rates to reflect emerging One CGIAR priorities in parts of Africa and South Asia. Then we incorporate poverty-growth elasticities derived from survey-based estimates from World Bank POVCALNET and consistent with figures from Klassen and Misselhorn (2008). Finally, we include consideration of the well-established finding that agriculture growth is approximately 3 times more effective in reducing poverty than growth in other sectors (Christiaensen et al 2011).

Based on these assumptions, we estimate that One CGIAR investments and corresponding complementary programming result in approximately 54 million people exiting poverty by 2030. Using the 3% factor described above, this translates to an approximate 1.6 million people assisted to exit poverty through foresight-related activities.

Gender equality, youth and social inclusion (# women in new jobs)

We start with the basic assumption that growth in income associated with agriculture results in more jobs (Frija et al 2020). Inclusive agricultural transformation creates more remunerative off-farm jobs within the agrifood sector and beyond. Women's inclusion in agricultural transformation is proxied by the share of new off-farm jobs filled by women. Using sex-disaggregated data from the ILO, we project 2017-2019 employment numbers out to 2030 assuming constant employment-to-population ratios.

We then compute expected growth in the agriculture economy associated with One CGIAR investments as projected in the COMP scenario. As employment is expected to increase both in on-farm and in the agrifood system as well as through labor shedding to other sectors, we multiply expected growth in 2030 with the overall employment-GDP growth elasticities. This results in total expected increases in employment.

New employment related to One CGIAR is projected at 5.4 million new jobs. Using the employment-to-population ratios (39% women), estimated new employment (across all sectors) for women within the CGIAR regions is 2.1 million jobs. When considering the equity component of the new One CGIAR strategy (50% women beneficiaries), we raise this estimate to 2.7 million new jobs for women. Following the 3% contribution of the Foresight Initiative to the One CGIAR, this is approximately 81,000 new jobs for women (economy-wide).

Climate adaptation and mitigation (# tonnes CO2 equivalent emissions)
Though adaptation is a major emphasis throughout many of the One CGIAR Initiatives, the fact remains that agriculture is also one of the principal contributors to CO2 and equivalent emissions that drive climate change. For this reason, it is important to also consider the potential for mitigation as a function of the investments in both the sphere of control and the sphere of influence in the One CGIAR. In the COMP scenario as described above (Rosegrant et al. 2017), emissions are reduced by 580 million metric tons CO2eq relative to reference values in 2030 via avoided forest loss and more efficient use of inputs. Using the 3% multiplier to capture the contribution of the Initiative, we estimate foresight-related activities supporting an approximate 20 million tons CO2eq emissions reduction.

Environmental health and biodiversity (# km3 consumptive water use in food production)
The projected benefits with this indicator reflect policy and investments leading to expanded irrigation, improved water use efficiency, and increased soil water-holding capacity. Importantly, both the trade-offs and benefits associated with investment in water productivity are not uniformly distributed. In some areas, improved crops can take better advantage of available rainwater or irrigation expansion can support sustainable intensification. In other areas, however, mining fossil water to support increased irrigation is unstainable. The use of this indicator is thus nuanced, and the specific impacts need to be analyzed relative to their geographic relevance and regional heterogeneity. At the global scale, the COMP scenario results in a net reduction of consumptive water use of 88 km3 in 2030, comprised of a reduction in blue water use and an increase in green water use. On net, a 3% share of this translates to a 2.64 km3 reduction in water use associated with the contribution of the Foresight Initiative.

The selected indicators and projected benefits are summarized in the table below.

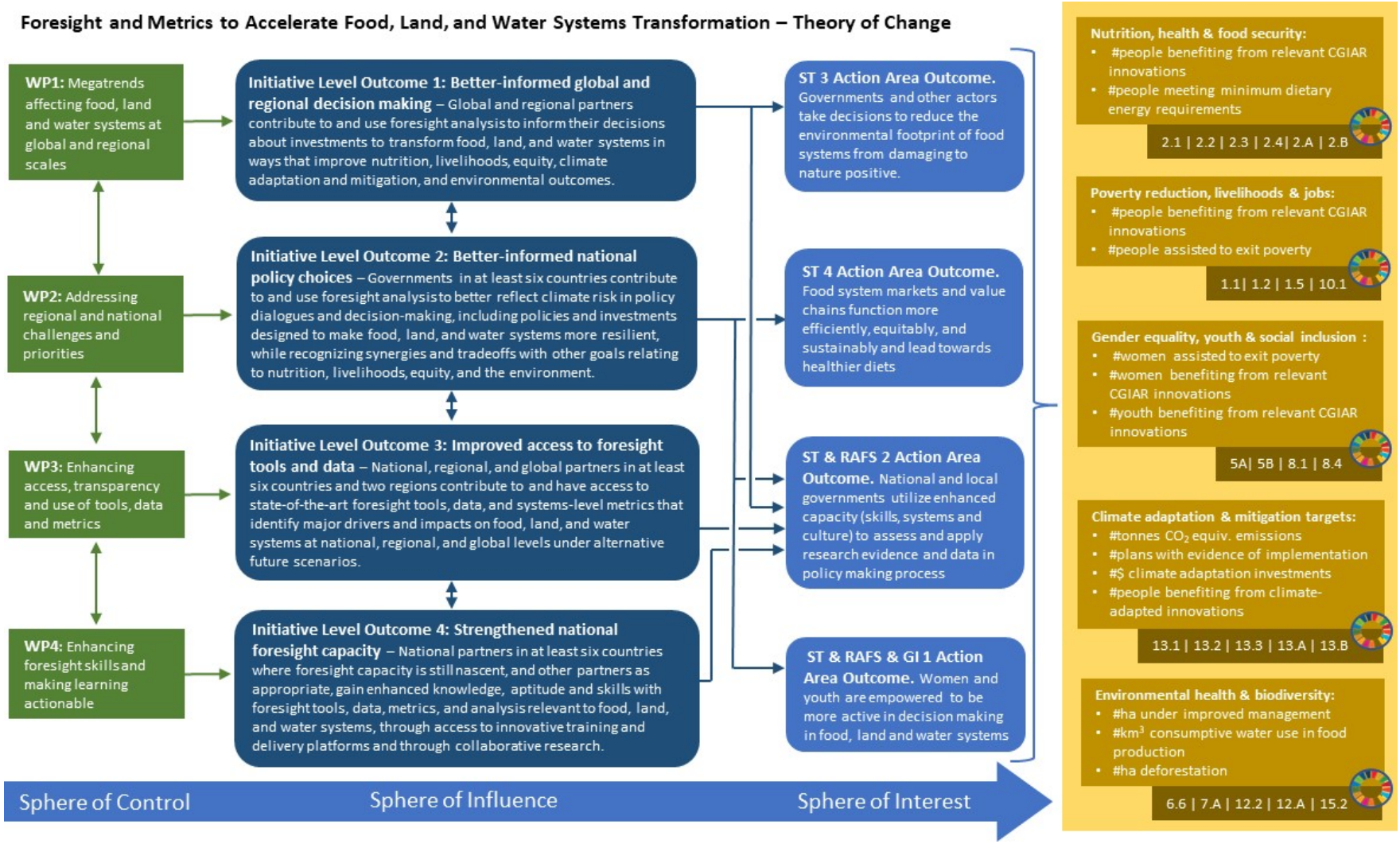
Impact Area	Breadth domain	Estimated breadth	Depth (intensity of effect)	Probability

Nutrition, health & food security	# people meeting minimum dietary energy requirements	5.5 million people	Significant	Low to Medium (10% to 50%)
Poverty reduction, livelihoods & jobs	# people assisted to exit poverty	1.6 million people	N/A	Low to Medium (10% to 50%)
Gender equality, youth & social inclusion	# new jobs for women	81,000 new jobs for women	N/A	Low to Medium (10% to 50%)
Climate adaptation & mitigation	# tons CO2 equivalent emissions	20 million tons CO2eq reduced	N/A	Low to Medium (10% to 50%)
Environmental health & biodiversity	# km3 consumptive water use in food production	2.64 km3 water saved	N/A	Low to Medium (10% to 50%)

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

3.1 Full Initiative TOC

3.1.1 Full Initiative TOC diagram



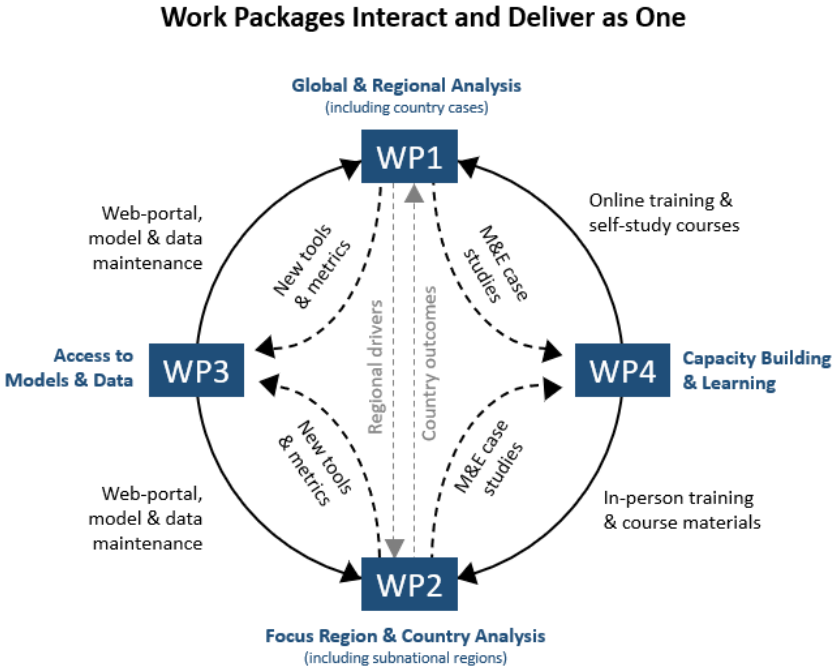
3.1.2 Full Initiative TOC narrative

The research and development community increasingly recognize the interconnections between food, land, and water (FLW) systems, and the importance of jointly managing systems transformation under climate change and uncertainty to achieve more sustainable, equitable, and resilient development. However, research and our experience also highlight the persistent technical and institutional barriers to adopting a multi-systems approach, with many analytical advances taking place within specific areas (e.g., agriculture and climate change), but without commensurate progress in combining tools and analysis across FLW systems to address a broader set of interlinked challenges. This is despite growing demand from governments and development partners for cross-cutting analysis to understand trends, anticipate trade-offs, and identify priorities. Moreover, FLW systems are expected to contribute to an expanding set of goals, requiring new tools and metrics to track more outcomes and trade-offs. As the required foresight tools and metrics become more numerous and complex, researchers and government agencies in many developing countries find it difficult to contribute to and use foresight analysis to inform the policy and investment choices they face.

The Foresight and Metrics Initiative identifies four elements of this gap:

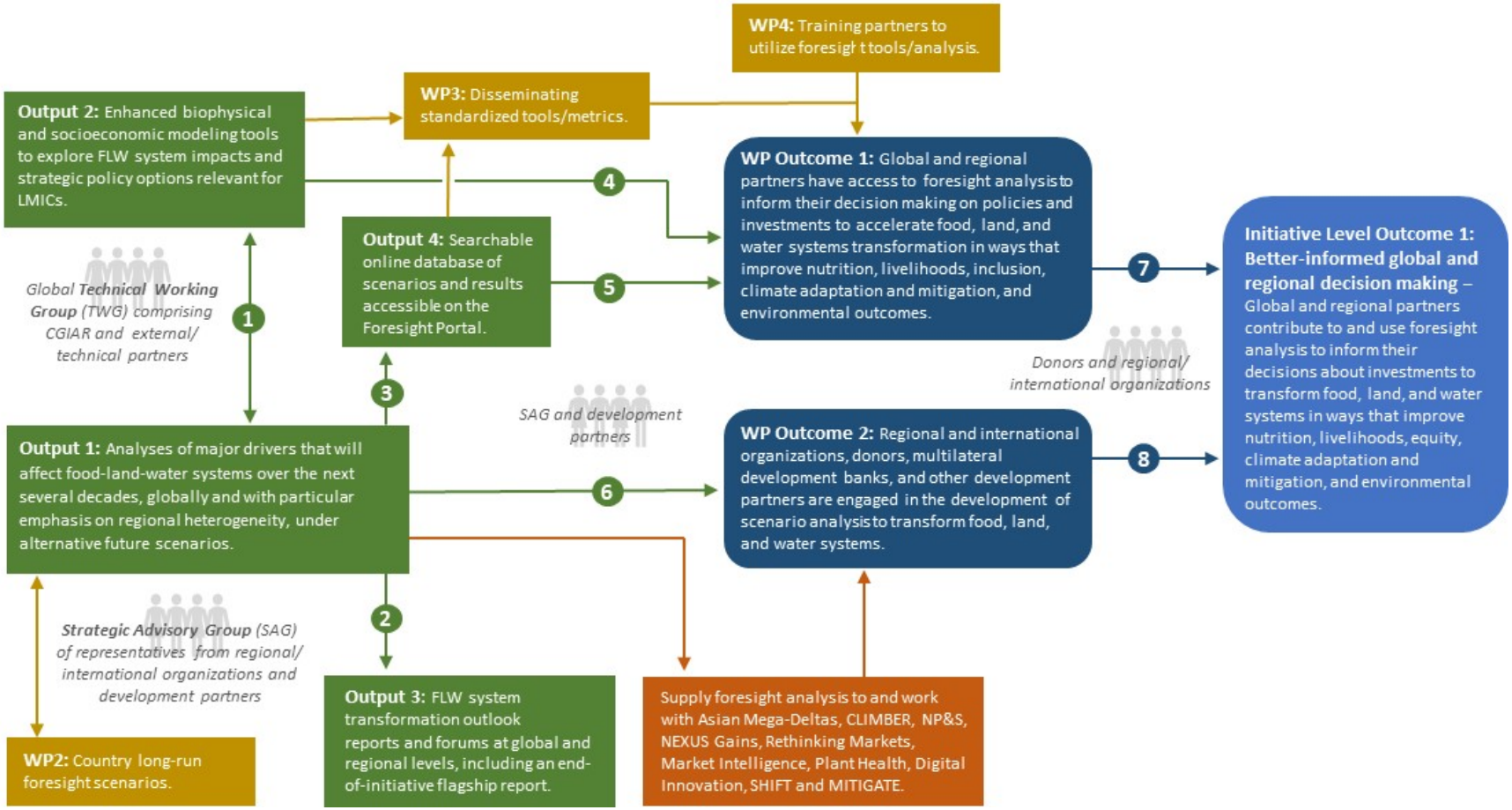
1. Given that food, land, and water systems are interconnected not only in terms of outcomes and trade-offs but also between countries and regions, a clear picture is needed of the larger global and regional landscape within which policymakers in developing countries confront their particular challenges. To date, this larger picture lacks sufficient resolution on the needs of developing countries.
2. Within that larger context, national policymakers often face analytical and institutional barriers to evaluating complex links and trade-offs between policy options and outcomes of interest to them.
3. National policymakers and their development partners often lack access to state-of-the-art foresight tools and metrics that can inform the decisions they make. Foresight tools are in high demand already and improved access will enhance their uptake and use.
4. Even when state-of-the-art tools are available, national policymakers, particularly in low-income countries, often lack the capacity to use and adapt them to address their needs.

The four Work Packages of the Foresight and Metrics Initiative are designed to help national governments and their development partners overcome these gaps. The four Work Packages together build on close and on-going engagement and learning with partners who are directly involved in supporting policy makers – not only to strengthen capacity, provide access to tools, enhance learning, and collaborate in joint research and policy dialogue, but to co-design the application of foresight tools to address the expressed needs and questions of partners and to build trust and confidence in the results generated (see figure below).


Work Packages Interact and Deliver as One
Global & Regional Analysis
(including country cases)
WP1
Web-portal, model & data maintenance
New tools & metrics
M&E case studies
Online training & self-study courses
Regional drivers
Country outcomes
Access to Models & Data
WP3
WP4
Capacity Building & Learning
New tools & metrics
M&E case studies
Web-portal, model & data maintenance
In-person training & course materials
WP2
Focus Region & Country Analysis
(including subnational regions)

3.2 Work Package Research Plans and TOCs

Work Package 1 – Megatrends Affecting Food, Land, and Water Systems at Global and Regional Scales – Theory of Change



Work Package title	**Megatrends affecting food, land, and water systems at global and regional scales (WP1)**
Work Package main focus and prioritization	WP1 identifies the major biophysical and socioeconomic trends affecting – and affected by – food, land, and water systems over the next several decades. These include changes in population, income, technology, urbanization, inequality, migration, diets, land and water use, and climate (including extreme events), along with their impacts on nutrition, poverty, inclusion, greenhouse gas emissions, and the environment. WP1 examines these challenges and impacts at global and regional scales, paying particular attention to interactions between Impact Areas and heterogeneity across regions, which in turn shape the diverse choices faced by decision-makers in the countries that are the focus of WP2.
Work Package geographic scope (global/region/country)	Global – including collaboration with technical partners in China, India, Indonesia, South Africa, Brazil, and elsewhere.

The science

Food, land and water systems face challenges from a host of interacting megatrends as well as local and regional drivers. These include changes in population, urbanization, income, inequality, migration, diets, technology, biodiversity, and climate. Many of these trends are themselves influenced by changes in FLW systems, interacting in complex ways that have important impacts on nutrition, poverty, equity, climate, and the environment. Policy makers are increasingly aware of these trends, but the dialogue on their implications and how to address them has thus far been dominated by the global North, with insufficient attention to impacts and solutions targeted to the concerns of low- and middle-income countries.

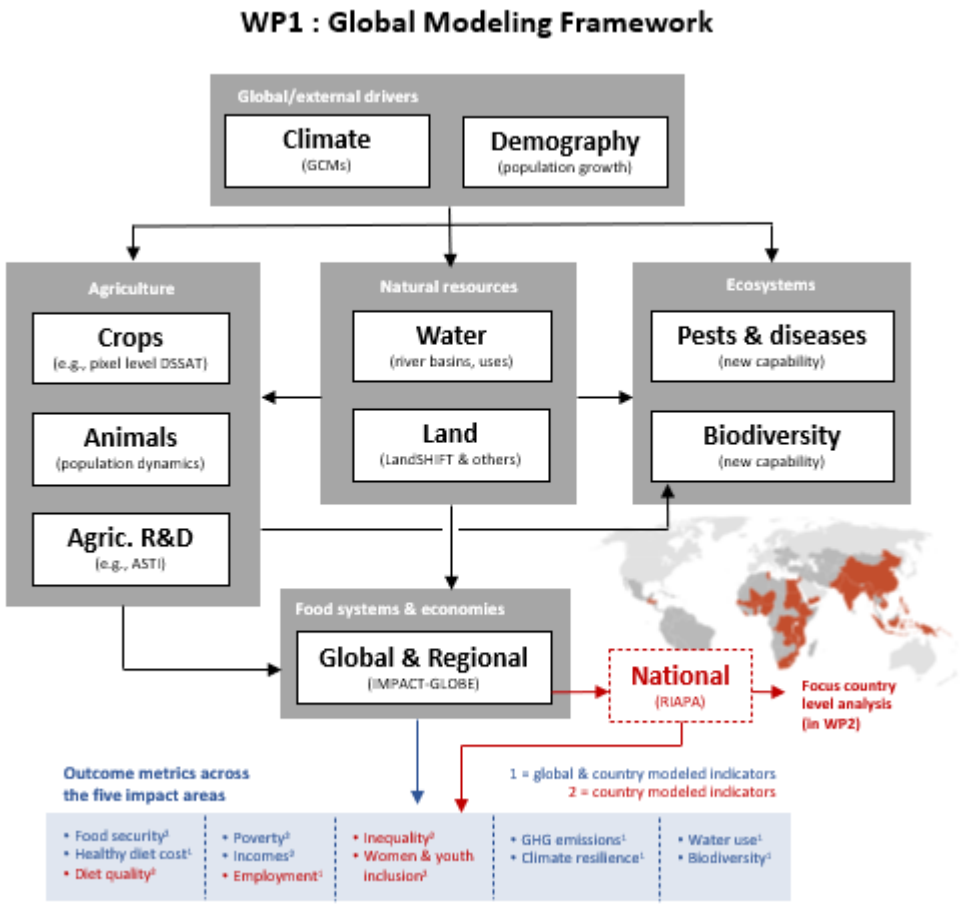
Providing a more complete picture requires systematic understanding of relationships between these megatrends and drivers across spatial and temporal scales. In addition to their global impacts, these factors interact in complex and diverse ways, resulting in a highly heterogenous challenge landscape that varies widely across regions and over time. Addressing country-level concerns requires a sound understanding of this diverse and changing global landscape, and addressing global concerns requires well-informed action at the national level.

WP1 focuses on these research questions:

1. Which megatrends have the greatest potential to affect FLW systems, both positively and negatively, particularly in low- and middle-income countries?
2. What are the likely impacts of these major drivers on LMICs and their FLW systems under “business-as-usual” development pathways?
3. What are the most effective strategies for better integrating policies and investment to improve nutrition, livelihood, equity, climate, and environmental outcomes in LMICs, given the synergies and trade-offs associated with different strategies?
4. Can national policy choices and solutions “roll up” to address global challenges?

To address these questions, this WP strengthens understanding of the impact of major drivers and responses, considering the global dynamic as well as regional heterogeneity. In doing so, it will develop a clear analytical agenda where priority challenges such as climate resilience, affordable diets, and shifting regional comparative advantage are “brokered” between researchers, funders/donors, and global, regional and national partners. This will help support better aligned action across decision-makers at multiple scales, while also positioning deeper

analysis to inform national policy objectives (WP2) in relation to broader-scale phenomena and outcomes. WP1 will employ a mix of qualitative and quantitative foresight approaches. State-of-the-art biophysical and socioeconomic modeling tools, including those developed by CGIAR scientists as well as other world-leading research centers, will be used to explore the effects of key drivers on agricultural production, land and water use, access to food, consumption trends, the circular economy, and their impacts on key development outcomes under business-as-usual trends as well as alternative policy and investment choices (see figure below). Drivers and impacts that are not well covered by modeling tools will be captured through meta-analysis of relevant statistical and qualitative studies. Participatory processes will relate these analytical findings to policy concerns at regional levels and explore barriers and opportunities to address them within diverse decision-making contexts.



WP1's main outputs include:

1. Analyses of major drivers that will affect FLW systems over the next several decades, globally and with particular emphasis on regional heterogeneity, under alternative future scenarios.
2. Enhanced biophysical and socioeconomic modeling tools to explore FLW system impacts and strategic policy options relevant for LMICs.
3. FLW systems transformation outlook reports and forums at global and regional levels, including an end-of-initiative flagship report highlighting synergies and trade-offs across the five Impact Areas and providing integrated pathways to reduced poverty, improved

diets, increased equity, reduced greenhouse gas emissions, and improved environmental quality.
4. A searchable online database of scenarios and results via the Foresight Portal (see WP3).

The theory of change

A Technical Working Group (TWG) comprising economists and foresight specialists from One CGIAR, leading global research institutions (including IIASA, PIK, Wageningen University, MIT, Oxford, and others), and regional and national research institutions (including China/CAAS, India/ICAR, Indonesia/Bappenas, South Africa/Treasury, and others), will assess major drivers that will affect FLW systems over the next several decades, globally and with particular emphasis on regional heterogeneity (Output 1). A Strategic Advisory Group (SAG) will include representatives from regional and international organizations (such as COMESA, SADC, and FAO), donor agencies (such as BMGF and USAID), and other development partners. With input from the SAG, the TWG will enhance biophysical and socioeconomic modeling tools to explore FLW impacts and strategic policy options relevant for LMICs (Output 2) and produce a series of global and regional FLW systems outlook reports to be shared at global and regional forums (Output 3). As such, understanding the demand for our innovations and unpacking the enabling environment to identify the key actors along our impact pathway are embedded into the Work Package from the beginning (see section 4 for more information). All tools and scenario results (Output 4) will be made publicly available via the Initiative's Foresight Portal (see WP3).

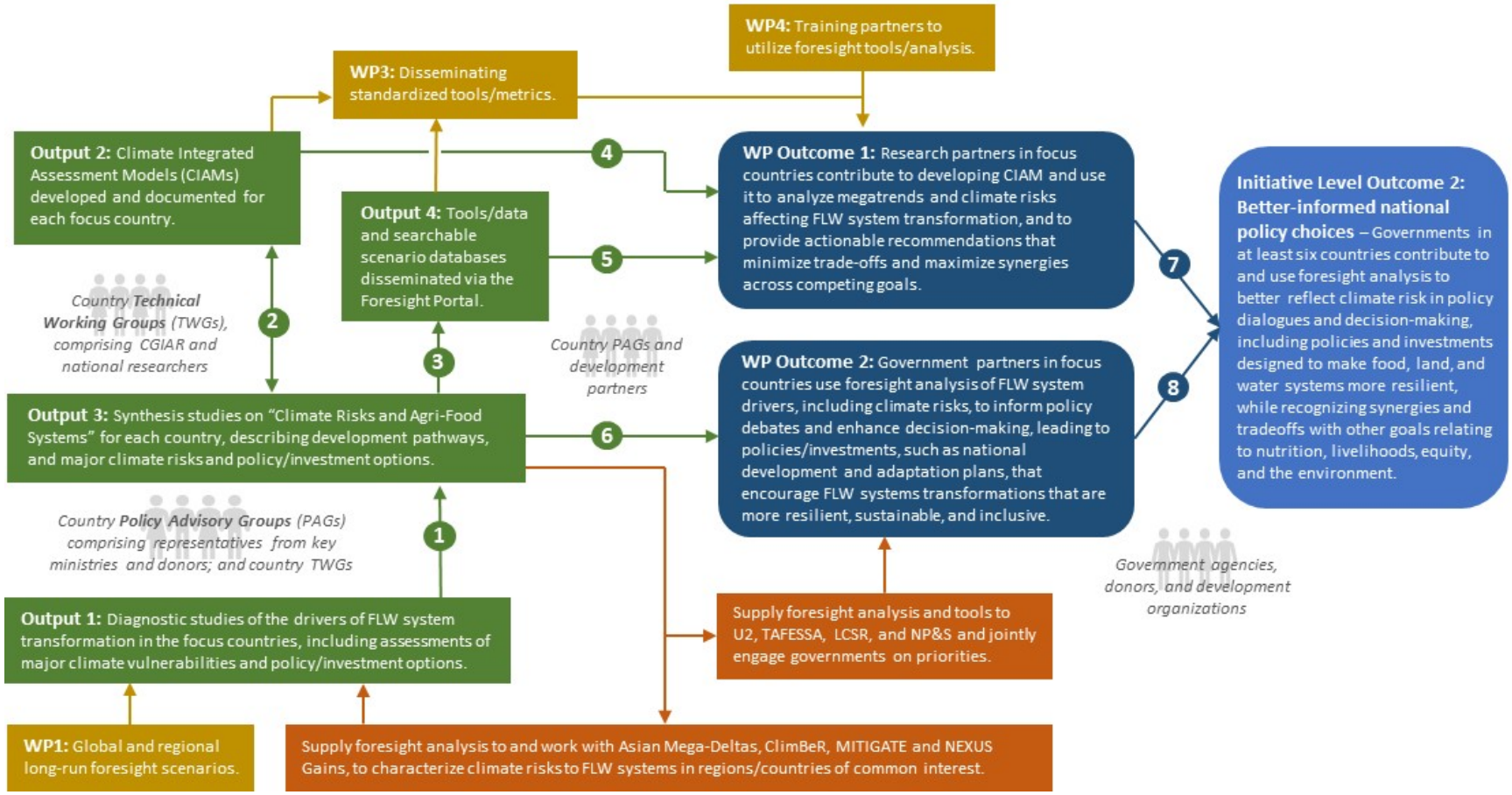
End-of-Initiative outcomes:

1. 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.
2. 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.

WP1 aims to inform decision-making, but most decision-making (including that affecting global and regional outcomes) occurs at the national level. WP1 will address this by helping to build a shared information base on common challenges to inform decision-making at multiple scales and in diverse contexts. There is also a risk that partners may lack capacity to contribute to or effectively use results of foresight analysis. WP1 will address this by working with WP4 to provide general training on foresight modeling, interpretation, and use.

WP1 provides global and regional scenario results to inform more detailed country-level analyses in WP2, and draws on results from WP2 to inform WP1's larger-scale analyses. WP1 will work with WP3 to make the foresight tools and data it develops and uses openly accessible, and will contribute to global and region-specific pages on the Initiative's Foresight Portal created and managed by WP3.
WP1 will work with WP4 to provide general training on foresight modeling in selected partner countries. WP1 will work with a number of other One CGIAR Initiatives, including National Policies and Strategies, Rethinking Markets, Market Intelligence, Plant Health, NEXUS Gains, Digital Innovation, ClimBeR, MITIGATE, SHiFT, Sustainable Intensification of Production, SeEdQUAL, Eastern & Southern Africa/U2, South Asia/TAFSSA, and Asian Mega-Deltas, among others.

Work Package 2 – Addressing Regional and National Challenges and Priorities – Theory of Change



Work Package title	**Addressing regional and national challenges and priorities (WP2)**
Work Package main focus and prioritization	WP2 focuses on challenges to systems transformation within specific regions and countries. It provides more in-depth and comprehensive foresight analysis and more immediate policy recommendations to national decision-makers and partners. In Phase 1, WP2 focuses on managing climate risks, alongside other megatrends affecting FLW systems, in at least six countries in Eastern and Southern Africa and South Asia. Goals include (a) integrating with local foresight tools and expertise; (b) closer engagement with partners in focus countries to co-design scenarios and analyze policy options; and (c) providing actionable policy and investment recommendations to support achievement of the 2030 SDGs.
Work Package geographic scope (global/region/country)	Eastern and Southern Africa (regional, Kenya, Rwanda, Malawi, Zambia), and South Asia (regional, Bangladesh, Nepal); additional countries if there is expressed government demand and available resources.

The science

Countries operate within global and regional systems (WP1), but also have unique challenges and policy concerns. Understanding these and identifying actionable and affordable policy/investment priorities requires (1) in-depth foresight analysis using models and metrics tailored to local contexts; and (2) close engagement with national decision-makers and research partners to diagnose challenges, design scenarios, and evaluate options. To achieve this depth of analysis and engagement, WP2 focuses on specific regions and countries, and pays particular attention to the challenges prioritized by regional Initiatives. In Phase 1, WP2 focuses on how to manage climate risks, alongside broader FLW systems transformations, in six countries within two regions. In later phases or if resources permit, WP2 may address other challenges and/or countries.

WP2 uses more detailed tools and metrics to evaluate how the same megatrends from WP1 affect FLW systems within focus countries. WP2 also adopts a more sophisticated approach to analyzing climate risks. Foresight studies of climate change at larger scales may not fully meet national decision-making needs, because they (1) focus on specific sectors, especially agriculture, rather than entire FLW systems (Wheeler and Von Braun 2013); (2) consider future climate change or current variability, but not both; (3) capture specific climate scenarios or extreme events, rather than the full range of potential realizations; (4) do not consider all five Impact Areas; and/or (5) measure vulnerability, without providing recommendations. As a result, policies may not incorporate insights from foresight analysis of climate risks.

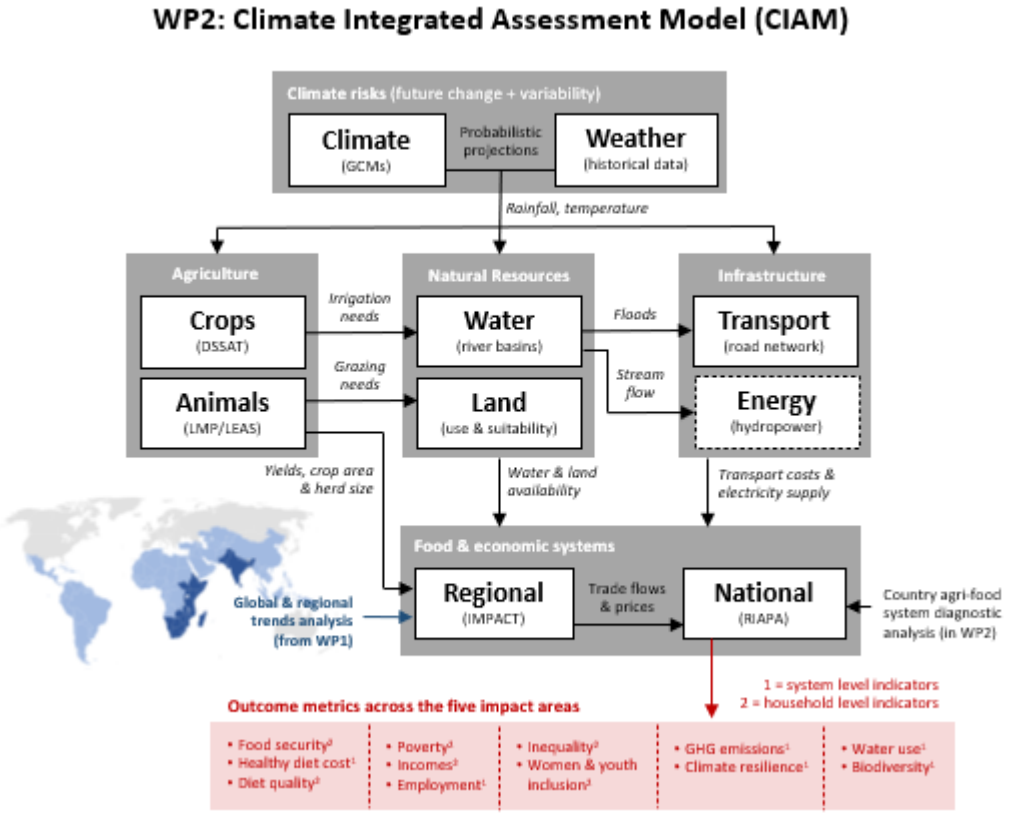
Research questions include:

1. How are megatrends affecting FLW systems in the focus countries and where do major climate vulnerabilities exist?
2. What improvements to foresight tools and metrics are needed to evaluate climate risks?
3. How do current and future climate risks affect FLW systems in the focus countries, and which policies/investments are most (cost) effective at promoting more resilient transformation?

WP2 develops Climate Integrated Assessment Models (CIAM) for each country (see figure below). CIAMs track FLW systems using countries' own tools and data where possible. Probabilistic climate projections combine with historical weather to characterize the full range of climate scenarios to 2030 and beyond (Schlosser et al 2012); natural resource models translate downscaled climate projections into water and land availability for agriculture; herd dynamics and process-based crop models estimate changes in crop and animal production under different farm technologies and practices; and engineering models track transport costs (i.e., market access) and energy availability (e.g., power for irrigation). Regional models assess how global megatrends (WP1) affect agricultural production and cross-border trade. The above results are supplied to economywide models that estimate impacts on national and subnational agrifood systems and populations and identify the most cost-effective policy/investment responses. Outcomes are reported across all five Impact Areas, permitting a more comprehensive evaluation of trade-offs and synergies across climate scenarios and policy/investment options.

Outputs include:

1. Diagnostic studies of the drivers of FLW systems transformation in the focus countries, including assessments of major climate vulnerabilities and policy/investment options.
2. CIAMs developed and documented for each focus country.
3. Synthesis studies on "Climate Risks and Agrifood Systems" for each country, describing development pathways, and major climate risks and policy/investment options.
4. Tools/data and searchable scenario databases disseminated via the Foresight Portal (WP3).



The theory of change

In each country, a Technical Working Group (TWG) will include economists and climate/natural resource specialists from CGIAR and national research institutions (e.g., Kenya's KIPPRA; Zambia's ZIPAR; South Asia's SANEM); and a Policy Advisory Group (PAG) will include government representatives from key ministries making decisions for FLW systems (e.g., Agriculture, Environment, Planning). As such, understanding the demand for our innovations and unpacking the enabling environment to identify the key actors along our impact pathway are embedded into the Work Package from the beginning (see section 4 for more information). Country launch events will be held to formally convene groups, discuss approaches, and outline objectives. TWGs will receive ongoing training (WP4) and will progressively develop CIAMs using local tools and data where appropriate (Output 2). TWGs will conduct initial diagnostic studies of FWL systems' main drivers and climate risks, and with PAGs, shortlist policy/investment options for in-depth analysis (Output 1). TWGs will use CIAMs to analyze climate and development scenarios and policies/investments, with results presented/updated at annual PAG-TWG meetings. Annual progress reports will summarize the analysis, and a final synthesis report (Output 3) will be presented at in-country closing events. Where possible, outputs will be sequenced and aligned with national policy cycles (e.g., national development and adaptation plans), but WP2 will also provide the tools and evidence to inform ongoing decision-making. Tools and scenario results (Output 4) will be made publicly available via the Foresight Portal (WP3).

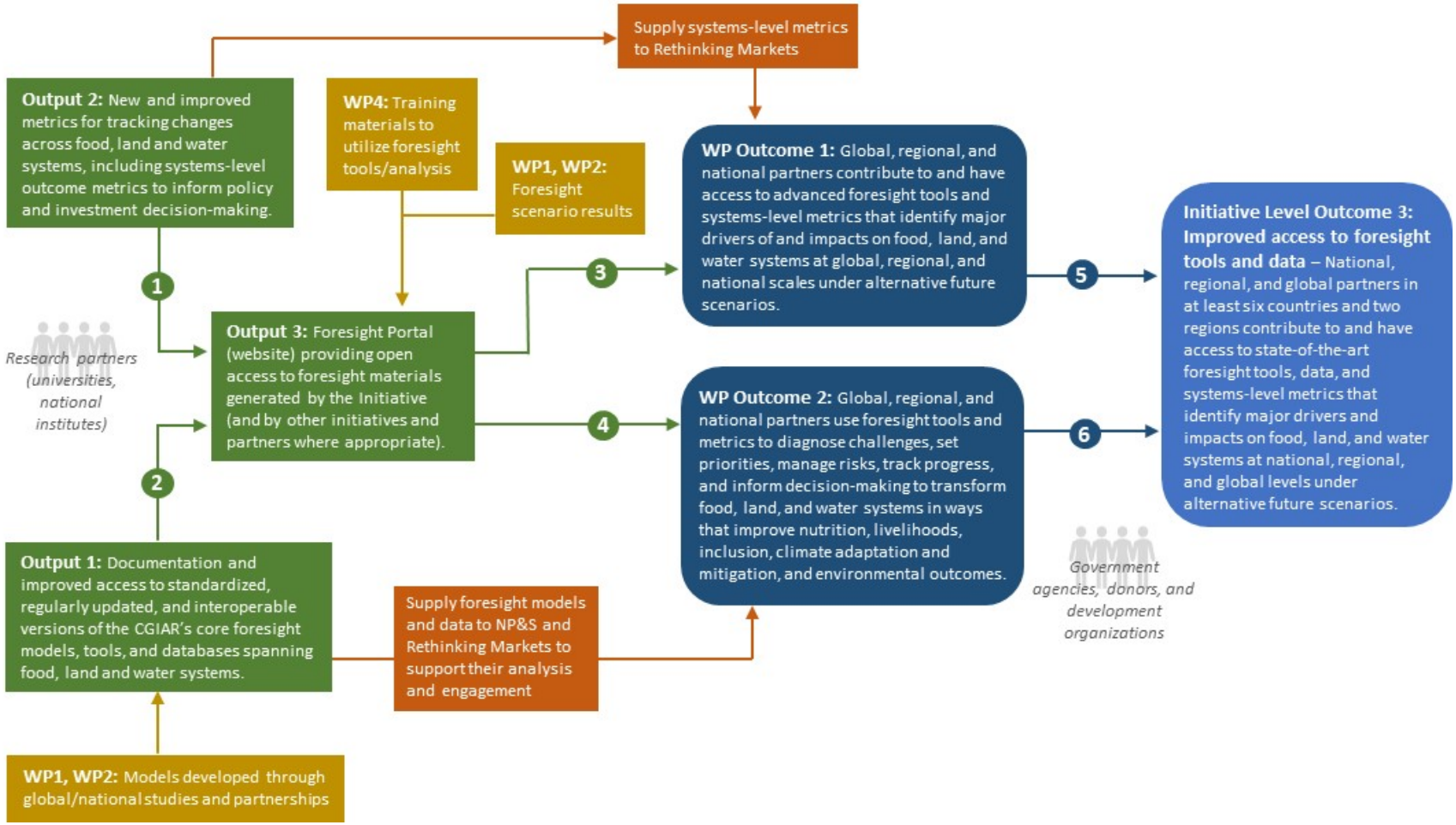
End-of-Initiative outcomes:

1. Research partners in focus countries contribute to developing CIAM and use it to analyze megatrends and climate risks affecting FLW systems transformation, and to provide actionable recommendations that minimize trade-offs and maximize synergies across competing goals.
2. 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 systems transformations that are more resilient, sustainable, and inclusive.

WP2 aims to inform decision-making in focus countries by combining advanced foresight analysis (conducted jointly by CGIAR and local researchers), with a more deliberate, intensive, and sustained engagement with multiple government ministries. Governments in focus countries have articulated demand for foresight/modeling, but the timing of WP2's analysis may not perfectly align with local policy cycles, especially for all ministries involved. This could reduce WP2's direct policy influence and impact. Moreover, local researchers with suitable expertise and foresight experience may not exist, especially within all areas of FLW systems. To reduce these risks, WP2 will co-create workplans with TWGs and PAGs to improve alignment; ensure that the foresight tools are accessible beyond the end of the Initiative (with WP3); and ensure that local researchers can utilize the tools and government partners can correctly interpret the completed foresight analysis (with WP3).

WP2 has strong synergies with other Initiatives: its focus on climate is guided by the U2 and TAFSSA regional Initiatives; it will work with the regional and National Policies and Strategies Initiatives to provide tools and analysis to support policy prioritization within focus countries; and its climate analysis will inform the Asian Mega-Deltas, ClimBeR, MITIGATE, and NEXUS Gains Initiatives, amongst others.

Work Package 3 – Enhancing Access, Transparency and Use of Tools, Data and Metrics – Theory of Change



Work Package title	**Enhancing access, transparency and use of tools, data, and metrics (WP3)**
Work Package main focus and prioritization	As food, land and water systems become more interconnected and the tools and metrics needed to analyze them become more complex, it is difficult and costly for governments and researchers, especially in developing countries, to remain at the forefront of foresight analysis. WP3 reduces these barriers by making it easier to access and use CGIAR's core foresight models, databases, and systems-level metrics. WP3 also maintains the Initiative's online web portal that provides easy access to its foresight tools, analysis, and training materials.
Work Package geographic scope (global/region/country)	Global, regional, and national – including but not limited to five technical partner countries (China, India, Indonesia, South Africa and Brazil), and six initial focus countries (Kenya, Malawi, Rwanda, Zambia, Bangladesh, and Nepal).

The science

Decision-makers in many regions and countries already use foresight tools and analysis to anticipate trends and evaluate policy trade-offs. However, development goals today span multiple Impact Areas with more possible trade-offs, and food, land, and water systems are also more integrated, with shared challenges and risks. As a result, the foresight tools and metrics needed to track trends and evaluate priorities have also become more complex. Many governments, researchers and development organizations face technical and institutional barriers to building and maintaining their foresight capabilities. Models and databases can be costly to develop, extend and maintain, and many government ministries and research institutions lack the mandate and/or expertise to develop their own tools and metrics that jointly cover food, land, and water systems. This leaves some countries, especially poorer countries, with inadequate tools and metrics to inform policy and investment decisions (World Bank 2021). This means that those countries are not sufficiently able to evaluate the complex food, land, and water systems challenges and trade-offs they face; that the policy and investment choices they make may fall short of their potential benefits in terms of nutrition, poverty reduction, inclusion, climate adaptation and mitigation, and environmental impacts; and that their interests are not adequately captured in broader regional and global dialogues and decision-making processes.

WP3 addresses these gaps by improving access to advanced tools, data, and metrics through greater harmonization, standardization, documentation, transparency, accessibility, and interoperability, as well as compliance with FAIR principles. Specifically, WP3 will (1) standardize and document CGIAR's core foresight models that capture food, land and water systems in and beyond the focus countries, including IMPACT (global and national market models) and RIAPA (country economywide models) and their underlying biophysical and household models; (2) maintain the databases needed to update and operate the core foresight and biophysical models; (3) develop and document new and improved metrics covering key areas of FLW systems, including outcome metrics and associated models needed to evaluate policy and investment impacts, such as agrifood system GDP, employment, water, and greenhouse gas emissions; and (4) maintain and promote CGIAR's Foresight Portal (website) that disseminates the above-mentioned tools, data, and metrics, and provides searchable databases containing the scenarios and results from CGIAR-led global, regional and national foresight studies (see WP1 and WP2).

WP3's main outputs include:

1. 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.
2. 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.
3. Foresight Portal (website) providing open access to foresight materials generated by the Initiative (and by other Initiatives and partners where appropriate).

The theory of change

WP3 reduces barriers to building and maintaining countries' foresight capabilities by providing easier access to CGIAR's core foresight tools, metrics and databases covering food, land, and water systems. The Foresight Portal (website) provides a shared platform for improving access to foresight tools and data, and for disseminating the Initiative's training materials and foresight scenarios. The Portal will also enable global and national partners to share their own models and data, and to adapt CGIAR's data and tools for their own purposes. Using more advanced and comprehensive foresight models and data is expected to enhance the quality of foresight analyses and the policy and investment decisions that these inform.

To accomplish this, the Foresight and Metrics Initiative will work with a variety of research institutions, statistical agencies, and other partners. For data and metrics these will include the AgMIP Data Interoperability Group (AgDIG); EPAR at University of Washington; the data unit at Wageningen Economic Research; the GEMS platform at the University of Minnesota; the Market Intelligence and Product Profile Initiative (MIPP); the community of practice on socio-economic data; FAO STAT; World Bank; World Resources Institute; Johns Hopkins University; and others. For foresight models and other tools, these partners will include AgMIP, the DSSAT team at the University of Florida, and the GTAP community, among others.

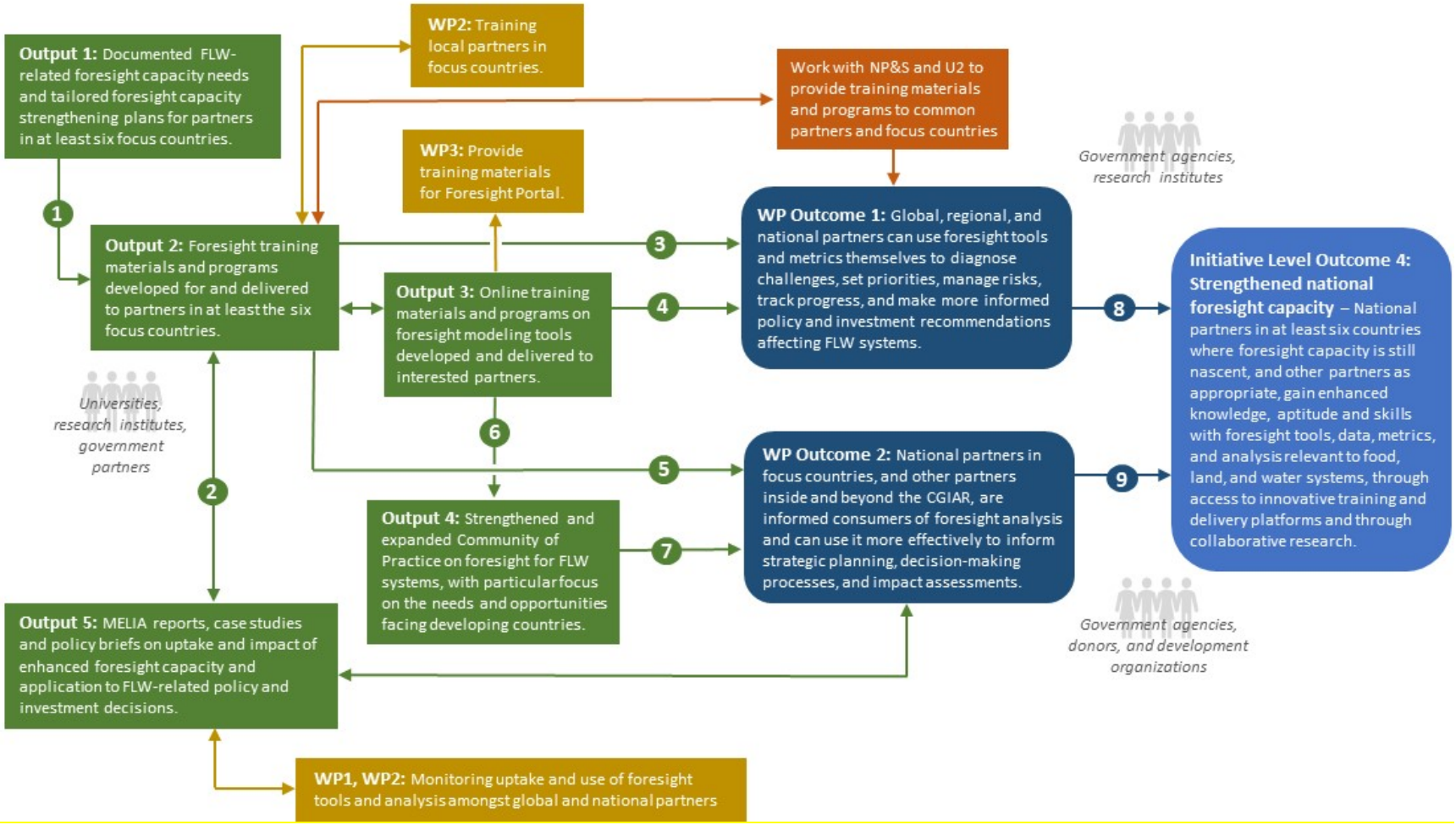
End-of-Initiative outcomes:

1. Global, regional, and national partners contribute to 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.
2. 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.

WP3 aims to provide access to foresight tools and metrics to inform decision-making, but users may not have the capacity to fully utilize these tools and metrics. To address this, WP3 will offer basic "help-desk" support to ensure that foresight practitioners can adequately access the data, metrics and tools provided by WP3 – and to monitor user feedback about ways to improve accessibility. To address capacity needs that exceed basic "help-desk" levels, WP3 will work with WP4 to strengthen partner capacity in selected focus countries. Another risk is that underlying data may be inaccurate or out of date. WP3 will address this by working to identify errors, correct, and update data where possible, and note caveats where needed.

WP3 will work with WP1 and WP2 to make the foresight tools and data developed and used in these Work Packages open access, and to make the results of their analyses available on the Initiative's Foresight Portal. WP3 will work with WP4 to provide open access training materials on foresight analysis in selected partner countries. WP3 will work with Rethinking Markets to provide systems-level metrics for its Dashboard. WP3 will work with the National Policy and Strategies Initiative to develop the standardized models (RIAPA) and metrics that will be used in their country engagement. WP3 will collaborate with other Initiatives that are collecting data relevant for foresight analysis to enhance its interoperability and reusability.

Work Package 4 – Enhancing Foresight Skills and Making Learning Actionable – Theory of Change



Work Package title	**Enhancing foresight skills and making learning actionable (WP4)**
Work Package main focus and prioritization	WP4 works with partners to strengthen their capacity to understand foresight metrics, use foresight tools, and apply foresight results to inform decision-making about food, land, and water systems. WP4 includes four activities with selected partner countries and institutions: (1) jointly assessing key foresight training needs; (2) developing scaling mechanisms for the uptake of integrated foresight tools, data and analysis; (3) building capacity on foresight tools, data and analysis; and (4) monitoring key outcome and impact indicators to inform the Initiative's learning processes and enable course adjustments.
Work Package geographic scope (global/region/country)	Five technical partner countries (China, India, Indonesia, South Africa, and Brazil) and six focus countries (Kenya, Malawi, Rwanda, Zambia, Bangladesh, and Nepal), with option to include more based on partner demand and Initiative resources.

The science

Effective foresight requires capacity – to assess future goals and challenges, to analyze options, to evaluate trade-offs between different courses of action, and to monitor outcomes and make course adjustments as needed. Yet decision-makers at multiple levels, particularly in developing countries, often lack the ability to use foresight tools, metrics and analysis to determine which future challenges are of greatest concern and to evaluate the policy and investment options available to address these challenges. As a result, policy and investment decisions may not fully account for impacts that will be felt beyond immediate planning horizons and may not anticipate trade-offs that could emerge between alternative pathways and desired outcomes in the future.

Effective foresight is thus about making learning actionable, and this begins with identifying capacity needs to support strategic planning by national, regional, and global partners on the future of FLW systems. WP4 will work with these partners to identify capacity needs and fill these gaps. Specifically, WP4 will work with national partners in at least six focus countries, and with other partners as appropriate, to (1) identify foresight capacity needs and formulate strategies to scale up understanding, use and impact of foresight tools and metrics in support of FLW systems; (2) develop and deliver tailored in-person training programs to selected partners to meet the identified capacity strengthening needs; (3) develop and deliver online training materials and programs on quantitative foresight modeling tools to meet the needs of prospective users who have the requisite skills and interest; (4) strengthen and expand the community of practice on foresight for FLW systems in CGIAR and its partners, with particular focus on the needs and opportunities facing developing countries; and (5) work with national partners in at least six focus countries, and with other partners as appropriate, to monitor, evaluate, and learn from experience in strengthening and applying foresight capacity to inform policy and investment decisions affecting FLW systems.

In-person and online training programs will aim to build the capacity of partners to: understand and use metrics relevant to the One CGIAR's five Impact Areas; use foresight analysis for decision-making (aimed at both technical and less technical partners); use qualitative foresight approaches, such as participatory processes and scenario building; and use quantitative approaches, such as simulation modeling.

WP4's main outputs include:

1. Documented FLW-related foresight capacity needs and tailored foresight capacity strengthening plans for partners in at least six focus countries.

2. Foresight training materials and programs developed for and delivered to partners in at least the six focus countries.
3. Online training materials and programs on foresight modeling tools developed and delivered to interested partners.
4. Strengthened and expanded community of practice on foresight for FLW systems, with particular focus on the needs and opportunities facing developing countries.
5. MELIA reports, case studies and policy briefs on uptake and impact of enhanced foresight capacity and application to FLW-related policy and investment decisions.

The theory of change

WP4 will work closely with the Initiative's national, regional, and global partners to identify foresight capacity needs and gaps, and to develop and provide training materials and programs to fill those gaps. As such, understanding the demand for our innovations and unpacking the enabling environment to identify the key actors along our impact pathway are embedded into the Work Package from the beginning (see section 4 for more information). Training will be offered in at least the six focus countries on data and metrics related to the five One CGIAR Impact Areas, on interpretation and use of foresight results to inform decision-making, on scenario design, and on use of foresight tools to generate analytical results. Training will be tailored to meet diverse needs based on the needs of partners, their skill levels, and the nature of the collaboration with different partners, including KIPPRA in Kenya, ZIPAR in Zambia, SANEM in South Asia, CAAS in China, government ministries in Rwanda and Malawi, and others. This may range from in-person courses to learning-by-doing and mentoring through collaborative research activities with selected country partners. WP4 will also develop and deliver online instructional materials, which offer a low-cost digital solution to scaling and sustaining outreach for a wider audience of prospective users with the necessary background skills.

WP4 also manages the Initiative's MELIA. This will include ongoing monitoring of the use of foresight tools and metrics to inform decision-making, particularly in the six focus countries. WP4 will conduct regular interviews with partners to collect feedback and identify if midstream course correction is needed. WP4 will also collect impact narratives from partners to identify opportunities for further in-depth evaluation of the Initiative's projected benefits.

End-of-Initiative outcomes:

1. Global, regional, and national partners can use foresight tools and metrics to diagnose challenges, set priorities, manage risks, track progress, and make more informed policy and investment recommendations affecting FLW systems.
2. 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.

WP4 aims to strengthen capacity to use foresight tools and metrics to inform decision-making, but this assumes interest in partner countries, identification of appropriate participants (institutions and individuals), and ability of partner individuals to participate actively in training (and to continue in or grow into positions where they can apply their enhanced skills to inform decision-making processes). To address this, WP4 will work with partners from the outset to identify needs and develop plans for implementation and scaling of training programs.

WP4 will work with WP1 and WP2 to identify and provide targeted training for partners who are collaborating in WP1 and WP2 foresight analyses. WP4 will work with WP3 to provide training in selected partner countries on use of databases and information resources developed by WP3. WP4 will work with the National Policies and Strategies Initiative and the ESA/U2 and SA/TAFSSA regional integrated Initiatives as needed to provide training to support foresight-related activities by partners of those Initiatives.

4. Innovation Packages and Scaling Readiness Plan

4.1 Innovation Packages and Scaling Readiness Plan

The Scaling Readiness elements are key components of our impact pathway: understanding the demand for our innovations and unpacking the enabling environment to identify who are the key actors along our impact pathway are both key activities embedded into our Work Packages.

WP 4 is entirely dedicated to establishing and strengthening regional communities of modelers and to understanding the best learning methods to enhance capacity for scaling. Ultimately, we seek to foster knowledge sharing among and beyond informed users of foresight information to pave the way for our innovations to be disseminated and used more widely.

In WP 4 we will identify which scaling mechanisms can successfully inform and promote policy change. This will enable us to identify constraints for uptake and solutions for alternative pathways, and to design and tailor innovations linked to outputs in our TOCs that will contribute to country- and regional-level changes in capacity and use of foresight to inform decision-making.

Learning acquired from WP4 together with the scaling readiness approach will help us prioritize and package innovations in WPs 1, 2, and 3 for broader use by decision-makers in partner countries. Outcomes and stakeholder mapping approaches will be used to identify Innovation Packages of interest, and then the Scaling Readiness approach will enable their assessment.

Dedicated activities, deliverables, indicators, and line-items will be included in the Management Plan's MELIA once a first thorough analysis of this is done during the inception phase. The proposed budget in section 10 reports an indicative budget for Innovation Packages and Scaling Readiness subject to revision during the inception phase.

CGIAR
Science for a food-secure future

5. Impact statements

5.1 Nutrition, health and food security

Challenges and prioritization

Improved diets are essential for improved nutrition and health. Less well understood are the complex drivers of dietary change and their interactions with other important aspects of food, land and water systems, including climate change and the environment. A rapidly growing body of research is exploring these issues, but focuses disproportionately on the interests and concerns of high-income countries. This Initiative will analyze future pathways of changing diets and their impacts, with particular attention to the interests of low- and middle-income countries, to enhance their ability to assess the opportunities and trade-offs that characterize the policy and investment choices they face in relation to improved nutrition, health and food security.

Research questions

- (WP1) How will the major drivers of FLW systems affect future dietary change and food and nutrition security at global and regional scales?
- (WP2) In the context of climate risk, which national policies and investments will be most effective in achieving improved diet quality at affordable costs?
- (WP3) What foresight tools and actionable metrics are needed to help our stakeholders monitor and project nutrition-related indicators related to FLW systems?
- (WP4) What are the best scaling pathways for foresight to inform decision-making to improve nutrition, health and food security outcomes?

Components of Work Packages

- WP1 will work with regional and global partners using participatory and quantitative foresight approaches to analyze how dietary pathways may evolve under alternative scenarios, with particular attention to variation across regions.
- WP2 and partners in focus countries/regions will develop tools and metrics to track and anticipate changes in diets and food security under climate risks and alternative policies and investments.
- WP3 will develop, document, and provide access to foresight tools and metrics related to nutrition, health and food security.
- WP4 will enhance the capacity of partners in selected low-income countries to understand, evaluate, and ultimately develop foresight metrics, scenarios and analyses related to nutrition, health and food security.

Measuring performance and results

Decision-makers in at least six focus countries, two regional organizations and three funding agencies will have improved access to and capacity to produce and/or use rigorous foresight information on the impacts of changing demand, novel technologies, and alternative policy and investment strategies on nutrition-related outcomes, under a range of climate and socioeconomic conditions, including:

- Cost of a Reference Diet (CoRD) using the EAT-Lancet healthy reference diet
- Household-level indicators of diet deprivation
- National food availability and household-level food access (incomes, prices)

Partners

- Demand: national governments, BMGF, USAID, WB, regional development banks
- Innovation: national and international policy, research and training institutions, SHiFT Initiative
- Scaling: national and regional policy support and training institutions

Human resources and capacity development of Initiative team

The Initiative will involve collaboration among economists, agriculture specialists, data scientists, gender specialists, nutritionists, health experts, and others. Relevant expertise will be acquired through recruitment, partnership, and/or capacity building as needed. See section 9.1 for more information.

5.2 Poverty reduction, livelihoods and jobs

Challenges and prioritization

Poverty remains a persistent challenge in many areas, and unemployment is an increasing concern, particularly in areas with large and rising youth populations. Agriculture is still the largest employer in the Foresight & Metrics Initiative's focus countries, and agricultural growth is still the most cost-effective means of reducing poverty. Foresight is needed to better understand how changing demographic, market, technology, resource and climate conditions will affect livelihoods, and how different policy and investment strategies can best improve employment prospects and incomes in areas and for populations that need them most.

Research questions

- (WP1) How will the major drivers of FLW systems affect poverty reduction, livelihoods and jobs at global and regional scales?
- (WP2) In the context of climate risk, which national policies and investments will be most cost-effective in reducing poverty, improving livelihoods, and expanding opportunities for employment?
- (WP3) What foresight tools and actionable metrics are needed to help our stakeholders monitor and project poverty- and livelihood-related indicators relevant to FLW systems?
- (WP4) What are the best scaling pathways for foresight to inform decision-making to improve poverty, livelihood, and employment outcomes?

Components of Work Packages

- WP1 will develop as shared understanding through stakeholder-driven scenario design and foresight analysis that highlights both the heterogeneity of impacts and where there may be trade-offs between poverty reduction and other Impact Area goals.
- WP2 and partners in focus countries/regions will develop tools and metrics to track and anticipate changes in poverty and employment under climate risks and alternative policy and investment options.
- WP3 will develop, document, and provide access to foresight tools and metrics related to poverty, livelihoods, and employment.
- WP4 will enhance the capacity of partners in selected low-income countries to understand, evaluate, and ultimately develop foresight metrics, scenarios and analyses related to poverty, livelihoods, and employment.

Measuring performance and results
Decision-makers in at least six focus countries, two regional organizations and three funding agencies will have improved access to and capacity to produce and/or use rigorous foresight information on the impacts of changing demand, novel technologies, and alternative policy and investment strategies on poverty- and livelihood-related outcomes, under a range of climate and socioeconomic conditions, including metrics of agricultural income and employment (by value chain) and poverty (headcount and gaps, by population group).

Partners
- Demand: national governments, BMGF, USAID, WB, regional development banks
- Innovation: national and international policy, research and training institutions, Rethinking Markets Initiative
- Scaling: national and regional policy support and training institutions

Human resources and capacity development of Initiative team
The Initiative will involve collaboration among economists, private sector specialists, data scientists, gender specialists, crop, livestock and aquaculture scientists, and others. Relevant expertise will be acquired through recruitment, partnership, and/or capacity building as needed. See section 9.1 for more information.

5.3 Gender equality, youth and social inclusion

Challenges and prioritization
Gender, youth and social inclusion are critical dimensions of food, land, and water system transformation that have long been recognized in qualitative foresight approaches, but which historically have received insufficient attention in quantitative foresight modeling. Improving the latter is critical in order to rigorously explore and evaluate how systemic changes are likely to affect gender and inclusion, and how policy and investment choices can shape these outcomes. The Foresight & Metrics Initiative will build on recent improvements in analytical capacity and apply those in collaboration with partners to better incorporate these considerations in decision-making processes.

Research questions
- (WP1) How will the major drivers of FLW systems affect gender equality, youth and social inclusion at global and regional scales?
- (WP2) In the context of climate risk, which national policies and investments will be most cost-effective in achieving improved opportunities for women and youth?
- (WP3) What foresight tools and actionable metrics are needed to help our stakeholders monitor and project indicators of gender equality, youth and social inclusion related to FLW systems?
- (WP4) What are the best scaling pathways for foresight to inform decision-making to improve gender equality, youth and social inclusion?

Components of Work Packages
- WP1 will work with partners using participatory and quantitative foresight approaches to analyze how gender equality, youth and social inclusion may evolve under alternative scenarios, with particular attention to variation across regions.

- WP2 and partners in focus countries/regions will develop tools and metrics to track and anticipate changes in opportunities for women and youth under climate risks and alternative policies and investments.
- WP3 will develop, document, and provide access to foresight tools and metrics related to gender equality, youth and social inclusion.
- WP4 will enhance the capacity of partners in selected low-income countries to understand, evaluate, and ultimately develop foresight metrics, scenarios and analyses related to gender equality, youth and social inclusion.

Measuring performance and results

Decision-makers in at least six focus countries, two regional organizations and three funding agencies will have improved access to and capacity to produce and/or use rigorous foresight information on the impacts of changing demand, novel technologies, and alternative policy and investment strategies on outcomes related to gender equality, youth and social inclusion, including employment opportunities for women and youth, under a range of climate and socioeconomic conditions.

Partners

- Demand: national governments, BMGF, USAID, WB, regional development banks
- Innovation: national and international policy, research and training institutions
- Scaling: national and regional policy support and training institutions

Human resources and capacity development of Initiative team

The Initiative will involve collaboration among economists, data scientists, gender specialists, sociologists, political economists, and others. Relevant expertise will be acquired through recruitment, partnership, and/or capacity building as needed. See section 9.1 for more information.

5.4 Climate adaptation and mitigation

Challenges and prioritization

Long-term trends in climate patterns and their impacts are increasingly recognized though still complex, uncertain, and contentious. Changes in weather variability and shocks associated with climate change, and their impacts on food, land, and water systems, are both more urgent and less well-captured in foresight analyses, limiting decision-makers' ability to anticipate their impacts and to evaluate options to support adaptation, mitigation and increased resilience in relation to other policy and investment priorities. The Foresight & Metrics Initiative will advance cutting-edge analytical techniques in collaboration with leading global research partners as well as decision-makers in partner countries to support better informed decision-making in this area.

Research questions

- (WP1) How will the major drivers of FLW systems affect climate adaptation and mitigation at global and regional scales?
- (WP2) In the context of climate risk, which national policies and investments will be most cost-effective in achieving improved climate adaptation and mitigation?
- (WP3) What foresight tools and actionable metrics are needed to help our stakeholders monitor and project indicators of climate adaptation and mitigation related to FLW systems?

- (WP4) What are the best scaling pathways for foresight to inform decision-making to improve climate adaptation and mitigation?

Components of Work Packages

- WP1 will work with partners using participatory and quantitative foresight approaches to analyze how climate adaptation and mitigation strategies may evolve under alternative scenarios, with particular attention to variation across regions.
- WP2 and partners in focus countries/regions will develop tools and metrics to track and anticipate changes in climate adaptation and mitigation under climate risks and alternative policies and investments.
- WP3 will develop, document, and provide access to foresight tools and metrics related to climate adaptation and mitigation.
- WP4 will enhance the capacity of partners in selected low-income countries to understand, evaluate, and ultimately develop foresight metrics, scenarios and analyses related to climate adaptation and mitigation.

Measuring performance and results

Decision-makers in at least six focus countries, two regional organizations and three funding agencies will have improved access to and capacity to produce and/or use rigorous foresight information on the impacts of changing demand, novel technologies, and alternative policy and investment strategies on climate-related outcomes, including impacts on agricultural productivity (by commodity), incomes (by population group), and greenhouse gas emissions, under a range of climate and socioeconomic conditions.

Partners

- Demand: national governments, BMGF, USAID, WB, regional development banks
- Innovation: national and international policy, research and training institutions, ClimBeR and MITIGATE Initiatives
- Scaling: national and regional policy support and training institutions

Human resources and capacity development of Initiative team

The Initiative will involve collaboration among economists, climate specialists, land and water modelers, crop, livestock and aquaculture scientists, data scientists, gender specialists, and others. Relevant expertise will be acquired through recruitment, partnership, and/or capacity building as needed. See section 9.1 for more information.

5.5 Environmental health and biodiversity

Challenges and prioritization

Environmental health and biodiversity are critical elements of food, land, and water systems that nonetheless are characterized by complex tenure and management systems and limited knowledge about use, quality, protection, and restoration. Better understanding requires integration in systems analysis with socioeconomic and other drivers. Improved foresight tools and analysis are needed to do forward-looking multi-objective optimization, in order to help decision-makers find solutions in different sectors that work synergistically with each other to optimize larger system-level outcomes, even if not locally optimal for individual sectors or components. The Foresight & Metrics Initiative will work with diverse partners to seek such solutions while assessing their implications for equity and other criteria.

Research questions

- (WP1) How will the major drivers of FLW systems affect environmental health and biodiversity at global and regional scales?
- (WP2) In the context of climate risk, which national policies and investments will be most cost-effective in improving environmental health and biodiversity?
- (WP3) What foresight tools and actionable metrics are needed to help our stakeholders monitor and project indicators of environmental health and biodiversity related to FLW systems?
- (WP4) What are the best scaling pathways for foresight to inform decision-making to improve environmental health and biodiversity?

Components of Work Packages

- WP1 will work with partners using participatory and quantitative foresight approaches to analyze how environmental health and biodiversity may evolve under alternative scenarios, with particular attention to variation across regions.
- WP2 and partners in focus countries/regions will develop tools and metrics to track and anticipate changes in environmental health and biodiversity under climate risks and alternative policies and investments.
- WP3 will develop, document, and provide access to foresight tools and metrics related to environmental health and biodiversity.
- WP4 will enhance the capacity of partners in selected low-income countries to understand, evaluate, and ultimately develop foresight metrics, scenarios and analyses related to environmental health and biodiversity.

Measuring performance and results

Decision-makers in at least six focus countries, two regional organizations and three funding agencies will have improved access to and capacity to produce and/or use rigorous foresight information on the impacts of changing demand, novel technologies, and alternative policy and investment strategies on outcomes related to environmental health and biodiversity, including water consumption and quality, environmental flows, and biodiversity, under a range of climate and socioeconomic conditions.

Partners

- Demand: national governments, BMGF, USAID, WB, regional development banks
- Innovation: national and international policy, research and training institutions
- Scaling: national and regional policy support and training institutions

Human resources and capacity development of Initiative team

The Initiative will involve collaboration among economists, scientists with expertise in biodiversity and ecosystem services, water specialists, spatial analysts, data scientists, agriculture specialists, gender specialists, and others. Relevant expertise will be acquired through recruitment, partnership, and/or capacity building as needed. See section 9.1 for more information.

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

6.1 Result framework

CGIAR Impact Areas				
Nutrition, health and food security	**Poverty reduction, livelihoods and jobs**	**Gender equality, youth and social inclusion**	**Climate adaptation and mitigation**	**Environmental health and biodiversity**
Collective global 2030 targets (the collective global 2030 targets are available centrally here to save space).				
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.	Lift at least 500 million people living in rural areas above the extreme poverty line of US $1.90 per day (2011 PPP).	Close the gender gap in rights to economic resources, access to ownership and control over land and natural resources for over 500 million women who work in food, land and water systems.	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.	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 toward low-input farming system.) and increased use efficiency; and phosphorus application of 10 Tg per year.
Common impact indicators that your Initiative will contribute to and will be able to provide data towards (refer to page 5 of Guidance for MELIA for selection of appropriate indicators)				
• # people benefiting from relevant CGIAR innovations • # people meeting minimum dietary energy requirements	• # people benefiting from relevant CGIAR innovations • # people assisted to exit poverty	• # women assisted to exit poverty • # women benefiting from relevant CGIAR innovations • # youth benefiting from relevant CGIAR innovations	• # tonnes CO2 equivalent emissions • # plans with evidence of implementation • # $ climate adaptation investments • # people benefiting from climate-adapted innovations	• # ha under improved management • # km3 consumptive water use in food production • # ha deforestation
SDG targets				
SDG 2 • Target 2.1 • Target 2.2 • Target 2.3 • Target 2.4	SDG1 • Target 1.1 • Target 1.2 • Target 1.5	SDG 5 • Target 5.A • Target 5.B SDG 8	SDG 13 • Target 13.1 • Target 13.2 • Target 13.3 • Target 13.A	SDG6 • Target 6.6 SDG 7 • Target 7.A

• Target 2.A • Target 2.B	SDG 10 • Target 10.1	• Target 8.1 • Target 8.4	• Target 13.B	SDG12 • Target 12.2 • Target 12.A SDG 15 • Target 15.2 • Target 15.5 • Target 15.9 • Target 15.A • Target 15.B

Action Area title Systems Transformation	
Action Area outcomes	**Action Area outcome indicators**
ST 3 - Governments and other actors take decisions to reduce the environmental footprint of food systems from damaging to nature positive.	STi 3.1 Area of land under improved mitigation plans (or area that is decreasing in net carbon emissions – more ambitious and longer term)
	STi 3.2 Area under improved water use plans (or water use efficiency measures – more ambitious and longer term)
	STi 3.3 Trends in measures of non-point pollution where available
ST 4 - Food system markets and value chains function more efficiently, equitably, and sustainably and lead towards healthier diets	STi 4.2 Gaps between farm/processor gate and consumer prices (with some measures focused on smallholder farmers if possible)
	STi 4.3 Domestic market price integration, both spatial and temporal
	STi 4.4 Improved international price and exchange rate transmission
	STi 4.5 Trends in relative prices of healthy to unhealthy foods
ST & RAFS 2 - National and local governments utilize enhanced capacity (skills, systems and culture) to assess and apply research evidence and data in policy making process	STRAFSi 2.1 Number of policies/ strategies/ laws/ regulations/ budgets/ investments/ curricula (and similar) at different scales that were modified in design or implementation, with evidence that the change was informed by CGIAR research
ST & RAFS & GI 1 Women and youth are empowered to be more active in decision-making in food, land and water systems	STRAFSGIi 1.1 Positive trends in the Women's Empowerment in Agriculture Index (WEIA) at various scales including nationally
Initiative and Work Package outcomes, outputs and indicators	

Result type (outcome or output)	Result	Indicator	Unit of measurement	Geographic scope	Data source Define the indicator data source. state name of data source Specify link to data source, where available	Data collection method	Frequency of data collection	Baseline value (outcome only)	Baseline year (outcome only)	Target value	Target year
Outcome 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.	Number of policies and strategies modified in design or implementation in core countries and regions.	Generic number	Global – including collaboration with technical partners in China, India, Indonesia, South Africa, Brazil, and other countries	Primary	Policy/document review; stakeholder interviews and discourse analysis	Year 1 and year 3	Not available	2022	TBD	2025
Outcome 1.1	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	Number of regional and international organizations, donors, multilateral and development banks accessing our web portal and using our modelling tools	Generic number	Global	Primary	Document review; stakeholder interviews	Year 1 and year 3	Not available	2022	TBD	2025

	mitigation, and environmental outcomes.										
Outcome 1.2	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.	Number of studies/scenarios co-developed with key partners	Generic number	Global	Primary	Document review; stakeholder interviews	Year 1 and year 3	Not availabl e	2022	TBD	2025
Outcome 2	**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 trade-offs with other goals relating to nutrition, livelihoods, equity, and the environment.	Number of policies, strategies, budgets, and investments modified in design or implementation, as a result of our Initiative outputs in core counties.	Generic number	Eastern and Southern Africa (regional, Kenya, Rwanda, Malawi, Zambia); South Asia (regional, Bangladesh, Nepal); additional countries based on expressed government demand and resource availability	Primary	Policy/document review; stakeholder interviews and discourse analysis	Year 1 and year 3	Not availabl e	2022	TBD	2025
Outcome 2.1	Research partners in focus countries contribute to developing CIAM and use it to analyze megatrends and climate risks affecting FLW system transformation, and to provide actionable	Number of national partners accessing and using our tools of analysis	Generic number	Eastern and Southern Africa (regional, Kenya, Rwanda, Malawi, Zambia); South Asia (regional, Bangladesh, Nepal); additional countr	Primary	Document review; stakeholder interviews	Year 1 and year 3	Not availabl e	2022	TBD	2025

	recommendations that minimize trade-offs and maximize synergies across competing goals.			ies based on expressed government demand and resource availability							
Outcome 2.2	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 systems transformations that are more resilient, sustainable, and inclusive.	Number of policies, strategies, budgets, and investments modified in design or implementation, as a result of our Initiative outputs in core counties.	Generic number	Eastern and Southern Africa (regional, Kenya, Rwanda, Malawi, Zambia); South Asia (regional, Bangladesh, Nepal); additional countries based on expressed government demand and resource availability	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not availabl e	2022	TBD	2025
Outcome 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.	Uptake of information product (including Altmetric sc ore)	Percentage	Global – including collaboration with technical partners in China, India, Indonesia, South Africa and Brazil, and with focus country partners in Kenya, Malawi, Rwanda, Zambia, Bangladesh, and Nepal (among others)	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not availabl e	2022	TBD	2025
Outcome 3.1	Global, regional, and national partners contribute to and have access to advanced foresight tools	Uptake of information product (including Altmetric sc ore)	Percentage	Global – including collaboration with technical partners in	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not availabl e	2022	TBD	2025

	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.			China, India, Indonesia, South Africa and Brazil, and with focus country partners in Kenya, Malawi, Rwanda, Zambia, Bangladesh, and Nepal (among others)							
Outcome 3.2	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	Uptake of information product (including Altmetric sc ore)	Percentage	Global – including collaboration with technical partners in China, India, Indonesia, South Africa and Brazil, and with focus country partners in Kenya, Malawi, Rwanda, Zambia, Bangladesh, and Nepal (among others)	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not availabl e	2022	TBD	2025
Outcome 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.	Number of people trained, long-term (including master's an d PhDs) and short-term, disaggregated by gender.	Generic number	Technical partners in China, India, Indonesia, South Africa and Brazil, and focus country partners in Keny a, Malawi, Rwanda, Zambia, Bangladesh and Nepal (among others)	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not availabl e	2022	TBD	2025

Outcome 4.1	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.	Number of people using our tools for their analysis and new studies generated	Generic number	Technical partners in China, India, Indonesia, South Africa and Brazil, and focus country partners in Kenya, Malawi, Rwanda, Zambia, Bangladesh and Nepal (among others)	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not available	2022	TBD	2025
Outcome 4.2	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	Number of people using our tools for their analysis	Generic number	Technical partners in China, India, Indonesia, South Africa and Brazil, and focus country partners in Kenya, Malawi, Rwanda, Zambia, Bangladesh and Nepal (among others)	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not available	2022	TBD	2025
Output 1.1	Analyses of major drivers that will affect food-land-water systems over the next several decades, globally and with particular emphasis on regional heterogeneity under alternative future scenarios.	Number of peer reviewed journal papers	Generic number	Global – including collaboration with technical partners in China, India, Indonesia, South Africa and Brazil, and other countries	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not available	2022	TBD	2025
Output 1.2	Enhanced biophysical and socioeconomic modeling tools to explore food-land-water system impacts and strategic policy options relevant for LMICs	Number of innovations	Generic number	Global - including collaboration with technical partners in China, India, Indonesia, South Africa and Brazil, and other countries	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not available	2022	TBD	2025

Output 1.3	FLW system transformation outlook reports and forums at global and regional levels, including an end-of-Initiative flagship report highlighting synergies and trade-offs across the five Impact Areas and providing integrated pathways to reduced poverty, improved diets, increased equity, reduced greenhouse gas emissions, and improved environmental quality.	Number of peer reviewed journal papers	Generic number	Global – including collaboration with technical partners in China, India, Indonesia, South Africa and Brazil, and other countries	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not available	2022	TBD	2025
Output 1.4 **Joint Output 2. 4 and 3.3**	Searchable online database of scenarios and results accessible on the Foresight Portal	Uptake of information product (including Altmetric sc ore)	Percentage	Global – including collaboration with technical partners in China, India, Indonesia, South Africa and Brazil, and other countries	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not availabl e	2022	TBD	2025
Output 2. 1	Diagnostic studies of the drivers of FLW system transformation in the focus countries, including assessments of major climate vulnerabilities and policy/investment options.	Number of peer reviewed journal papers	Generic number	Eastern and Southern Africa (regional, Kenya, Rwanda, Malawi, Zambia); South Asia (regional, Bangladesh, Nepal); additional countries based on expressed government demand and resource availability	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not availabl e	2022	TBD	2025
Output 2.2	CIAMs developed and documented for each focus country	Number of innovations	Generic number	Eastern and Southern Africa (regional, Kenya, Rwanda,	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not availabl e	2022	TBD	2025

				Malawi, Zambia); South Asia (regional, Bangladesh, Nepal); additional countries based on expressed government demand and resource availability							
Output 2.3	Synthesis studies on "Climate Risks and Agrifood Systems" for each country, describing development pathways, and major climate risks and policy/investment options. .	Number of peer reviewed journal papers	Generic number	Eastern and Southern Africa (regional, Kenya, Rwanda, Malawi, Zambia); South Asia (regional, Bangladesh, Nepal); additional countries based on expressed government demand and resource availability	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not available	2022	TBD	2025
Output 2.4 **Joint Output 1.4 and 3.3**	Tools/data and searchable scenario databases disseminated via the Foresight Portal	Uptake of information product (including Altmetric score)	Percentage	Eastern and Southern Africa (regional, Kenya, Rwanda, Malawi, Zambia); South Asia (regional, Bangladesh, Nepal); additional countries based on expressed government demand and resource availability	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not available	2022	TBD	2025
Output 3.1	Documentation and improved access to standardized, regularly updated, and	Number of information products (including: reports, briefs, extension, training	Generic number	Global – including collaboration with technical	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not available	2022	TBD	2025

	interoperable versions of CGIAR's core foresight models, tools, and databases spanning food, land and water systems.	and e-learning content and other materials, books and book chapters, data and databases, data collection and analysis tools (e.g., models and survey tools), video, audio and images, graphics, maps, and other GIS outputs, computer software, models and code, digital and mobile applications, and web-based services (e.g., websites, data portals, online platforms)		partners in China, India, Indonesia, South Africa and Brazil, and with focus country partners in Kenya, Malawi, Rwanda, Zambia, Bangladesh, and Nepal (among others)							
Output 3.2	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.	Number of other information products (including: reports, briefs, extension, training and e-learning content and other materials, books and book chapters, data and databases, data collection and analysis tools (e.g., models and survey tools), video, audio and images, graphics, maps, and other GIS outputs, computer software, models and code, digital and mobile applications, and web-based services (e.g., websites, data portals, online platforms)	Generic number	Global – including collaboration with technical partners in China, India, Indonesia, South Africa and Brazil, and with focus country partners in Kenya, Malawi, Rwanda, Zambia, Bangladesh, and Nepal (among others)	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not availabl e	2022	TBD	2025
Output 3.3 **Joint Output 1.4 and 2.4**	Searchable online database of scenarios and results accessible on the Foresight Portal	Uptake of information product (including Altmetric sc ore)	Percentage	Global - including collaboration with technical partners in China, India, Indonesia,	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not availabl e	2022	TBD	2024

				South Africa and Brazil, and with focus country partners in Kenya, Malawi, Rwanda, Zambia, Bangladesh, and Nepal (among others).							
Output 4.1	Documented FLW-related foresight capacity needs and tailored foresight capacity strengthening plans for partners in at least six focus countries.	Number of other information products (including: reports, briefs, extension, training and e-learning content and other materials, books and book chapters, data and databases, data collection and analysis tools (e.g., models and survey tools), video, audio and images, graphics, maps, and other GIS outputs, computer software, models and code, digital and mobile applications, and web-based services (e.g., websites, data portals, online platforms)	Generic number	Technical partners in China, India, Indonesia, South Africa and Brazil, and focus country partners in Kenya, Malawi, Rwanda, Zambia, Bangladesh and Nepal (among others).	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not available	2022	TBD	2025
Output 4.2	Foresight training materials and programs developed for and delivered to partners in at least the six focus countries	Number of other information products (including: reports, briefs, extension, training and e-learning content and other materials, books and book chapters, data and databases, data collection and analysis tools (e.g., models and survey tools), video, audio and images, graphics, maps, and other GIS outputs, computer software,	Generic number	Technical partners in China, India, Indonesia, South Africa and Brazil, and focus country partners in Kenya, Malawi, Rwanda, Zambia, Bangladesh and Nepal (among others).	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not available	2022	TBD	2025

		models and code, digital and mobile applications, and web-based services (e.g., websites, data portals, online platforms)									
WP Level Output 4.3	Online training materials and programs on foresight modeling tools developed and delivered to interested partners	Number of people trained, long-term (including Master's and PhDs) and short-term, disaggregated by gender.	Generic number	Technical partners in China, India, Indonesia, South Africa and Brazil, and focus country partners in Kenya, Malawi, Rwanda, Zambia, Bangladesh and Nepal (among others).	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not available	2022	TBD	2025
Output 4.4	Strengthened and expanded Community of Practice on foresight for FLW systems, with particular focus on the needs and opportunities facing developing countries.	Evidence of uptake on people and/or environment of the policy influenced by our Initiative.	Generic number	Technical partners in China, India, Indonesia, South Africa and Brazil, and focus country partners in Kenya, Malawi, Rwanda, Zambia, Bangladesh and Nepal (among others).	Primary	Policy/document review; stakeholder interviews	Year 1 and year 3	Not available	2022	TBD	2025
Output 4.5	MELIA reports, case studies and policy briefs on uptake and impact of enhanced foresight capacity and application to FLW-related policy and investment decisions	Number of other information products (including: reports, briefs, extension, training and e-learning content and other materials, books and book chapters, data and databases, data collection and analysis tools (e.g., models and survey tools), video, audio and images, graphics, maps, and	Generic number	Technical partners in China, India, Indonesia, South Africa and Brazil, and focus country partners in Kenya, Malawi, Rwanda, Zambia, Bangladesh and Nepal (among others).	Primary	See section 6.2	Year 1 and year 3	Not available	2022	TBD	2025

		other GIS outputs, computer software, models and code, digital and mobile applications, and web-based services (e.g., websites, data portals, online platforms)									

6.2 MELIA plan

a. Narrative for MEL plans

This Initiative will develop an evidence-based monitoring framework that will enable us to assess the extent to which the Initiative's activities are informing policy change and the extent to which policy change triggered by our innovations is leading towards inclusive and sustainable FLW systems transformation, and associated improvements in nutrition, livelihoods, equity, climate resilience, and environmental quality. This framework will be fully nested and compatible with the framework One CGIAR will develop to monitor Initiatives at the system level.

Our monitoring framework will be developed and validated by using problem tree analysis methods that will highlight cause and effect around the Initiative's hypothesis, activities, processes, and the intended changes that are expected to occur throughout the Initiative life-cycle to achieve outcome and impact. The framework will allow us to harvest our Initiative results and performance information for further resource mobilization, accountability, and decision-making.

The framework will form the basis for periodic revision and adaptive management for agile implementation, with rationalized and documented updates of our Impact Pathway and nested theories of change at the Initiative and Work Package level. The Impact Pathway, TOCs, and monitoring system will be interconnected and provide answers to the following learning questions:

- How is our sphere of control changing? Are our innovations responding to the actual needs of our stakeholders? How are their needs and demands changing?
- Are we targeting the right stakeholders within our sphere of control, or do we need to reframe our partnership and stakeholder engagements?
- Are we measuring our progress and achievements correctly?

b. Narrative for impact assessment research plans

Our evidence-based monitoring framework will enable us to assess progress along indicators within and beyond our sphere of control and influence, also reaching our sphere of concern with the objective of making learning actionable.

The Phase 1 (2022–2024) Impact Assessment Plan will enable us to answer the following key research questions:

- Are our innovations and research outputs properly influencing/informing/incentivizing our stakeholders to become key change agents?
- To what extent have the policy dialogue around inclusive and sustainable FLW systems changed and related funding mechanisms shifted as a result of our innovations?
- Are new policies developed as a result of the knowledge and products generated through this Initiative, and what will be the likely impact on transforming inclusive and sustainable agrifood development pathways toward achievement of the SDGs and CGIAR Impact Areas?

To answer the questions above we will utilize a variety of methodologies and approaches that will enable us to generate rigorous and transparent causal evidence on the link between research conducted, policy change generated, and subsequent impact. Specifically, we will:

1. Assess the extent to which the innovations generated and scaled out are generating change in the major trends in policy dialogue on FLW systems and pathways.
2. Develop a database of foresight-relevant findings from existing ex post impact assessment/adoption studies addressing the impact of CGIAR innovations on FLW systems in target countries. The database will inform scenario design and model parameter updating for better-targeted foresight analysis.
3. Conduct a model-based evaluation that will be parametrized with information collected during prior years, which will enable us to understand to what extent policy change is informed by our innovations, and as a result is likely to lead towards more inclusive and sustainable FLW systems, and associated improvements in nutrition, livelihoods, equity, climate resilience, and environmental quality.

6.3 Planned MELIA studies and activities

Type of MELIA study or activity	Result or indicator title that the MELIA study or activity will contribute to	Anticipated year of completion (based on 2022-24/25 Initiative timeline)	Co-delivery of planned MELIA study with other Initiatives	How the MELIA study or activity will inform management decisions and contribute to internal learning

Studies linked to outcomes 1-2-3-4 listed in 6.1				
Development of an internal evidence-based monitoring framework coherently linking Initiative activities to deliverables, outputs and subsequently to outcome and impact with SMART indicators	Multiple indicators, helping to understand synergies and trade-offs between them	2022	National Policies and Strategies	Our evidence-based monitoring framework will form the basis for periodic revision, and adaptive management for agile implementation, with rationalized and documented updates of our Impact Pathway and nested theories of change at the Initiative and Work Package level
Baseline Report aiming at capturing the status quo of the policy dialogues around sustainable food-land-water systems	Multiple indicators, helping to understand synergies and trade-offs between them	2022	National Policies and Strategies, TAFSSA, U2	This report will help us understand how to shape the work in WP 1 and 2.
Dashboard of ex post impact assessment studies relevant for informing parameterization of foresight modeling tools	Multiple indicators, helping to understand synergies and trade-offs between them	2023		This dashboard could inform the parametrization of our WP 1 and 2 modelling tools therefore improving results and outputs generated in WP 3 and 4
Final report to assess change in the policy discourse on sustainable FLW systems as a result of our work	Multiple indicators, helping to understand synergies and trade-offs between them	2024/2025	National Policies and Strategies, TAFSSA, U2	This report will serve as the basis for developing the next phase post 2025 of the Initiative
Dataset generated in this workplan made publicly available	Multiple indicators, helping to understand synergies and trade-offs between them	2024/2025		

7. Management plan and risk assessment

7.1 Management plan

The Foresight and Metrics Initiative will be managed by a leadership team comprised of the Initiative lead, co-lead, and four Work Package leads, with focal points for gender; monitoring, evaluation and learning; impact assessment; and scaling readiness.

The leadership team will receive guidance from a technical advisory committee representing the perspectives of stakeholders; national, regional and global partners; funders; and subject matter experts. The leadership team will be supported by specialists in program coordination, finance, data management, communications, and other essential skills.

Drawing on the evidence-based monitoring framework described in section 6.2, the leadership team will be responsible for reviewing activities and results and revising plans in relation to the Initiative and Work Package theories of change as well as the Initiative's MELIA plan, scaling readiness process, and risk management plan, in collaboration with partners. This will be done first by month six of inception and then every six months thereafter, to evaluate progress and course correct as needed.

The technical advisory committee will, on a yearly basis, review and provide feedback on the Initiative's key assumptions, research questions, and progress along the Initiative and Work Package TOCs. The gender, MELIA and scaling readiness focal points will liaise periodically with their counterparts at the One CGIAR System level and with SPIA (and other One CGIAR senior managers as appropriate) in order to seek synergies and further collaboration across Initiatives and Action Areas.

The Initiative will also receive guidance from a WP1 strategic advisory group and a WP2 policy advisory group, respectively.

7.2 Summary management plan Gantt table

Definition 'Deliverable': A specific, time-bound, contractually obligated indicator of progress toward results. It is proof, in digital, electronic, physical or other kind of soft or hard copy of the completion of a set of activities. Examples of deliverables are workshop reports, journal articles, datasets, training materials.

Initiative start date	Timelines												Description of key deliverables
	2022			2023				2024				2025	
Work Packages	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	Q4	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	
Work Package 1:			**2**				1;2;3				1;2;3		1. A set of analyses of major drivers that will affect FLW systems over the next several decades under alternative future scenarios. 2. Enhanced biophysical and socioeconomic modeling tools to explore FLW system impacts and strategic policy options relevant for LMICs. 3. FLW system outlook reports and forums at global level and by region.
Work Package 2:			2				1;2;3				1;2;3		1. Diagnostic studies of historical and future drivers and constraints to agrifood system transformation including climate vulnerability assessments and shortlisting of policy/investment options. 2. Climate Integrated Assessment Models (CIAM) for each focal country/region using locally developed tools where possible. 3. Synthesis studies on “Climate Risks and Food Systems” for each focus country/region, describing future development pathways, major climate risks, and policy/investment priorities.

Work Package 3:			2;3				2				1		1. Documentation and improved access to standardized and interoperable versions of CGIAR's core foresight models, tools, and databases spanning FLW systems 2. New and improved metrics for tracking changes across FLW systems, including systems-level outcome metrics to inform policy and investment decision-making. 3. Foresight Portal (website) providing open access to foresight materials generated by the Initiative (and by other Initiatives and partners where appropriate).
Work Package 4:			1				2; 3						1. Documented FLW-related foresight capacity needs and tailored foresight capacity strengthening plans for partners in at least six focus countries 2. Foresight training materials and programs developed for and delivered to partners in at least the six focus countries. 3. Community of Practice for CGIAR and external partners on foresight for food, land and water systems
Innovation Packages & Scaling Readiness			1				1				1		*Innovation Packages & Scaling Readiness activities, timelines & deliverables are provided in the detailed guidance that will be provided on Section 4.1*
MELIA													*Regular M&E reports and case studies on uptake of foresight capacity and analysis to inform partner's decision-making (for the Initiative's MELIA and projected benefit estimates)*
Project management													*Examples could include key decision points, key financial or results reporting moments*

7.3 Risk assessment

Top 5 risks to achieving impact	**Description of risk**	**Likelihood**	**Impact**	**Risk score** Likelihood x Impact	**Mitigations**
		Rate from 1-5	**Rate from 1-5**		
Low uptake of scientific innovation of the Initiative [WP1]	WP1 aims to inform decision-making, but most decision-making (including that affecting global and regional outcomes) occurs at the national level.	3	5	15	WP1 helps build a shared information base on common challenges to inform decision-making at multiple scales and in diverse contexts.
Low uptake of scientific innovation of the Initiative [WP2]	Governments in focus countries have articulated demand for foresight/modeling, but the timing of WP2's analysis may not perfectly align with local policy cycles, especially for all ministries involved. This could reduce WP2's direct policy influence and impact.	2	5	10	To reduce these risks, WP2 will co-create workplans with TWGs and PAGs to improve alignment; and ensure that the foresight tools are accessible beyond the end of the Initiative (with WP3)
Dependency on legacy data [WP1, WP2, WP3]	Underlying data may be inaccurate or out of date.	2	5	10	WP3 will work to identify errors, correct, and update data where possible, and note caveats where needed.
Capability, and capacity constraints within and across the regions may hinder the uptake of innovations [WP2]	Local researchers with suitable expertise and foresight experience may not exist, especially within all areas of FLW systems	3	4	12	WP2 will ensure that the foresight tools are accessible beyond the end of the Initiative (with WP3); and ensure that local researchers can utilize the tools and government partners can correctly interpret the completed foresight analysis (with WP3).
Capability, and capacity constraints within and across the regions may hinder the uptake of innovations [WP3]	WP3 aims to provide access to foresight tools and metrics to inform decision-making, but users may not have the capacity to fully utilize these tools and metrics.	3	4	12	WP3 will offer basic "help-desk" support to ensure that foresight practitioners can adequately access the data, metrics and tools provided by WP3 – and to monitor user feedback about ways to improve accessibility. To address capacity needs that exceed basic "help-desk" levels, WP3 will work with WP4 to strengthen partner capacity in selected focus countries.

8. Policy compliance, and oversight

8.1 Research governance

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

8.2 Open and FAIR data assets

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

The Foresight and Metrics Initiative will align with the OFDA Policy's Open and FAIR requirements, ensuring:

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

Moreover, the Initiative will ensure that analytical tools that use or generate the data mentioned above will also abide by FAIR standards, specifically:

- Models and tools and their documentation will be supplemented with rich descriptive metadata conforming to the CGIAR Core Schema to maximize Findability.
- Core models and tools supported by the Initiative will be deposited in open access repositories with General Public License (GPL))/Massachusetts Institute of Technology (MIT) licenses.
- Interoperability of models and tools will be promoted through the use of input data conforming to relevant best practices in data interoperability and providing model results with rich descriptive and structural metadata conforming to CoP-SED best practices.

9. Human resources

9.1 Initiative team

'Research' category includes roles involving design, implementation, management of research, scientific knowledge, quality control, MEL, publications, delivery. 'Research support' category includes non-research staff or consultants such as roles in administration; finance; communication, HR etc.

Category *Guidance: please enter 'research' or 'research support'*	***Area of expertise***	***Short description of key accountabilities*** *Guidance: we suggest that this field is an opportunity for IDTs to make clear to funders how the composition of your team is well aligned to your TOC and Initiative priorities*
Research	Leadership and management	Initiative and Work Package planning, implementation, and reporting
Research	Policy dialog & engagement	Facilitation of engagement processes with national and regional partners
	Research and scenario design	Lead development of key research questions and corresponding scenario development with national partners, donors, and researchers
Research	Agriculture sector modeling	Development and application of economic modeling tools for integrated simulation analysis of FLW system interactions at multiple scales
	Economy-wide modeling	Development and application of economic modeling tools for integrated simulation analysis of FLW system interactions at multiple scales
	Econometrics	Econometric analysis to complement and support integrated foresight analysis
Research	Climate and environmental modeling	Development and improvement of links to relevant climate, biodiversity, ecosystem service, and pest-and-disease models as needed for integrated foresight analysis
	Crop, livestock, and fish modeling	Development and improvement of links to relevant crop, livestock, and fish models as needed for integrated foresight analysis
	Land and water modeling	Development and improvement of land use and hydrological models and associated system metrics as need for integrated foresight analysis
	Spatial modeling	Development and implementation of theme-specific spatial analyses in support of different domain priorities
Research	Data science	Demand-driven quantitative and statistical analysis of large data sets to enhance understanding of FLW system processes and outcomes
	Data management	Development and maintenance of foresight focused databases and knowledge repositories
	Indicator development	Developing system-level metrics related to the One CGIAR Impact Areas in collaboration with thematic specialists
Research	M&E	Coordinate implementation of the M&E plan with Initiative and WP leads
	Impact assessment	Impact assessment analysis in coordination with Initiative and WP leads
	Scaling readiness	Implementation of scaling readiness assessments in coordination with Initiative and WP leads
	Capacity development	Development and delivery of in-person and online training materials and programs
	Knowledge sharing	Facilitate knowledge sharing among and beyond Initiative partners
Research support	Program management	Support Initiative leadership in day-to-day operation and reporting; track deliverables and budget
	Website development	Development, maintenance and updating of the Foresight web portal
	Communications	Editorial, design, and publication support
	Administrative support	Support Initiative leadership and program management in administrative duties including sub-contracts and budget monitoring

9.2 Gender, diversity and inclusion in the workplace

The Initiative team has not yet been fully identified, but we will strive to meet CGIAR's gender target of a minimum of 40% women in professional roles and to include individuals from diverse backgrounds. To address this, we will consciously consider gender and diversity when we recruit, follow the guidance outlined in CGIAR's GDI Inclusive Recruitment Toolkit, and mindfully include diverse voices into our project activities.

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

(1) "Professional roles" includes staff in the Director General, Center/ Alliance Leadership, Senior Management - Research, Senior Management Non-Research, Scientists, Professionals (Research and Non-Research) and Post- Doctoral Fellows categories.

(2) "underrepresented group" means a group defined by a common physical trait, belief or other distinctive characteristics that are few in number in CGIAR's workplaces and that have previously had minimal access to power and/or little or no influence on decisions that affect them.

9.3 Capacity development

1. Initiative team leaders and managers will complete training on inclusive leadership within 3 months of launch.
2. Within 6 months of launch, Initiative team members will complete training on gender, diversity and inclusion, including on whistleblowing and how to report concerns.
3. The Initiative kick-off will include an awareness session on CGIAR's values, code of conduct, and range of learning opportunities available within CGIAR.
4. Development opportunities will be made available for junior level Initiative team members, partners and stakeholders, including mentorship, internships with representation of emerging professionals from under-represented groups, conference attendance, training on analytical skills, data management, communications skills, and other technical and management skills as needed.

Note that capacity development is also a key component of our Initiative with its own TOC outlined in WP4.

10. Financial resources

10.1 Budget

10.1.1: Activity breakdown

USD	2022/2023	2023/2024	2024/2025	Total
Crosscutting across Work Packages	933,333	933,333	933,333	2,800,000
Work Package 1	2,566,667	2,800,000	3,033,333	8,400,000
Work Package 2	2,566,667	2,800,000	3,033,333	8,400,000
Work Package 3	1,166,667	1,400,000	1,633,333	4,200,000
Work Package 4	1,073,333	1,306,667	1,540,000	3,920,000
Innovation Packages & Scaling Readiness	93,333	93,333	93,333	280,000
Total	**8,400,000**	**9,333,333**	**10,266,667**	**28,000,000**

10.1.2: Geographic breakdown

USD	2022/2023	2023/2024	2024/2025	Total
Global	3,455,667	3,826,667	4,197,667	11,480,000
Region: Eastern & Southern Africa	409,500	443,333	477,167	1,330,000
Region: South Asia	409,500	443,333	477,167	1,330,000
Country: Bangladesh	557,667	620,667	683,667	1,862,000
Country: Brazil	155,867	179,200	202,533	537,600
Country: China	155,867	179,200	202,533	537,600
Country: India	155,867	179,200	202,533	537,600
Country: Indonesia	155,867	179,200	202,533	537,600
Country: Kenya	557,667	620,667	683,667	1,862,000
Country: Malawi	557,667	620,667	683,667	1,862,000
Country: Nepal	557,667	620,667	683,667	1,862,000
Country: Rwanda	557,667	620,667	683,667	1,862,000
Country: South Africa	155,867	179,200	202,533	537,600
Country: Zambia	557,667	620,667	683,667	1,862,000
Total	**8,400,000**	**9,333,333**	**10,266,667**	**28,000,000**

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