



INITIATIVE ON  
NEXUS Gains



# CGIAR Initiative on NEXUS Gains

ANNUAL TECHNICAL REPORT 2022



# CGIAR Technical Reporting 2022

CGIAR Technical Reporting has been developed in alignment with the [CGIAR Technical Reporting Arrangement](#).

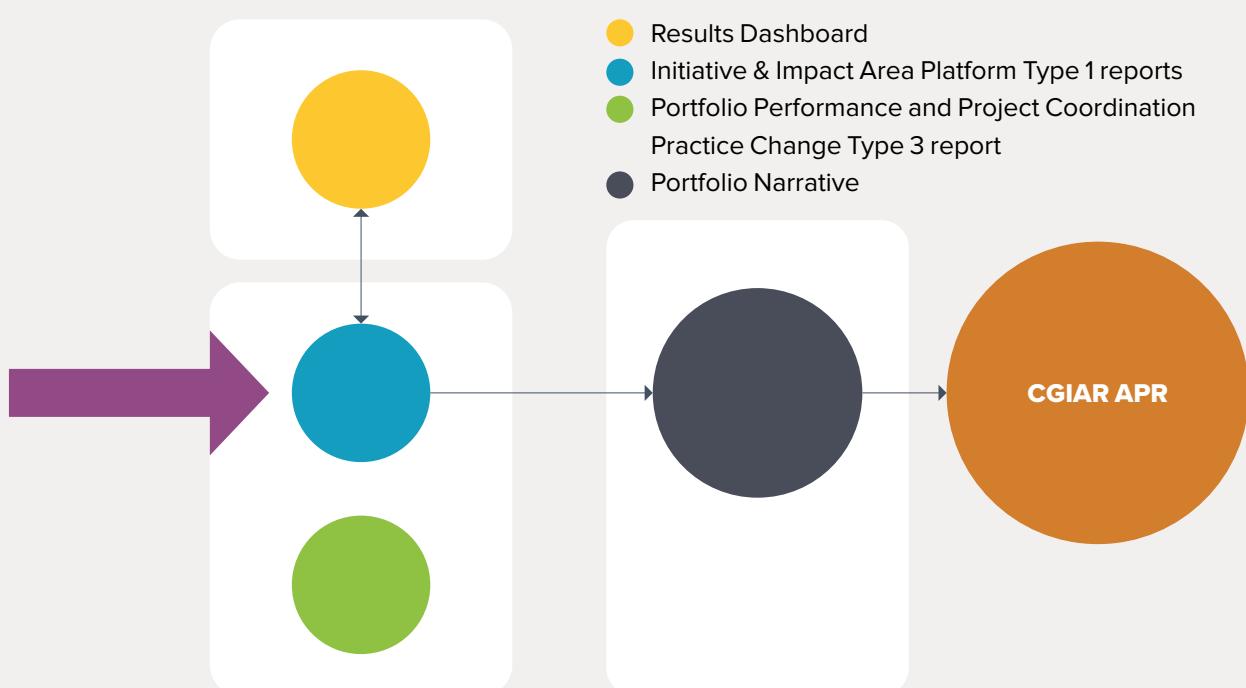
This Initiative report is a Type 1 report and constitutes part of the broader CGIAR Technical Report. Each CGIAR Initiative submits an annual Type 1 report, which provides assurance on Initiative-level progress towards End of Initiative outcomes.

The CGIAR Technical Report comprises:

- Type 1 Initiative and Impact Area Platform reports, with quality assured results reported by Initiatives and Platforms available on the CGIAR Results Dashboard.

- The Type 3 Portfolio Performance and Project Coordination Practice Change report, which focuses on internal practice change.
- The Portfolio Narrative, which draws on the Type 1 and Type 3 reports, and the CGIAR Results Dashboard, to provide a broader view on portfolio coherence, including results, partnerships, country and regional engagement, and synergies among the portfolio's constituent parts.

The CGIAR Technical Report constitutes a key component of the CGIAR Annual Performance Report (APR).



US\$	2022	2023	2024
Proposal Budget from initial submission	US\$ 8,720,000	US\$ 11,239,999	US\$13,040,001
Approved 2022 Budget	US\$6,221,007		

2022 Disbursement Target based on Approved FinPlan

# Section 1 Fact sheet

Initiative name		NEXUS Gains: Realizing Multiple Benefits Across Water, Energy, Food and Ecosystems
Initiative short name		NEXUS Gains
Action Area		Systems Transformation
Geographic scope		<b>Countries targeted in the proposal:</b> Botswana; Ethiopia; India; Kyrgyzstan; Nepal; Pakistan; Republic of the Sudan; South Africa; Uzbekistan; Zimbabwe <b>Countries with results reported in 2022:</b> <b>Target countries:</b> Botswana; Ethiopia; India; Kyrgyzstan; Nepal; Pakistan; South Africa; Uzbekistan; Zimbabwe <b>Additional countries:</b> Argentina; Bangladesh; Benin; Brazil; Burkina Faso; Cameroon; Chad; Côte d'Ivoire; Egypt; Guinea; Jordan; Kazakhstan; Malawi; Malaysia; Mali; Morocco; Niger; Nigeria; Socialist Republic of Viet Nam; Sri Lanka; Tajikistan; United Republic of Tanzania
Start date		Jan. 1, 2022
End date		Dec. 31, 2024
Initiative Lead		Matthew McCartney – <a href="mailto:M.McCartney@cgiar.org">M.McCartney@cgiar.org</a> (September 2022 to date) Stefan Uhlenbroek (January–August 2022)
Initiative Deputy		Claudia Ringler – <a href="mailto:c.ringler@cgiar.org">c.ringler@cgiar.org</a>
Measurable three-year End of Initiative outcomes (EOI-Os)		<b>EOI-O 1: Demand partners assess Water Energy Food Environment (WEFE) tradeoffs and synergies to prioritize WEFE innovations</b> By 2024, NEXUS Gains modeling tools are used to assess and prioritize WEFE innovations.  <b>EOI-O 2: Demand partners assess integrated water productivity and storage options to improve system-level water security</b> By 2024, novel water productivity assessments and water storage diagnostics enable integrated assessments across scales and sectors to improve system-level water security  <b>EOI-O 3: Private investors and policymakers, cognizant of systems linkages and gendered benefits, accelerate equitable access to rural clean energy</b> By 2024, new knowledge regarding targeting of gender-responsive, clean-energy solutions will grow sustainable investment and the reach of public and private sector actors using NEXUS Gains tools.  <b>EOI-O 4: Policymakers and stakeholders identify ways to improve governance across WEFE systems</b> By 2024, policymakers and stakeholders at different levels will identify WEFE Nexus governance solutions approaches that are sustainable and equitable.

	<p><b>EOI-O 5: EOI-O 5. Government, business, NGO, and CSO professionals in WEFE sectors use new capacities to co-develop sustainable and equitable WEFE approaches</b></p> <p>By 2024, key stakeholders (government, NGO and CSO actors) will have gained the capacities to co-develop and implement nexus innovations per focal basin.</p>
<b>OECD DAC Climate marker adaptation score*</b>	<b>Score 2:</b> Principal: The activity is principally about meeting any of the three CGIAR climate-related strategy objectives — namely, climate mitigation, climate adaptation, and climate policy, and would not have been undertaken without this objective.
<b>OECD DAC Climate marker mitigation score*</b>	<b>Score 2:</b> Principal: The activity is principally about meeting any of the three CGIAR climate-related strategy objectives — namely, climate mitigation, climate adaptation, and climate policy, and would not have been undertaken without this objective.
<b>OECD DAC Gender equity marker score*</b>	<b>Score 1B:</b> Gender-responsive: On top of the minimum requirements for 1A, the Initiative/project includes at least one explicit gender equality outcome, and the Initiative/project team has resident gender expertise or capacity. The Initiative/project includes gender equality indicators and monitors the participation of and differential benefits for diverse men and women.
<b>Website link</b>	<a href="https://www.cgiar.org/initiative/nexus-gains/">https://www.cgiar.org/initiative/nexus-gains/</a>

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

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

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

#### Acronym list:

<b>CSO</b>	Civil Society Organization
<b>EOIO</b>	End of Initiative Outcome
<b>GESI</b>	Gender Equality and Social Inclusion
<b>GIZ</b>	Deutsche Gesellschaft für Internationale Zusammenarbeit
<b>IFPRI</b>	International Food Policy Research Institute
<b>IPBES</b>	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
<b>IPSR</b>	Innovation Packages and Scaling Readiness
<b>IWMI</b>	International Water Management Institute
<b>MELIA</b>	Monitoring, Evaluation, Learning and Impact Assessment
<b>MSP</b>	Multi-stakeholder Platforms
<b>NBA</b>	Niger Basin Authority
<b>NGO</b>	Nongovernmental Organization
<b>OECD DAC</b>	Organisation for Economic Co-operation and Development's Development Assistance Committee
<b>PyWR</b>	Python Water Resources Planning Model
<b>SADMS</b>	South Asia Drought Monitoring System
<b>SWAT</b>	Soil and Water Assessment Tool
<b>TOC</b>	Theory of Change
<b>WEFE</b>	Water–Energy–Food–Ecosystems
<b>WP</b>	Work Package

Canal water is used to  
irrigate rice in rural Nepal.  
Photo credit: Nabin Baral/IWMI



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



### Overall summary of progress against the theory of change

NEXUS Gains has made substantial progress in its science and toward its End of Initiative outcomes (EOIOs) following its launch in Nepal in April 2022. Energy and food production and ecosystems are driven by water, which is central to the WEFE Nexus approach. Therefore, logically, much of our research is focused on river basins (see [Annex 1](#)). To ensure lasting impacts, we invested considerable time in building teams and partnerships in our target basins (i.e., Ganges, Indus, Aral Sea, Blue Nile, and Limpopo/Incomati). All Work Packages are on track to achieve their planned outputs and outcomes, and we are confident we will achieve all five of our EOI outcomes.

We are promoting 11 innovations, each at a different stage of scaling readiness. Two innovation profiles are complete: the [Agrobiodiversity Index](#) (a threat hotspot and [agrobiodiversity solution tool](#) for local stakeholders to address WEFE issues) and the [Environmental Flow Estimation Tool](#) (for quick desktop estimates of environmental flow requirements of rivers). The Women's Empowerment in Energy Index has been piloted in India, Nepal, and Pakistan, and a [disaggregated WEFE systems model has been developed for Ethiopia](#) to study the economy-wide effects of water and energy investments; another [study](#) analyzed optimal policies for sustainable development in Egypt. A study on energy and irrigation benefits

in Sudan from storage development in Ethiopia is under review. We have published a [review paper](#) and organized a workshop on tools for groundwater governance, prepared a [guideline for multi-stakeholder platforms \(MSPs\)](#), and established a [community of practice \(COP\) on MSPs](#) in collaboration with the Agroecology and Low-Emission Food Systems Initiatives; 14 CGIAR Initiatives now participate.

A [review](#) of studies evaluating agricultural water management interventions found they lack assessments of negative hydrological externalities and unexpected societal feedback. This suggests the need for a nexus approach that adequately considers human behavior. Another [study](#) explored the water–food system transformation nexus. NEXUS Gains also contributed to understanding the potential [benefits of integrated water storage](#) in various contexts, including in [Ethiopia](#) and [Southern Africa](#), and the challenges of managed aquifer recharge in [Viet Nam](#) and [India](#).

We have made especially good progress in building WEFE knowledge and capacities overall, and women's leadership capacities. We completed a [capacity needs assessment in Nepal](#); held [roundtables with women nexus actors on women's leadership](#) and prepared a [concept note](#) on a WEFE Nexus women's leadership program in Nepal; [developed syllabi for three WEFE courses](#) with [inputs from Nepali stakeholders](#); [surveyed the teaching of WEFE](#) Nexus approaches in selected South African higher-education institutions;

**Right:** Rice crop harvesting in Pakistan.  
Photo credit: Muhammad Usman Ghani/IWMI  
**Left:** South Ferghana Main Canal, Uzbekistan.  
Photo credit: Neil Palmer/IWMI

implemented a [nexus master class and winter school with partners in South Africa](#); and published a [gender and inclusion learning module](#).

The NEXUS Gains team was very active at major global conferences in 2022. At the 27th Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC COP27), we provided technical support to the Nepal Government delegation; with partners, shared early results at events in the Water Pavilion, the Food and Agriculture Pavilion, the Resilience Hub, and the Health Pavilion; and provided critical inputs to the global [stocktaking submission](#). Our presenters and panelists made the case [for inclusive, sustainable, and effective governance of the WEFE nexus](#) to address the growing climate emergency. At the Convention on Biological Diversity COP15, we organized a [webinar on nexus and biodiversity](#), worked with governments and regional groups to contribute to the formulation and priority setting of the post-2020 Global Biodiversity Framework, and, with partners, contributed to the explicit recognition of “[inland waters](#)” in the Framework text. We were also active at Ramsar COP14: we convened a side event on [Community wetland management for livelihood and biodiversity resilience](#), supported the Ramsar Scientific and Technical Review Panel and International Organization Partner activities, and contributed to other side events.

In August 2022, Pakistan — one of the countries most at risk from climate change — declared a state of emergency in response to the [worst flood in its history](#). Some 33 million people were directly affected by the floods, and lasting impacts on food, land, water, and energy systems and the environment were recorded. At the request of Pakistan’s federal and four provincial governments, the International Water Management Institute (IWMI) and NEXUS Gains provided substantial support to assess the damage and contribute to relief efforts at the request of various levels of government. For example, we carried out a rapid assessment of [flood inundation in Khyber Pakhtunkhwa Province using pre- and post-flood satellite medium spatial](#)



[resolution images](#) (~10 m) and coordinated with multiple international partners to develop clear and coherent messages and response options. The government also requested a technical review of the National Flood Protection Plan IV (US\$500 million funding from multi-lateral donors) to make it more climate resilient, and to provide analytical support on the food price implications of the floods. IWMI and International Food Policy Research Institute (IFPRI) researchers are developing a technical response to flood damage and the impacts on food security from a WEFE Nexus perspective. NEXUS Gains scientists organized a well-attended session on “[Recurring Floods — Building Resilience in the Wake of Climate Change](#)” as part of Pakistan Water Week 2022.

The floods in Pakistan, like the droughts in the Horn of Africa and the war in Ukraine, undermine agricultural activity and food systems, threaten the livelihoods of vulnerable smallholder farmers, and negatively impact food and nutrition security at multiple levels — triggering more widespread, chronic suffering. Moreover, they are interlinked at multiple levels: each crisis intensifies the others. [Water security is the foundation for food and energy security. Nexus thinking helps to identify linkages, tradeoffs, and synergies](#) across the water, energy, food, and environment systems at different levels so that resilience can be built within and across them.

## Initiative-level theory of change diagram

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



EOI — End of Initiative outcome

AA — Action Area

IA — Impact Area

SDG — Sustainable Development Goal

 Nutrition, Health, and Food Security

 Poverty Reduction, Livelihoods, and Jobs

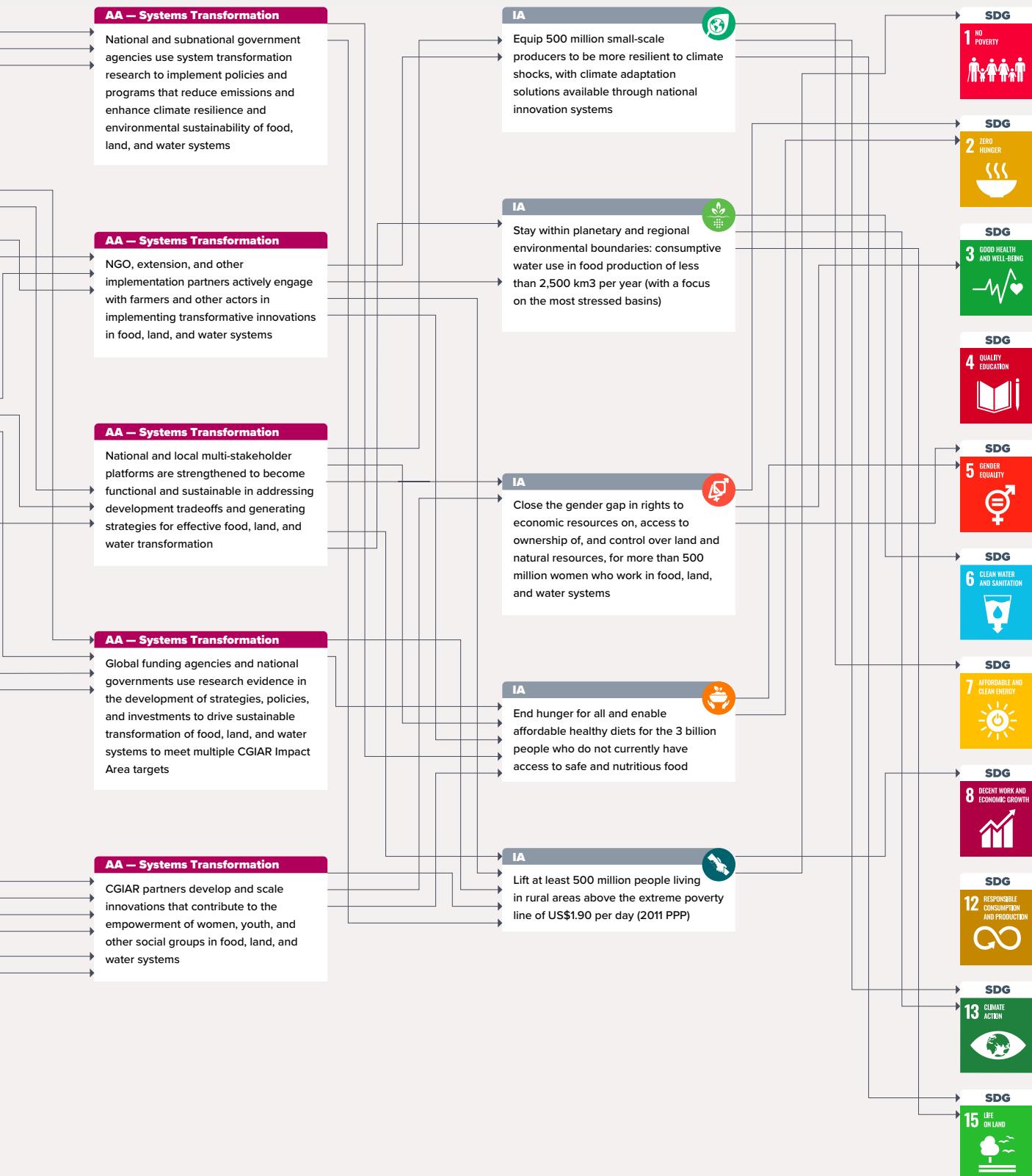
 Gender Equality, Youth, and Social Inclusion

 Climate Adaptation and Mitigation

 Environmental Health and Biodiversity

Teams from CGIAR's three Action Areas — System Transformation, Resilient Agrifood Systems and Genetic Innovation — worked to develop an improved set of Action Area outcomes in October 2022. Since this was near the end of the reporting cycle for 2022, it was decided not to update the theories of change based on these new Action Area outcomes.

The exception to this is Genetic Innovation — for this Action Area, as the new outcomes had already been widely discussed among the relevant Initiatives, and with its advisory group of funders and other stakeholders, the decision was made to update their outcomes in time for the 2022 reporting cycle.



# Progress by End of Initiative outcome

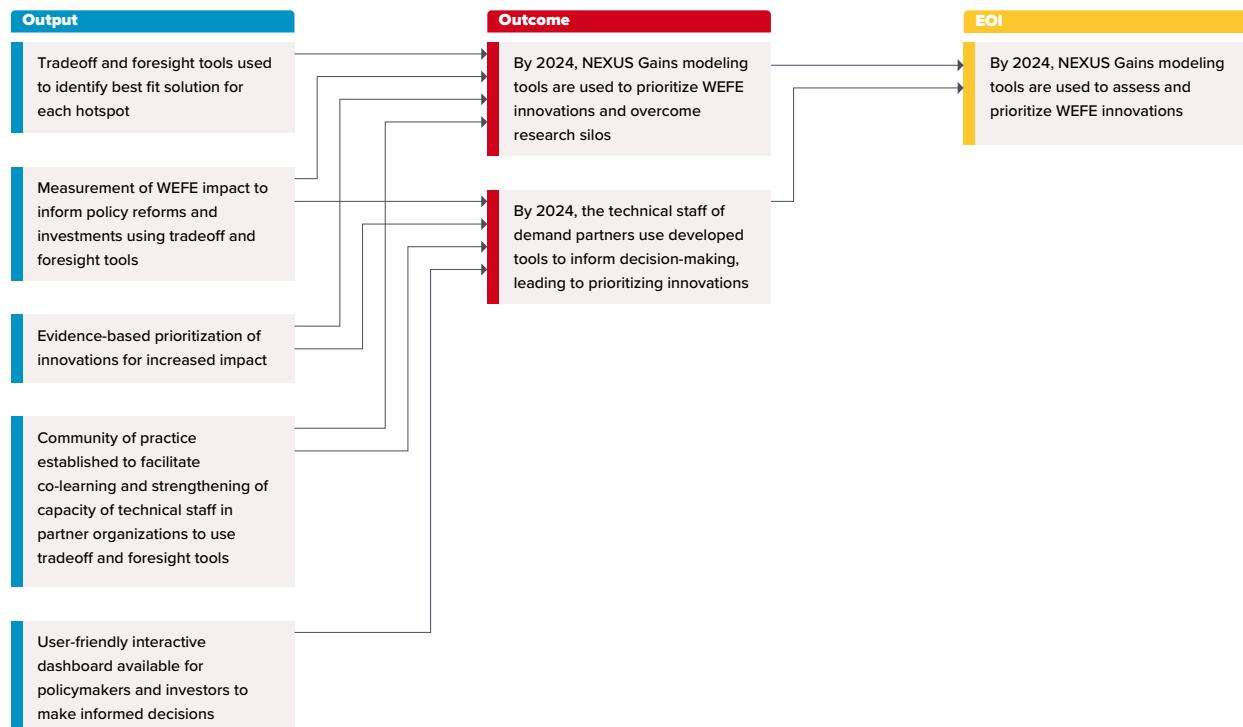
<b>EOI-O 1</b> <b>Demand partners assess Water Energy Food Environment (WEFE) tradeoffs and synergies to prioritize WEFE innovations</b>	We engaged with many actors to share information on potential foresight methodologies and tradeoff tools in four river basins (Indus, Ganges, Aral Sea, and Blue Nile) to prioritize nexus interventions and alignment with ongoing government initiatives. This helped us improve the methodology for selecting hydrological and water resources planning models and hydro-economic frameworks. We updated economic models for the Indus and Blue Nile Basins and analyzed irrigation–energy tradeoffs in Sudan. We started working on environmental flow assessments in the Indus Basin and western Nepal. We developed the Agrobiodiversity Index threat and solution hotspot tool for the Ganges (India). Of the three EOI-O 1 innovations, two have already been published as Innovation Packages and Scaling Readiness (IPSR) profiles. We will adjust the EOI-O to reflect work with two scaling and demand partners to develop foresight methodologies and tradeoff analysis in two river basins.
<b>EOI-O 2</b> <b>Demand partners assess integrated water productivity and storage options to improve system-level water security</b>	Work is underway in four river basins (Ganges, Aral Sea, Nile, and Limpopo/Incomati). We engaged with various actors to develop their knowledge of, and interest in, water productivity tools and water storage diagnostics. Guided by these engagements, we identified the planned research sites, developed partnerships, and started several water storage and water productivity decision-support system analyses. We developed three innovations and progressed on methodology development and data collection for integrated storage assessment. While integrated storage is conceptually appealing, no practical approach has yet emerged. Therefore, we are focused on developing and pioneering an integrated storage analysis methodology. The TOC remains valid: In 2023 we need to ensure the contextual assessments sufficiently link storage and decision-support system work streams.
<b>EOI-O 3</b> <b>Private investors and policymakers, cognizant of systems linkages and gendered benefits, accelerate equitable access to rural clean energy</b>	In India and Nepal, we developed framework papers on women's access to and use of energy, identified pilot intervention areas, and piloted the Women's Empowerment in Energy Index in three countries (India, Nepal, and Pakistan). We also progressed in developing three innovations: two on business and finance models for accelerating access/use of energy technologies and one on solar sizing focused on Asia. Initial analyses in Ethiopia identified gendered benefit streams from electricity access. Achieving this EOI-O is on track. We updated our assumptions to better reflect the critical roles of non-governmental organizations (NGOs) and rural communities in the scaling of clean-energy technologies.

<b>EOI-O 4</b> <b>Policymakers and stakeholders identify ways to improve governance across WEFE systems</b>	<p>We established a COP on MSPs and developed guidance for their establishment. To develop the groundwater governance toolbox innovation, we produced a review paper and held an international workshop. We implemented qualitative research on groundwater in Nepal, Pakistan, and Uzbekistan, which lays the foundation for locally adapted interventions. Through our close involvement in the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and other science–policy dialogues, we promoted nexus approaches through the global discourse on systems transformation in three major global COPs — on climate change, biodiversity, and wetlands. We are on track to achieve this EOI-O through strengthened collaboration with partners in the focal basins.</p>
<b>EOI-O 5</b> <b>Government, business, NGO, and CSO professionals in WEFE sectors use new capacities to take over or take back sustainable and equitable WEFE approaches</b>	<p>We focused on understanding the capacities, needs, gaps, and priorities of key stakeholders, including women professionals, on WEFE Nexus approaches, and creating demand from, and engagement with, key actors. We were especially successful in Nepal and South Africa and had some achievements in Ethiopia and developing global learning products. We developed a <a href="#">methodology for capacity needs assessment</a> in Nepal — a NEXUS Gains innovation. Our TOC remains valid, and we are on track to achieve this EOI-O.</p>



# Section 3 Work Package-specific progress

## Work Package 1: Analyzing WEFE Nexus innovations using foresight and tradeoff methodologies



### Work Package 1 progress against the theory of change

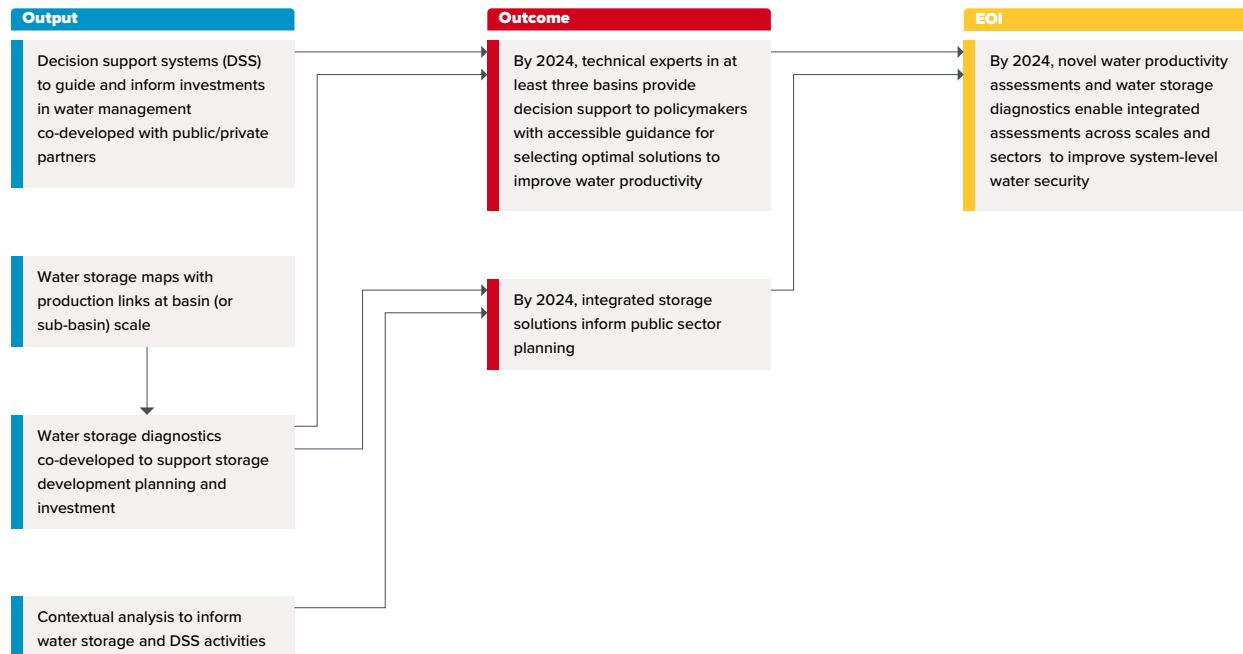
Work Package 1 progressed in developing foresight methodologies and tradeoff tools for four river basins (Indus, Ganges, Aral Sea, and Blue Nile) to prioritize nexus interventions (research question 1). After stocktaking and a systematic review, the Soil and Water Assessment Tool (SWAT) model was selected for hydrological analysis. We reviewed relevant WEFE policies and projects in the four basins. The Python Water Resources Planning Model is being developed for the Aral Sea and Limpopo basins. We also made progress in updating economic models (Computable General Equilibrium and the International Model for Policy Analysis of Agricultural Commodities and Trade) for the Indus and Blue Nile Basins. We started working on environmental flow assessments in the Indus

and in western Nepal in the Ganges basins (research question 2). We developed the Agrobiodiversity Index threat and solution hotspot tool for the Ganges (India). The scaling readiness profiles of the environmental flow tools and agrobiodiversity analysis are complete. We developed draft guidelines for a COP for hydrological models. An initial hydro-economic framework for tradeoff analysis was developed and will be piloted in the Indus Basin during 2023 (research question 3). We produced blogs on the need for WEFE Nexus tools at the river basin scale; the work will be completed and published in 2023.

Based on a review of our TOC, in 2023 we will work with two scaling and demand partners to develop foresight methodologies and tradeoff analyses in two river basins and will adjust our planned outcomes and assumptions accordingly.

## Work Package 2:

### Boosting water productivity and integrated storage management at basin scale



## Work Package 2 progress against the theory of change

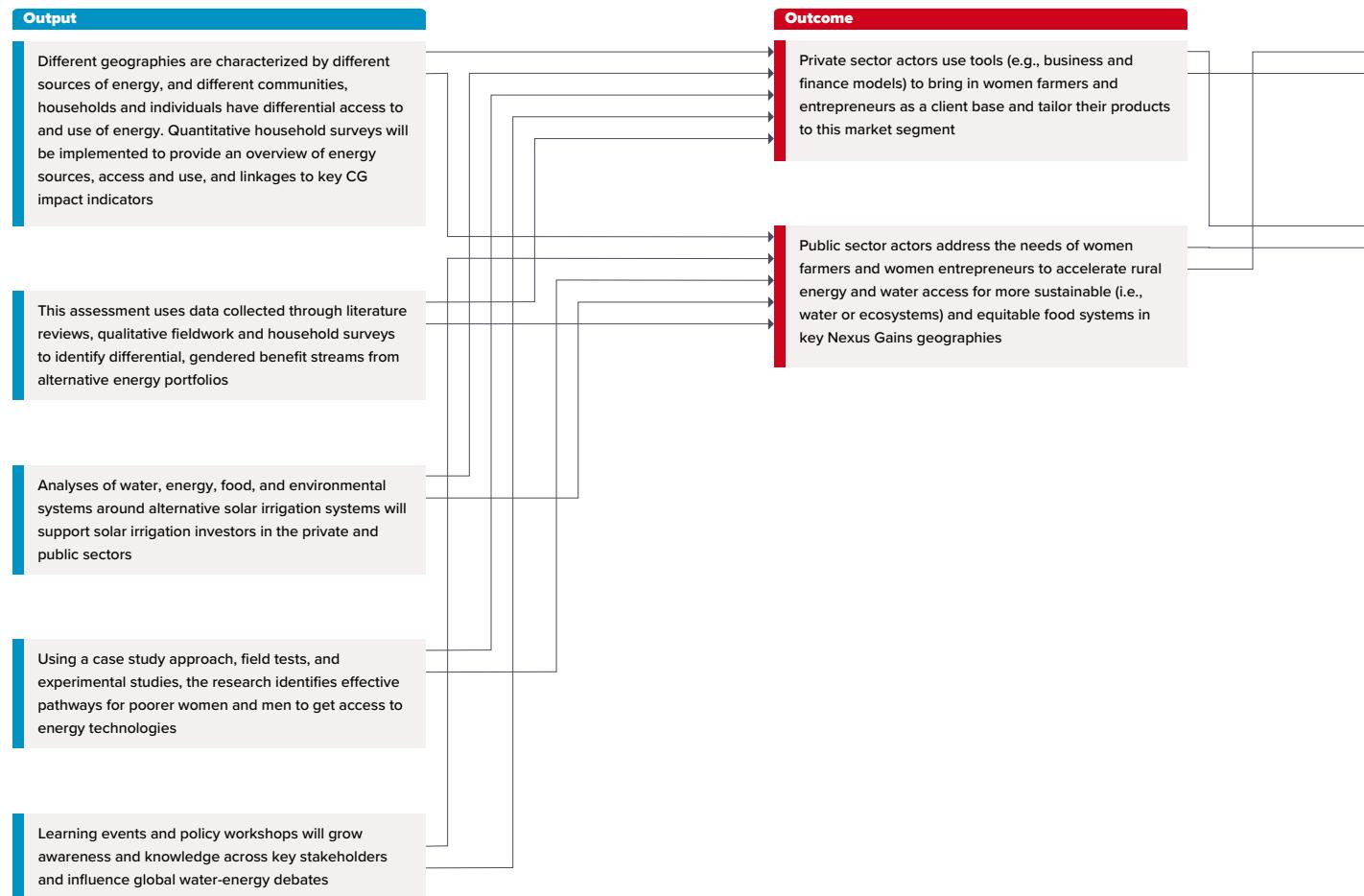
Work Package 2 has begun answering all four research questions: (1) How much water storage do we have, and how many of what types will we need in the future? (2) How can WEFE interventions improve water productivity at local/farm, watershed, and river basin scales, considering whole-system productivity? (3) What are the implications of alternative investments in water productivity for poor rural women and men? (4) how can basin-level water resource productivity be optimized, and climate resilience enhanced, through understanding the political economy? Decision-support systems are under development for the Aral Sea and the Ganges River Basin. Water storage maps are under development in four river basins. Contextual assessments have begun in the Eastern

Nile and the Aral Sea with support from government agency partners. We have begun analyzing the political economy context, i.e., governance and power relations, in two basins, to provide a basis for formulating policy guidance that optimizes cross-sector benefits. An inventory of tools to measure the productivity of water in the Aral Sea has been compiled; methods for integrated water storage have been developed; and there has been considerable engagement with stakeholders to lay the groundwork for uptake and adoption. Several blogs have been produced to raise awareness of these important issues. Planned outputs will be published in 2023.

Two of the four TOC assumptions have held. The remaining two, centered on storage maps being viewed credibly and contextual assessments capturing all the dynamics in the river basins, will be reviewed in 2023.

## Work Package 3:

### Energizing food and water systems sustainably and inclusively



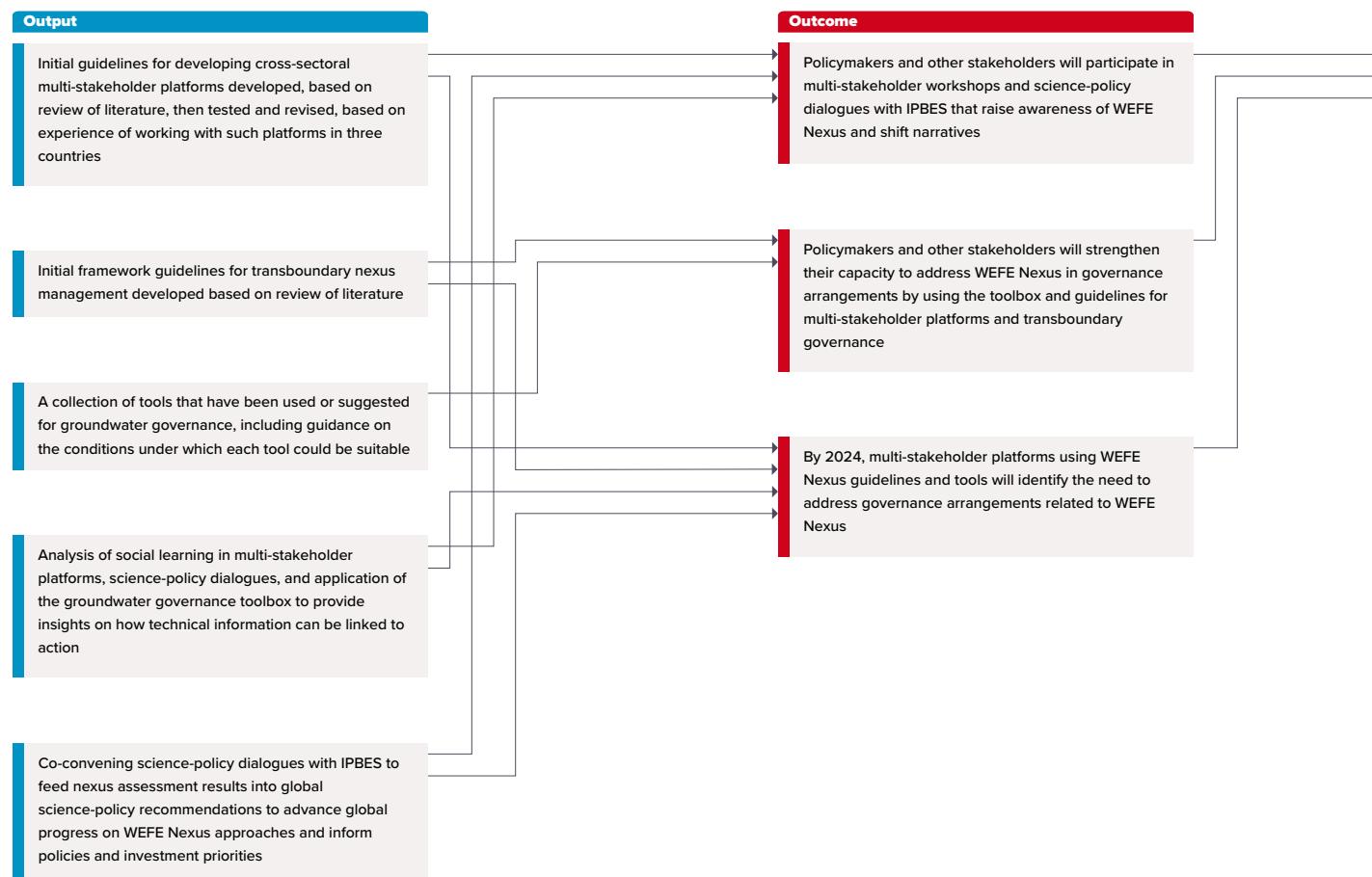
## Work Package 3 progress against theory of change

EOI
By 2024, new knowledge regarding targeting of gender- responsive, clean-energy solutions will grow sustainable investment and the reach of public and private sector actors using NEXUS Gains tools
By 2024, key women and men professionals in government, NGOs and CSOs will acquire increased technical, leadership, and negotiation capacities to design, influence, and implement WEFE Nexus approaches. By 2024, key stakeholders (government, NGO and CSO actors) will have gained the capacities to co-develop and implement nexus innovations per focal basin

Work Package 3 co-develops scalable business and finance models for accelerated, inclusive access to clean energy for food and water systems, with a focus on women and other marginalized groups. It asks: (1) What rural energy portfolios and business and finance models best support and accelerate rural clean-energy access for food system transformation and environmental sustainability? (2) How can solar-powered irrigation enhance agricultural production while supporting groundwater sustainability, inclusion, economic growth, and ecosystem health? (3) What are effective pathways for women to access renewable energy in ways that strengthen their agency and entrepreneurship? In 2022, frameworks identifying pathways from women's energy access to various benefit streams were developed and data on rural energy sources, access, and use portfolios was collected in South Asia. An initial Women's Empowerment through Clean Energy Index was developed and is currently being field-tested. A series of sites and modalities for pilot projects on energy access were identified in India and Nepal. We also contributed to the global discourse on groundwater-fed solar irrigation through participation in a series of national, regional, and global events. Analyses in Ethiopia identified gendered benefit streams from electricity access.

Based on a review of our TOC, we identified NGOs and rural communities themselves as a third scaling partner, aligned outputs with budgets, and have added an outcome and modified our assumptions accordingly.

## Work Package 4: Strengthening WEFE Nexus governance



## Work Package 4 progress against theory of change

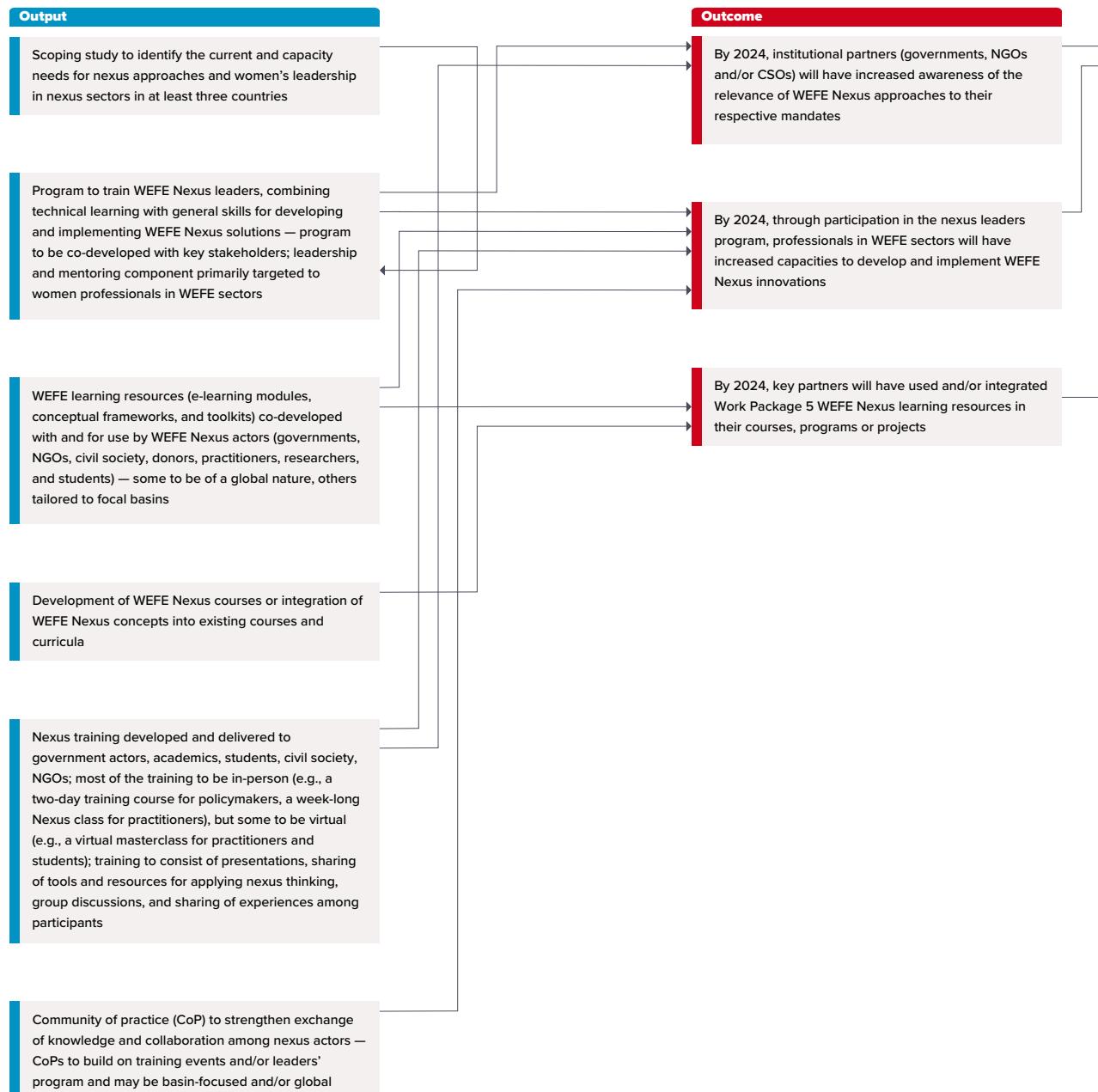
EOI
By 2024, policymakers and stakeholders at different levels will identify WEFE Nexus governance solutions approaches that are sustainable and equitable

Work Package 4 addresses three research questions: (1) How can MSPs be adapted to realize nexus outcomes, and what coordination mechanisms would be effective in achieving nexus outcomes? (2) How can social learning interventions be linked with technical and policy measures to develop inclusive groundwater governance systems? (3) How can a nexus systems approach advance the global discourse on systems transformation? A literature review and an international workshop on MSPs provided guidance on improving inclusion of women and marginalized groups and led to establishing a COP on MSPs for CGIAR Initiatives. A review paper and international workshop on Institutional Tools for Groundwater Governance provided guidance on identifying tools to improve governance (a core innovation). This involves all WEFE Nexus sectors in a participatory and locally appropriate manner. Qualitative research on groundwater in Nepal, Pakistan, and Uzbekistan laid the foundation for locally adapted interventions. Presentations of NEXUS Gains research raised awareness of the role of WEFE Nexus approaches at three major COPs: UNFCCC COP27, the Convention on Biological Diversity COP15, and Ramsar COP14. Our work emphasizes the importance of understanding the political economy and incentive structures of different actors to promote transformation successfully, and will link to Work Package 2 work on political economy to strengthen uptake of innovations.

The TOC assumes that social learning processes create the conditions for partners to adopt/adapt the toolbox and guidelines for collective action and engage in science–policy dialogues and multi-stakeholder processes. Improving the governance of nexus systems is a longer-term endeavor, not achievable within three years.

## Work Package 5:

### Developing capacity for WEFE actors, including emerging women leaders



## Work Package 5 progress against the theory of change

**EOI**

By 2024, key women and men professionals in government, NGOs and CSOs will acquire increased technical, leadership, and negotiation capacities to design, influence, and implement WEFE Nexus approaches. By 2024, key stakeholders (government, NGO and CSO actors) will have gained the capacities to co-develop and implement nexus innovations per focal basin.

Work Package 5 asks three questions: (1) What capacities are needed to effectively develop and implement inclusive and sustainable nexus interventions? (2) How can we make learning more accessible in often resource-poor environments? (3) How can we bring women's perspectives, capacities, and leadership into local, national, regional, and global discourse and agendas on systems transformation? We completed a scoping study in Nepal on the challenges women professionals face in influencing, negotiating, and implementing nexus solutions and conceptualized a nexus leaders' program. This is a core innovation focusing on women professionals and provides practical training in technical and general skills as well as mentorship. We developed training resources, including a learning module on gender equality and social inclusion in nexus approaches. Three Nexus courses (for practitioners, government, and graduate students) were co-developed with partners, informed by two multi-stakeholder discussions. These will be piloted and subsequently implemented by local organizations, made available as e-learning modules, and integrated into at least two universities' curricula. Nexus training was delivered to practitioners, officials, civil society, and researchers in Ethiopia; two intensive courses were delivered in South Africa with a consortium of partners; and one training course was held in Nepal in response to a request from the Department of Water Resources and Irrigation.

These achievements are creating the conditions needed to satisfy our TOC assumptions: that WEFE resources will be fit for purpose, professors will use the resources produced, the program will address critical capacity needs, and there will be institutional support for WEFE actors to engage in training.

# Work Package progress rating

WORK PACKAGE	TRAFFIC LIGHT / RATIONALE
1	 There has been some delay in producing outputs, but they will be completed in 2023. We are on track to complete all planned work by the end of 2024.
2	 Despite some challenges, such as elections in Nepal and political uncertainty in Ethiopia, all outputs will be delivered in 2023.
3	 We had some delays in data collection. We have hired additional research staff to ensure that all analyses will be completed as planned.
4	 The Work Package has progressed as planned. Key foundational pieces have been completed under each research question. Collaboration with IPBES and others has advanced nexus thinking in the global discourse.
5	 The Work Package has progressed as planned. Key foundational pieces have been completed, and we are on track with respect to our TOC and targets.

## KEY

On track		<ul style="list-style-type: none"><li>Annual progress largely aligns with Plan of Results and Budget and Work Package theory of change</li><li>Can include small deviations/issues/ delays/risks that do not jeopardise success of Work Package</li></ul>
Delayed		<ul style="list-style-type: none"><li>Annual progress slightly falls behind Plan of Results and Budget and Work Package theory of change in key areas</li><li>Deviations/issues/delays/risks could jeopardise success of Work Package if not managed appropriately</li></ul>
Off track		<ul style="list-style-type: none"><li>Annual progress clearly falls behind Plan of Results and Budget and Work Package theory of change in most/all areas</li><li>Deviations/issues/delays/risks do jeopardise success of Work Package</li></ul>

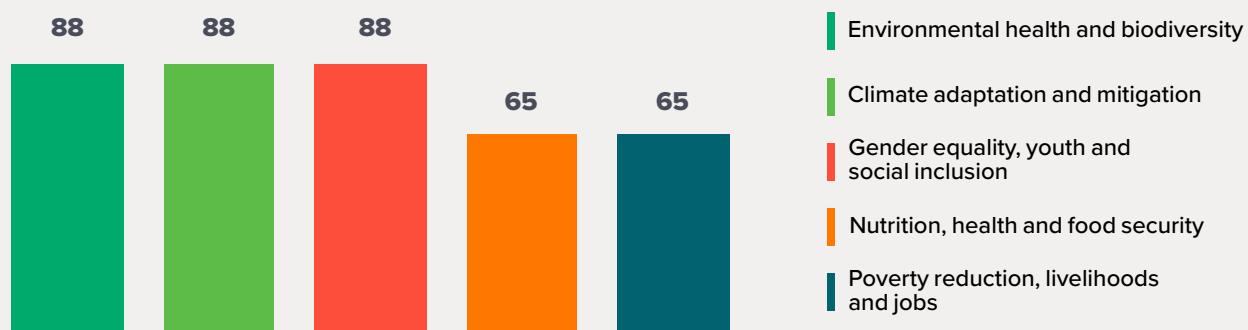
# Section 4 Initiative key results

This section provides an overview of 2022 results reported by NEXUS Gains. These results align with the CGIAR Results Framework and NEXUS Gain's theory of change. Further information on these results is available through the [CGIAR Results Dashboard](#).

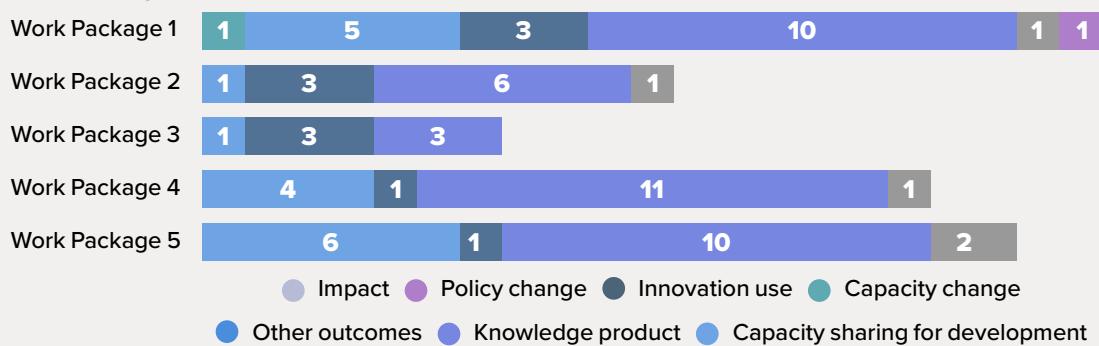
## Overview

Results	Outputs	Outcomes
<b>88</b>	<b>19</b> Capacity sharing for development <b>12</b> Innovation development <b>44</b> Knowledge products <b>7</b> Other outputs	<b>1</b> Innovation use <b>2</b> Policy change <b>3</b> Capacity change

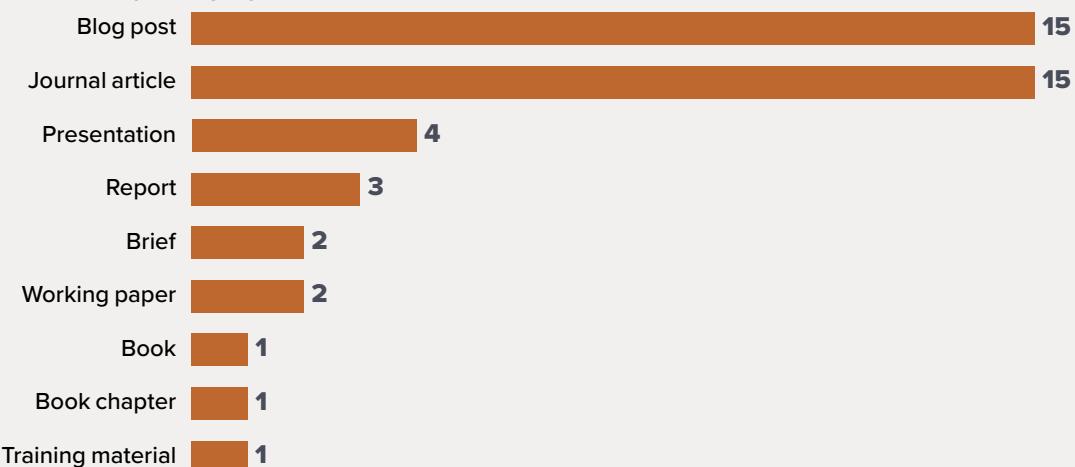
## Results by Impact Area



## Results by Work Package



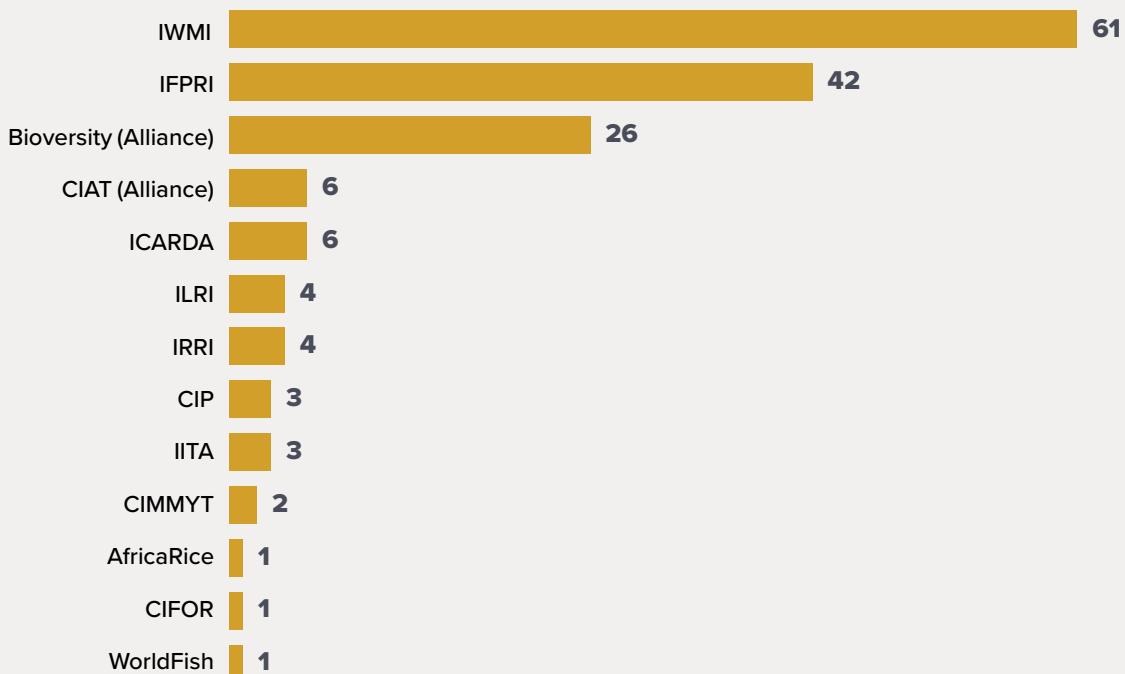
## Knowledge Products by category



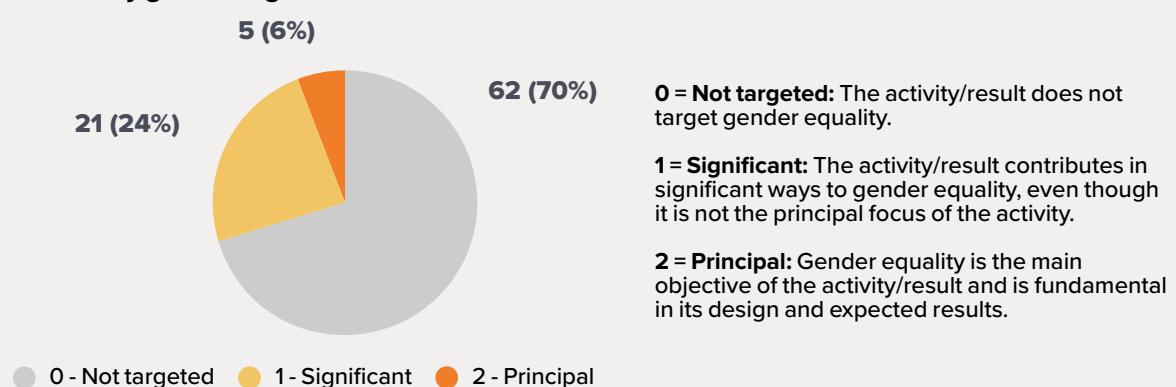
### Capacity development



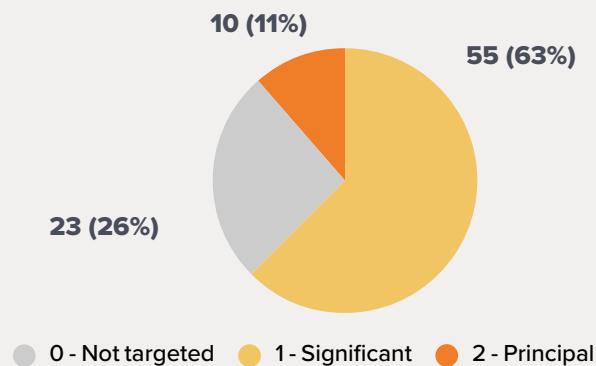
### Contributing CGIAR Centers



### Results by gender tag



## Results by climate change tag



**0 = Not targeted:** The activity does not target climate mitigation, adaptation, and climate policy goals of the CGIAR as put forward in its strategy.

**1 = Significant:** The activity contributes in significant ways to either one of the three CGIAR climate-related strategy objectives — namely, climate mitigation, climate adaptation, and climate policy, even though it is not the principal focus of the activity.

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

## Results by country



## Section 5 Impact pathway integration – External partners



### Partnerships and NEXUS Gains' impact pathways

Our partners play critical roles throughout the research cycle, from conceptualization, innovation development, and testing, to training and uptake of innovations.

We partnered with The University of Manchester to adapt, apply, and develop the capacity to use the open-source Python Water Resources Planning Model to analyze WEFE options in three river basins. This included training of Central Asian government officials in collaboration with regional and national research and extension systems. In Nepal, we collaborated with Tribhuvan University to implement scoping studies on WEFE and gender capacity needs and to support capacity development, especially for women professionals. We worked with the University of KwaZulu-Natal, Water Research Commission, WaterNet, Global Water Partnership, IHE Delft, and the Ministry of Foreign Affairs – Netherlands to develop WEFE

Setting up a solar-powered water pump to pump groundwater in Ethiopia.

Photo credit: Maheder Haileselassie/IWMI

learning models and offer WEFE training. We are working with the Indian Central Water Commission and the Department of Water Resources and Irrigation in Nepal to develop, test, and adapt an innovative water storage diagnostic tool. We collaborate with the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ)-led Nexus Regional Dialogues Programme to support the application of WEFE tools. This partnership resulted in our key result story (see Section 8) on the adoption of a WEFE policy framework by the Niger Basin Authority (NBA). Finally, we collaborate with multiple international agencies, e.g., IPBES, the Earth Commission, and the Ramsar Secretariat.

NEXUS Gains covers multiple sectors, creating a special challenge in bringing together institutions from sectors which rarely collaborate. This remains a work in progress, but we are advancing, particularly through our work on MSPs.

# Section 6 Impact pathway integration – CGIAR portfolio linkages

## Portfolio linkages and NEXUS Gains' impact pathway

The WEFE Nexus covers multiple sectors, each with its own institutional arrangements and priorities. Collaboration among them is critical to achieving our EOI outcomes, but it is also challenging. MSPs offer a potentially effective way to engage this diverse set of stakeholders on cross-systems thinking and learning. Building on previous work, three CGIAR Initiatives, NEXUS Gains, Agroecology, and Low-Emission Food Systems, established an [MSP Community of Practice](#) to reduce the costs and enhance the benefits of MSPs and facilitate research on MSPs across the CGIAR. Fourteen CGIAR Initiatives have joined to date.

NEXUS Gains contributes to the COP on gender-transformative research methodologies. This is led by the GENDER Impact Platform with contributions from other Initiatives including Gender Equality, Low-Emission Food Systems, and Climate Resilience.

We collaborate with Climate Resilience to use the South Asia Drought Monitoring System ([SADMS](#)) to promote early warning of droughts and South–South learning among South Asian and African nations. In Central Asia, we collaborate with the Fragility to Resilience in Central and West Asia and North Africa Initiative to promote nexus approaches. NEXUS Gains and Transforming Agrifood Systems in South Asia have initiated work to amplify climate change adaptation research and impact through common partners in Nepal and India; we have also exchanged baseline survey modules. We anticipate expanding our collaboration further with these and other CGIAR Initiatives, including the new Initiative on Fragility, Conflict, and Migration.

Many NEXUS Gains activities are supported by non-pooled projects funded by a range of donors. These include ongoing work on solar irrigation in South Asia and Africa, water storage in South Asia, groundwater governance, and expanding early warning and drought forecasting through SADMS.



## Section 7 Adaptive management

RECOMMENDATION	SUPPORTING RATIONALE
1. Amend Initiative TOC to match available funding.	NEXUS Gains has drafted updates to the TOC to match the reduction in funding (2022 funding was 67% of proposal budget; currently expected 2023 funding is 57% of proposal budget). The number of countries/basins where EOI-Os are expected has been reduced, with Work Package outputs and outcomes also modified accordingly.
2. Amend planned MELIA studies.	Planned monitoring, evaluation, learning, and impact assessment (MELIA) studies have been reviewed to be in line with available resources. For example, the number of geographies for the Work Package 1 foresight studies and Work Package 4 evaluation will be reduced; external funding will be sought for the assessment of the impact of the leadership program.
3. Update Risk Framework.	The Risk Framework will be updated to reflect: (i) challenges of bringing about cross-sectoral change; (ii) relationship-building with governments in the context of personnel changes; (iii) commitment to supporting women leaders; and (iv) timing and unpredictability of CGIAR processes and decisions.
4. Progress innovations to stage two.	As an early adopter of the IPSR process, NEXUS Gains has completed two innovation profiles, with a further six profiles to be developed in 2023. In 2023 an innovation focal point will be trained to lead on innovation scaling. Funding permitting, NEXUS Gains will support the development of two to three innovations into the second phase of IPSR.
5. Develop communications strategies at a basin level.	Experience in Year 1 has shown communications tailored by geography to be most effective. In 2023, a new Initiative communications strategy will be developed, and local strategies will be developed with colleagues at a basin level, for maximum contextual impact. This will bring effective outreach and raise awareness of the work.
6. Strengthen new WEFE partnerships.	Over the course of 2022, we have initiated discussions on collaboration with the United Nations University Institute for Integrated Management of Material Fluxes and of Resources, the NEXUSNET consortium, the Nexus Regional Dialogues Programme, and other institutions promoting nexus research and systems thinking. We will seek opportunities to strengthen these collaborations through research, capacity-building, and joint communications.
7. Accelerate integration of GESI.	Efforts to integrate gender equality and social inclusion (GESI) considerations across the NEXUS Gains portfolio will accelerate, including through a COP on GESI and capacity-strengthening activities targeted at the Work Package and basin levels.
8. Review projected benefits.	The projected benefits developed during the proposal phase are not only overambitious given the now reduced levels of funding, but several are challenging and costly to measure. NEXUS Gains will review and update these in 2023.
9. Engage with Centers with smaller contributions.	Given the challenges in output achievement of Centers with limited contributions to NEXUS Gains, in 2023 we will engage through more regular meetings to support and monitor progress.

## Section 8 Key result story



**The Niger Basin Authority has integrated nexus analysis into its operational and investment planning, potentially benefiting over 160 million people.**

**In 2018, the IFPRI and the University of Ottawa supported the NBA under the NEXUS Regional Dialogues Programme to prioritize projects in the NBA's operational plan that considered synergies and tradeoffs across the WEFE Nexus. In 2022, NEXUS Gains continued this partnership to support development of a nexus guidance policy that was formally adopted by the Niger Basin Council of Ministers in December 2022.**

**Rationalizing decision-making will ultimately benefit some 160 million basin inhabitants.**

The Niger River Basin in West Africa suffers from extreme water, energy, and food insecurity, environmental degradation, growing adverse climate change impacts, and overall instability, insecurity, conflict, and civil strife. The NBA is responsible for coordinating and prioritizing multiple development projects among the nine

Participants including the Executive Secretary of the Niger Basin Authority, Abderahim Bireme Hamid at the Niger National Nexus Dialogue held in Niamey on May 10–12, 2022.  
Photo credit: Robert Kranefeld/GIZ

countries sharing the basin, supporting 160 million people and covering 2.23 million km<sup>2</sup>. However, the NBA had no systematic methodology to assess the synergies and linkages among the 350 projects intended to achieve the basin's Shared Vision [1]. The projects cover a wide range of investments, including dams, irrigation schemes, navigation, and ecosystem preservation. Many of these projects are supported by international finance institutions such as the African Development Bank and the World Bank. But without careful assessment of the projects and their interlinkages, the scarce and fragile water, land, and ecosystem resources could suffer unforeseen but irreversible damage.

The European Union and the Federal Republic of Germany, through GIZ and the NEXUS Regional Dialogues Programme in the Niger Basin [2], supported the NBA, University of Ottawa, CGIAR, and other partners to build WEFE Nexus capacity and develop and discuss a Nexus guidance

document for adoption by the NBA Council of Ministers. For this, NEXUS Gains developed a first draft of the Nexus guidance in early 2022; this draft was discussed and received suggested edits and adjustments during three-day workshops that took place in all nine basin countries. These workshops also included further capacity-building for the nexus analysis methodologies developed in an earlier partnership (2018–2019) and presented an analysis of a nationally selected priority project with nexus linkages.

Based on the feedback received, a second draft of the guidance was prepared and presented at a regional workshop. The nexus guidance was then finalized and presented to the NBA's Technical Committee of Experts in October 2022, which recommended adoption by the NBA's Council of Ministers [3]. The guidance was adopted on December 8, 2022, during the 41st Ordinary Session of the NBA Council of Ministers in N'Djamena, Chad, and immediately came into force [4]. This is the first-ever basin-wide adoption of nexus guidance and can support the development of similar policies in other river basins with competing WEFE goals.

The content of the guidance builds on earlier support given to the NBA by the Nexus Regional Dialogues Programme and the CGIAR Research Program on Water, Land and Ecosystems. Specifically, the earlier support implemented a first round of capacity-building on WEFE synergies and tradeoffs and developed a simplified as well as a semi-modeled tradeoff analysis [5], which was incorporated into the Nexus guidance that was adopted in 2022 [4]. Using the guidance document will reduce the threat of adverse impacts on the basin's shared water and land resources and save millions of dollars of investment funds while jointly meeting various Shared Vision objectives. It will help strengthen positive impacts and reduce cross-sectoral constraints of single-sector solutions and help identify multi-sector solutions. This will increase the efficiency of the use of natural resources and support the implementation and monitoring of (multi-purpose) investments. If this can be achieved, the River of Rivers — the literal meaning of the Niger — will continue to support water, food, and energy security and environmental sustainability for generations to come.

**“ The majority of the projects in the Operational Plan contribute to multiple objectives, i.e., water, energy, and food security and environmental sustainability, but this is not always explicit. Making these linkages explicit supports cross-sectoral implementation as well as monitoring of impacts on all linked sectors. ”**

**Mr. Abdou Ramani Traore, Monitoring and Evaluation Expert and Nexus focal point, NBA. Source: Nexus Niger Basin // Achieving the Niger Basin Shared Vision by Drawing on its Cross-Sectoral Strength | Nexus — The Water, Energy & Food Security Resource Platform.**

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LINKS TO IMPACT AREAS	GEOGRAPHIC SCOPE
<p><b>Primary Impact Area:</b> Environmental Health and Biodiversity</p>  <p><b>Other relevant Impact Area(s):</b> Climate Adaptation and Mitigation; Gender Equality, Youth, and Social Inclusion; Nutrition, Health, and Food Security; Poverty Reduction, Livelihoods, and Jobs</p>  <p><b>Which collective global targets for the relevant Impact Area(s) from the CGIAR 2030 Research and Innovation Strategy does the key result contribute to?</b></p> <ul style="list-style-type: none"> <li>• <b>Environmental Health and Biodiversity:</b> Stay within planetary and regional environmental boundaries: consumptive water use in food production of less than 2,500 km<sup>3</sup> per year (with a focus on the most stressed basins), zero net deforestation, nitrogen application of 90 Tg per year (with redistribution toward low-input farming system) and increased use efficiency, and phosphorus application of 10 Tg per year.</li> <li>• <b>Climate Adaptation and Mitigation:</b> Equip 500 million small-scale producers to be more resilient to climate shocks, with climate adaptation solutions available through national innovation systems.</li> </ul>	<p><b>Region(s):</b> West and Central Africa</p> <p><b>Country/ies:</b> Benin; Burkina Faso; Cameroon; Chad; Côte d'Ivoire; Guinea; Mali; Niger; Nigeria</p>
KEY CONTRIBUTORS	LINK TO CGIAR RESEARCH PROGRAMS
	<p><b>Contributing Initiative(s):</b> NEXUS Gains</p> <p><b>Contributing Center(s):</b> IFPRI</p> <p><b>Contributing external partner(s):</b></p> <ul style="list-style-type: none"> <li>• GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit/German Society for International Cooperation)</li> <li>• Niger Basin Authority</li> <li>• University of Ottawa</li> </ul>

## Annex 1

### NEXUS Gains basin approach

**COVER PHOTO:** Meka reservoir near Nekemte, Ethiopia.  
Photo credit: Matthew McCartney/IWMI



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