CGIAR

RESEARCH PROGRAM ON
Water, Land and Ecosystems

LED BY:
IWMI
International Water Management Institute

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CGIAR Research Program on Water, Land and Ecosystems (WLE)

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Connected Thinking, Compelling Solutions

WLE is a global research-for-development program connecting partners to deliver sustainable agricultural solutions that enhance our natural resources and the wellbeing of people. WLE brings together CGIAR Centers, the UN Food and Agriculture Organization (FAO), the RUAF Global Partnership, and numerous national, regional and international partners to find integrated solutions.

WLE is led by the International Water Management Institute (IWMI) and partners, and supported by CGIAR, a global research partnership for a food-secure future.

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IWMI International Water Management Institute

IN PARTNERSHIP WITH:

Bioversity International · CIAT · FAO · ICRISAT · CIFOR · CIP · RUAF · ICARDA · IFPRI · World Agroforestry · ILRI · WorldFish

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FLAGSHIPS

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- Flagship 2: Land and Water Solutions for Sustainable Intensification (LWS)
- Flagship 3: Sustaining Rural-Urban Linkages (RUL)
- Flagship 4: Managing Resource Variability, Risks and Competing Uses for Resilience (VCR)
- Flagship 5: Enhancing Sustainability Across Agricultural Systems (ESA)

Participating Centers: Alliance of Bioversity International and CIAT, ICARDA, ICRAF, ICRISAT, IFPRI, IWMI, RUAF Global Partnership

ACRONYMS

ABDI	Agrobiodiversity Index
Africa RISING	Africa Research in Sustainable Intensification for Next Generation
AGRF	African Green Revolution Forum
AICCRA	Accelerating Impacts of CGIAR Climate Change Research for Africa
ALWM	Agricultural land and water management
APAARI	Asia-Pacific Association of Agricultural Research Institutions
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CIAT	International Center for Tropical Agriculture
CoSAI	Commission on Sustainable Agriculture Intensification
CRFS	City regional food systems
CRP	CGIAR Research Program
EDACaP	Ethiopian Digital AgroClimate Advisory Platform
FAO	Food and Agriculture Organization of the United Nations
FCDO	UK Foreign, Commonwealth and Development Office
FISH	CGIAR Research Program on Fish
FP	Flagship Program
FSM	Fecal sludge management
FTA	CGIAR Research Program on Forests, Trees and Agroforestry
GEFIS	Global Environmental Flow Information System
GFRAS	Global Forum for Rural Advisory Services
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GYI	Gender, youth and inclusion
IBFI	Index-based flood insurance
ICARDA	International Center for Agricultural Research in the Dry Areas
ICRAF	World Agroforestry Centre
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICT	Information and communications technology
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
IRRI	International Rice Research Institute
IUCN	International Union for Conservation of Nature
IWMI	International Water Management Institute
KP	Khyber Pakhtunkhwa
LDN	Land degradation neutrality

LIMS	Laboratory information management system
MELIA	Monitoring, evaluation, learning and impact assessment
MENA	Middle East and North Africa
MUFPP	Milan Urban Food Policy Pact
NGO	Non-governmental organization
NRM	Natural resource management
OICR	Outcome impact case report
OND	October-November-December
PIM	CGIAR Research Program on Policies, Institutions, and Markets
RICE	CGIAR Research Program on Rice
RRR	Resource Recovery and Reuse
RUAF	RUAF Global Partnership on Sustainable Urban Agriculture and Food Systems
SAMS	Systematic Asset Management Software for Irrigation
SLO	System level outcome
SME	Small- and medium-sized enterprise
SPIA	Standing Panel on Impact Assessment
TAP	Tropical Agriculture Platform
ToC	Theory of change
TPP	Transformative Partnership Platform
UNCCD	United Nations Convention to Combat Desertification
UNFSS	United Nations Food Systems Summit
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WASH	Water, sanitation and hygiene
WEF	Water-Energy-Food
WEFE	Water-Energy-Food-Ecosystems
WLE	CGIAR Research Program on Water, Land and Ecosystems

EXECUTIVE SUMMARY

2021 was WLE's final year – the culmination of a decade of science and impact. Throughout the year we saw the real-world difference made by our flagship projects and watched solutions unfold at landscape and basin scales. We also saw our research flow into larger processes in a year of international action that included the UN Food Systems Summit and high-stakes meetings of the UN Conventions on Climate Change and Biological Diversity.

WLE participated in all of these, bringing proven solutions to the table. We also helped shape the CGIAR 2030 Research and Innovation Agenda: several new One CGIAR initiatives will build on – and advance – WLE research, including 'NEXUS Gains: Realizing Benefits across Water, Energy, Food and Ecosystems', 'Agroecology' and the 'NATURE+' initiative on nature-positive solutions. We also worked with other CRPs to propose a future model for assessing integrated systems research.

In 2021, results spanned the five impact areas of the One CGIAR Research and Innovation Strategy:

- **Environmental Health and Biodiversity** were boosted by evidence-based tools, including tools to improve water investments in seven countries and decisions by companies using the Agrobiodiversity Index. We advanced use of the water-energy-food-environment nexus framework for basin-level decisions. We created platforms to co-implement environmental restoration, and piloted these interventions to show what can be achieved.
- **Poverty Reduction, Livelihoods and Jobs** gained from water equity, as in Laos, where new policies and investments draw on our assessments of links between groundwater and economic well-being. We developed a tool to scale farmer-led irrigation and applied it in four countries, and began scaling use of flood-spreading weirs to diversify opportunities in Ethiopia.
- **Nutrition, Health and Food Security** contributions progressed in the shadow of COVID-19, with research on responses to the pandemic by urban food systems, water and sanitation stakeholders and migrant communities. We enabled sanitation service reforms at the city level and enhanced capacities of 15 towns and cities to increase food security through city regional resilience, while the World Bank adopted our recommendations on nutrition in irrigation investments.
- **Gender Equality, Youth and Social Inclusion** benefited as we helped insurers maximize inclusiveness and reach of flood insurance, while the Innovative Food Systems Solutions platform connected youth to learn, share and act. We generated guidelines for mainstreaming inclusion in landscape restoration, and evidence on its gendered impacts.
- **Climate Adaptation and Mitigation** efforts grew, from resilience assessment tools for cities to a climate sensitive development trajectory for South Africa and solar-powered irrigation business models. We deployed innovations to reduce climate shocks, from bundled insurance products to satellite data utilization to a smart farming platform for smallholders.

This is just a part of the significant legacy that WLE is leaving for CGIAR and the wider world of research for development. The scale of our work is visible in a series of legacy knowledge products we released this year to synthesize our past research, available on a WLE science-driven solutions platform, with the aim of influencing future research, planning, policies and investments.

Part A: NARRATIVE SECTION

1. Key Results

1.1 Highlights of Global Progress and Achievements

WLE contributes to System Level Outcome (SLO) 1, "reduced poverty" and SLO 3, "improved natural resources systems and ecosystems services," as well as to the health and nutrition benefits of SLO 2, though less directly. Impacts of natural resource innovations often take years to mature and be measurable (Table 1); and such impact measurement is methodologically challenging. Nevertheless, WLE has explored new and innovative impact methodologies for integrated systems research and prioritizes completing outcome-level assessments for accountability and learning.

Preliminary evidence suggests that in 2021, WLE has made tangible contributions to achieving SLO targets. For example, in relation to the SLO target of *21 million farm households adopting improved (water and land) management practices,* WLE/the Alliance of Bioversity International and CIAT created the Agua de Honduras platform to provide evidence-based support to improve water investments. It covers 44% of Honduras, and in 2021, it was expanded to three sub-Saharan African countries. The tool will be expanded to much of the Caribbean in 2022. Moreover, in Ethiopia, the expansion of flood-spreading weirs is improving food security in dry areas.

In South Asia, WLE/IWMI and CCAFS have used advanced tools and modeling to strengthen farm households' resilience to climate change. Governments and insurance companies are beginning to scale out these new products to farmers, including women, in Bangladesh, India and Sri Lanka, and farmers are already receiving payouts for flood damage. Likewise, in South Africa, WLE/IFPRI and PIM partnered to help create evidence-based policies that build resilience into infrastructure investments and implement climate-sensitive development policies and programs (OICR).

In 2021, WLE also contributed to the SLO target of *assisting 5.74 million people (50% of whom are women) to exit poverty.* In Ghana and Ethiopia, WLE/IWMI established farmer-led irrigation development partnerships with private sector actors to improve irrigated agricultural value chains (OICR). In one case in northern Ghana, such research-led partnerships increased solar irrigation water pump sales by over 80% in just one year.

WLE can point to many such examples. Our contributions to the cross-cutting SLO "capacity development" also warrants special mention. Since 2019, when WLE/IWMI reported on the impact of its research on groundwater knowledge generation and management in Laos, policies and investment programs have begun benefiting groundwater-dependent communities: WLE-facilitated knowledge and capacity development are helping Laos establish a national groundwater roadmap and sub-national groundwater management plans (OICRs 2019 & 2021).

1.2 CRP Progress towards Outputs and Outcomes

1.2.1 Overall CRP progress

This year was pivotal for the future of humanity and our home, Earth. The outcomes of the UN Food Systems Summit (UNFSS) in September, the 26th UN Framework Convention on Climate Change Conference of the Parties (COP26) in November, as well as that of the UN Convention on Biodiversity (COP15) will likely help determine whether humanity makes the reforms and investments required to both achieve the SDGs and effectively confront the multiple challenges posed by climate change. WLE actively participated in all of these events, drawing on a decade of experience, innovative research and important outcomes to make major

contributions to the key food and environmental systems events of 2021. WLE also contributed significantly to shaping the CGIAR 2030 Research and Innovation Agenda.

The Commission on Sustainable Agriculture Intensification (CoSAI) was launched by WLE in 2020 to investigate the current level of investment in agri-food system innovation and explore how to overcome constraints to more rapid development and uptake of innovations. The Commission published a baseline study of the current level of investment in innovation in agri-food systems in the Global South. Only 7% of current agri-food innovation funding had explicit environmental objectives, and less than 50% of this also had explicit social objectives. It also co-published – with the UK's FCDO – an Innovation Investment Gap study. This study estimated a global investment gap of just over USD 15 billion per year by 2030 to meet the SDG2 hunger target and make progress toward other targets. This includes a CGIAR "investment gap" of at least USD 2.1 billion per year. The headline finding from this study is that reorienting global innovation funding to be more intentionally focused on sustainability is a critical priority. CoSAI has also produced evidence on two other main issues:

- *Innovation priorities:* Mining the gaps: Mapping global agricultural research (small-scale farms); Paying for nature and society (financial instruments); and Urban and peri-urban agriculture (managed by WLE for CoSAI)
- *Innovation approaches*: Pathways for innovation and Approaches and instruments for innovation.

Furthermore, CoSAI established an international taskforce to propose principles and metrics for innovation for sustainable agri-food systems. The taskforce agreed on a pilot set of principles and scoring system, to be piloted in the first half of 2022.

The UN Food Systems Summit (UNFSS). WLE made significant contributions to the preparatory processes of the UNFSS, including the pre-Summit event in July 2021. WLE staff co-coordinated UNFSS Action Track 3 (nature-positive production); co-chaired the Land-Freshwater Nexus Solution Cluster, which promotes integrated land and water resources management in food systems; contributed to Action Track 5 (building resilience to vulnerabilities, shocks and stresses); and co-organized and participated in several UNFSS Global and Independent Summit Dialogues. CoSAI's evidence on the innovation financing gap was presented to the UNFSS finance forum. CoSAI also partnered with the Tropical Agriculture Platform (TAP) to host a side event, "Capacity development for agriculture innovation systems", and contributed to the Summit's cross-cutting "Lever of Change" on innovation and "repurposing policy" cluster. A key WLE focus was on strengthening the understanding of the importance of water governance and resilience for food systems transformations, water for food systems and nutrition, and the importance of considering biodiversity in agriculture. WLE produced other outreach materials as well.

COP26. Bridging UNFSS with COP26 on climate change, in October, WLE organized eight influential webinars, From research to resilience, which promoted promising scientific innovations designed to protect climate-vulnerable ecosystems, communities and livelihoods. In partnership with UK-FCDO, CoSAI hosted two pre-COP26 webinars as part of a five-part webinar series, highlighting the importance of innovation in transforming global food systems. In November, at COP26, WLE co-hosted four sessions at the Water Pavilion, a multimedia platform located in the COP26 Blue Zone intended to optimize virtual interactions between the COP26 venue in Glasgow and different locations around the world. The four sessions were on Water and climate-smart agriculture for adaptation, Integrated land and water solutions for climate change mitigation, Reinforcing climate resilience through integrated climate solutions, and Gender and social

inclusion across the water–food–climate nexus. WLE also participated in other events, including at the Energy Day on the water–energy nexus: A scientific perspective with insights for agriculture.

WLE helped shape the CGIAR 2030 Research and Innovation Agenda. WLE researchers were heavily involved in the design of One CGIAR Initiatives; several built on 10 years of WLE research. Two Initiatives were led by WLE Management Committee members. "NEXUS Gains – Realizing Benefits across Water, Energy, Food and Ecosystems (WEFE)" aims to support the transformation of food, land and water systems through strengthening nexus thinking and integrated management of WEFE systems in key bread-basket basins in South and Central Asia and East and Southern Africa. The Initiative on Agroecology recognizes the urgent need for transformation of food systems to simultaneously achieve ecological, economic and social sustainability. The aim is to promote the scaling of smallholder agroecology in Africa, Asia and Latin America. This is further complemented by the NATURE+ Initiative on nature-positive solutions for shifting agri-food systems to more resilient and sustainable pathways. In addition, WLE Flagship Leaders and researchers have supported the development of other Initiatives in the Systems Transformation and Resilient Agri-Food Systems Areas; summaries of all initiatives can be found online.

WLE held a final virtual Symposium to celebrate the science-driven, practical innovations that the program has generated to address critical climate challenges and advance the transition to more productive, sustainable, equitable and resilient food systems. The event offered a wide range of stakeholders the opportunity for deep reflection on how WLE has brought about impact and had influence in the field, as well as to consider the use of WLE results for future investments, planning and research.

A series of WLE legacy knowledge products were developed synthesizing WLE research of the past 10 years with the aim of influencing future research, planning, policies and investments. 26 summaries and 8 legacy products were published on the online platform Science-driven solutions, with linkages to approximately 100 detailed knowledge sources, including multimedia content.

1.2.2.a Progress by Flagships

FP1. Restoring Degraded Landscapes (RDL)

RDL informed landscape restoration policies (**Outcome 1.1**) by mainstreaming zero deforestation criteria in value chains in Colombia and Peru, as well as by enabling farmers to include agrobiodiversity in managing their landscapes (Nepal). RDL produced evidence on the benefits of restoring soil fertility and biodiversity (**Outcome 1.2**) in Kenya and Tanzania and supported piloting restoration interventions in Kenya, Zimbabwe, Ethiopia (OICR) and other countries (**Outcomes 1.1 and 1.2**). RDL and its partners created information platforms to co-design and implement interventions and test technologies with farmers to rehabilitate soils and manage agricultural landscapes sustainably (El Salvador, African Soils Data Manager, Regreening Africa Dashboard).

RDL expanded its work on soil monitoring methods, e.g., soil-plant spectral technology (**Outcome 1.3**), by promoting its application in various international initiatives (e.g., Soils4Africa, Landscape Restoration Transformative Partnership Platform, Drylands Transform) and new CGIAR initiatives (Excellence in Agronomy).

Finally, RDL facilitated a cross-CGIAR evidence-based reflection on applying integrated landscape management approaches. Current CGIAR landscape work, mapped in an Atlas, constitutes an opportunity to nurture the new field of landscape agronomy to manage landscapes for improved livelihoods.

FP2. Land and Water Solutions for Sustainable Intensification (LWS)

LWS supported scaling of innovative agricultural land and water management (ALWM) investment options (**Outcome 2.1**) in South Asia and Africa, including:

- Scaled ALWM solutions in three countries through private sector collaboration to pilot business models (OICR); and developed a tool to guide the scaling of farmer-led irrigation and applied it in four countries (OICR). This contributed to the World Bank Farmer-Led Irrigation Guide.
- A WLE/ICRISAT watershed restoration model and flood-spreading weirs are being scaled out in Ethiopia (OICR).
- Generated solar irrigation suitability maps in Ghana, Mali and Ethiopia; engaged with the GIZ Scaling Task Force to advocate an adaptive scaling approach for system transformation; and published papers and viewpoints on integrated ALWM investments.
- The World Bank adopted WLE/IFPRI recommendations for including nutrition in irrigation investment planning (OICR).

Progress on achieving improved irrigation scheme management (**Outcome 2.2**) included:

- Provided recommendations for improving water governance, capacity and performance of irrigation in Ethiopia, the Nile Basin, Pakistan, Uzbekistan, Sri Lanka and the MENA countries. This included developing and applying the Systematic Asset Management Software for Irrigation (SAMS) in Sri Lanka and Uzbekistan and related capacity development of managers to support irrigation performance.

FP3. Sustaining Rural-Urban Linkages (RUL)

RUL enhanced the capacities of 15 towns and cities to implement assessments and initiate strategies to improve city regional food systems (CRFS) resilience against climate change-related shocks and disasters (OICR, OICR, OICR) (**Outcome 3.1**). This was largely achieved through webinars with CityFood, African CityFood, Milan Urban Food Policy Pact (MUFPP) Signatory City global, regional (African) and COP26 meetings.

The CRFS Toolkit was updated. Key deliverables were released (MUFPP Monitoring Framework including indicator assessment methodology and CRFS adapted Toolkit and Handbook [also here]). They include tools to assess vulnerability to climate change and pandemics based on COVID-19 lessons. The toolkit was launched in November 2021 and announced at meetings including MUFPP 2021 in Barcelona.

Work on **Outcome 3.2** moved from research to outreach in Sri Lanka (feasibility studies for resource recovery and reuse, food waste reduction video with FAO), and sanitation service reforms in Ghana (Tamale-OICR). In the MENA region, IWMI made multiple presentations on water reuse, including water reuse plans for six sites in Egypt, Jordan and Lebanon, supported by national learning alliances.

Cross-CRP collaboration between WLE and FTA focused on improving refugees' livelihood strategies in East Africa while reducing land degradation by encouraging home gardening, agroforestry and sustainable bioenergy.

FP4. Managing Resource Variability, Risks and Competing Uses for Resilience (VCR)

VCR continued implementing innovative approaches for mitigating climate-related shocks (**Outcome 4.1**):

- Worked with governments and insurance companies to test innovative bundled products (including weather advisories) in India, Bangladesh and Sri Lanka (OICR).
- Built Sri Lankan insurance companies' capacities to utilize satellite technology products.
- Developed a smart farming ICT platform (GeoGoviya) through a public–private partnership in Sri Lanka to support decision making by farmers (some 1.6 million smallholders) and policymakers.
- Transferred water resources and drought monitoring tools developed for Asia to Southern Africa.

For **Outcome 4.2**, WLE:

- Assessed poverty, growth and job creation linkages to sustainable groundwater development and supported new groundwater policies and investments in Laos (OICR).
- Assessed the costs and benefits of solar versus diesel powered irrigation in sub-Saharan Africa and made recommendations on avoiding groundwater depletion.
- Developed recommendations for a global groundwater quality assessment.
- Led development of a water–energy–food–environment nexus framework for the Niger Basin Authority (OICR) and a water investment strategy for South Africa (OICR).

Finally, VCR contributed to multiple global discussions – UNFSS, COP26, World Water Week and the International Wetlands Conference – and collaborated with FISH on integrating fisheries into irrigation and rice-fish systems.

FP5. Enhancing Sustainability Across Agricultural Systems (ESA)

To enhance capacity to design and manage effective landscape level policies and programs (**Outcome 5.1**), ESA:

- Co-developed learning modules on synergies and tradeoffs in food, land and water systems and contributed to curricula on landscape, biodiversity and food system transformations.
- Released CoSAI findings on innovation investment gaps and opportunities.
- Made available a global database on diversified farming effects on biodiversity and yields at local and landscape levels.
- Launched the Innovative Food Systems Solutions platform that supports bundling and scaling people- and nature-positive solutions (OICR).
- Reviewed scaling approaches for business investments in natural resource recovery and reuse.

To identify and incorporate synergies, tradeoffs and uncertainties into food and agricultural programs (**Outcome 5.2**), ESA:

- Co-developed and employed tools for balancing agriculture and natural resources management in the Limpopo River Basin, Ethiopia, Zambia, India and Uganda.
- Employed decision-support tools to leverage the potential of agrobiodiversity in multifunctional food systems (Agrobiodiversity Index [ABDI] applications); through the food and agriculture benchmark, ABDI is now used by 350 food and agricultural companies (OICR).
- Provided recommendations on synergies between people and nature goals to UNFSS, COP26, CBD, new European Union–International Fund for Agricultural Development investments, and One CGIAR.

1.2.2.b Relevance to COVID-19 by flagship

FP1. Restoring Degraded Landscapes (RDL)

Some planned activities were adapted as a result of travel restrictions and social distancing. For example, a plan to pilot a pastoral game was postponed in 2020 and fieldwork was stopped. In 2021, an implementing partner in Ethiopia opted out of the collaboration. The RDL/IFPRI team decided to pilot the work in Kenya. However, strict donor approval processes due to COVID-19 continued to delay the deployment. The team eventually managed to conduct virtual training and implemented the fieldwork during October and early November 2021.

Similarly, RLD/Alliance's training plan on the Diversity Assessment Tool for Agrobiodiversity and Resilience (DATAR), an innovation reported in 2019, was postponed due to the pandemic. Fieldwork to collect soil samples for assessing changes in soil organic carbon because of the implementation of silvopastoral systems in Colombia suffered delays given travel restrictions and social unrest.

FP2. Land and Water Solutions for Sustainable Intensification (LWS)

In general, COVID-19 affected researchers' ability to undertake fieldwork – this delayed many field activities, and several planned policy dialogues and consultations were converted to virtual/hybrid events. A short article on post-COVID-19 rural recovery was published for Down to Earth.

FP3. Sustaining Rural-Urban Linkages (RUL)

As reported last year, COVID-19 opened new research orientations for RUL, especially in the analysis of shocks to urban food systems (originally only focused on climate change, resulting in a new FAO report). Another new study evaluated the response of stakeholders to COVID-19 in the water and sanitation sector in Ghana and made recommendations for further strengthening resilience.

In the project on resource recovery and reuse in refugee and host settlements in Eastern Africa, virtual training for enumerators was implemented for baseline survey work. Digital research was adopted where enumerators used phone calls to collect data using the KoBo Toolbox and a central database of 600 questionnaires for Kenya, Uganda and Ethiopia were managed from Nairobi. For the same project a virtual training of trainers for project partners was adopted due to COVID-19 travel restrictions. This prepared the staff of an NGO based in the region to carry out training events for local refugee and host communities.

COVID-19-related restrictions continued to undermine progress in all projects that depend on fieldwork (surveys, farmer training), in particular in offline areas and locations sensitive to pandemics such as refugee camps. Many projects had to apply for a no-cost extension. Other projects which are based on consultations, e.g., with municipal stakeholders, shifted to virtual meetings.

FP4. Managing Resource Variability, Risks and Competing Uses for Resilience (VCR)

Much of the work in VCR is focused on building resilience and so is relevant to COVID-19. In 2021, only limited funding was allocated to direct research on COVID-19; rather, WLE worked to ensure that research could be continued to the extent possible despite COVID-19 restrictions and challenges. One phone survey was implemented to assess the impacts of COVID-19 on women migrants in Bangladesh, as qualitative and quantitative in-person fieldwork was not possible from mid-2020 through most of 2021. Moreover, some activities had to be postponed from 2020 to 2021 and selected activities had to be cancelled, such as summer schools, or moved online, such as planned workshops. Finally, some activities, like face-to-face research that

had to be moved from 2020 to 2021, could only be implemented in late 2021, as a result of which only early findings can be reported. Only one substantial activity, the gender study in the Gulf of Mottama, was seriously affected by the pandemic as well as the coup in Myanmar; field activities had to be replaced with more conceptual research.

FP5. Enhancing Sustainability Across Agricultural Systems (ESA)

In response to COVID-19, ESA moved in-field capacity building to building a series of online e-learning modules with over 40 contributors from WLE partners, sharing insights and lessons learned, tools and approaches for better anticipating and actively managing synergies and tradeoffs in food, land and water systems. Otherwise, no major adaptation of ESA programs in response to COVID-19 was required.

1.2.3 Variance from Planned Program for this year

*a) Have any promising research areas been significantly **expanded**? If so, for each example, please explain clearly where the demand came from (promising research results, demand from partners etc.). Where has the money for expansion come from?*

- **RDL:** Research on fertilizer recommendations and climate information expanded in Ethiopia to include climate advisory services, supported by GIZ and Accelerating Impacts of CGIAR Climate Change Research for Africa (AICCRA).
- **RUL:** A new International Development Research Centre (IDRC)–funded activity in Quito and Lima, Peru, building on Quito's Food Strategy experiences. Lessons learned from three cities are used in new projects (UNICEF project in Zimbabwe through the EU HealthyFoodAfrica project).
- **VCR:** Additional funding from WLE enabled synthesis of: i) WLE's work on renewable energy; ii) water governance; iii) water-related nature-based solutions; and iv) aquatic ecosystem health.
- **ESA:** The Innovative Food Systems Solutions platform used WLE funds to expand youth engagement, connect investments and support innovation accelerators.
- **ESA:** The research and learning modules on synergies and tradeoffs and landscapes approaches, particularly through Agrolandscapes, was expanded to support the One CGIAR portfolio.

*b) Have any research lines been dropped or significantly **cut back**? (Please note that cutting research lines which do not seem to be delivering is seen by Funders and System Organization as a sign of good management, not of failure.) If so, please give specific examples and brief reasons. If funding was reallocated to other work, where did the money go?*

RUL's City Region Food System (CRFS) action planning in five cities was delayed due to COVID-19. The three-country refugee project in East Africa suffered significant delays due to COVID-19, forcing a need to obtain a no-cost extension.

Outcome 2.1 (LWS) deliverables were delayed due to the departure of a senior research leader to the World Bank. The planned deliverables were allocated to three other researchers with heavy workloads; hence they could not complete the deliverables in a timely manner. Furthermore, a sustainable finance study was cut back to focus on sustainable finance for irrigated cocoa production in Ghana.

Some VCR research was re-oriented slightly to cope with political instabilities in some countries. This led to changes in fieldwork that had to be implemented later in 2021 or converted to phone surveys. Where some fieldwork became totally impracticable (Myanmar), more conceptual pieces of work were developed instead.

*c) Have any Flagships or specific research areas **changed direction**? If so, please describe how, and the reason.*
RUL's Milestone under Outcome 3.1, "Ten towns or cities **created** Urban Food Policies or Strategies" does not align with the intent of the outcome, which is on capacity development **toward** policy change, but not the change itself. Nevertheless, various cities have developed Food Strategies or Food Policy Councils. On the other hand, elections (Quito, Lusaka, Toronto) have affected progress. Moreover, the work of RUL will continue under the One CGIAR Initiative on Resilient Urban Food Systems, which will provide opportunities to support outcomes and impact.

1.3 Cross-cutting dimensions

1.3.1 Gender

*a) List any important CRP **research findings, methods or tools, capacity development, policy changes or outcomes** in the reporting year related to gender issues.*

- To coincide with the UN Decade for Ecosystem Restoration, WLE/FTA/PIM co-produced a special issue of *Ecological Restoration* outlining how a feminist political ecology approach can address persisting inequalities through more socio-ecological, transdisciplinary approaches.
- On request by the *Society for Ecological Restoration*, WLE/FTA/PIM coordinated an opinion article on people-centered rules for sustainable ecosystems, also presented in a webinar.
- Flagship 1 produced guidelines for mainstreaming gender equality and social inclusion in landscape restoration, providing evidence on how restoration impacts gender and other social inequalities.
- Flagship 1/FTA research demonstrated that enhancing capacities of marginalized groups results in greater gains to land restoration interventions.
- Flagship 2 policy outreach initiatives targeting the Government of India and practitioners vis-à-vis watershed programs were discussed at the WLE Securing inclusive land restoration webinar series.
- Flagship 2/IWMI/IFPRI research in Ghana is exploring how to provide women better access to financing for purchase of solar irrigation pumps by using a market segmentation and client assessment scorecard to assess a customer's creditworthiness, targeting products and services to the right farmers in the right way, boosting technology uptake, and promoting gender equality.
- Asset ownership and control over income and production decisions do enhance women's empowerment, but not significantly.
- Flagship 3's Resource Recovery and Reuse (RRR) team and FTA described how natural resource competition and conflict in refugee settlements disproportionately impacts women and children, adding to women's drudgery. This calls for unpacking gender–energy challenges and addressing social equality aspects in 'clean energy' innovations.
- Another Flagship 3 paper examined the gender dimensions of vegetable value chains in three West African cities.
- Flagship 3/RUAF/IWMI published a special issue of *Urban Agriculture Magazine* on gender-transformative approaches to rural–urban food systems, targeting policymakers and practitioners.
- A Flagship 3 report documented the gender roles and hierarchy in informal waste management institutions, practices and outcomes.

- Three WLE projects presented in the CGIAR GENDER Platform and Wageningen University coordinated two sessions at the Cultivating Equality Conference 2021: *What will it take to transform power relations in urban and peri-urban food systems* and *The challenges of interdisciplinary projects*.
- Flagship 4 research highlighted how complex nature-society interrelations shape the socio-ecological dimensions of wetlands.
- Flagship 4 research on gender equality and social inclusion in the index-based flood insurance work in Bihar informed a CGIAR GENDER Platform grant to IWMI.
- Working through local partner organizations, Flagship 4 supported private insurance companies to make flood insurance socially inclusive (OICR).
- Flagship 5 found that a narrow focus on economic returns may lead to unsustainable outcomes in landscape intensification projects, including exclusion of women. Policymakers need to consider the social and human dimensions of sustainability.
- The WLE Gender, Youth and Inclusion (GYI) Leader is a member of the One CGIAR GENDER Platform Steering Committee.

*b) Mention any **important findings** that have influenced the direction of the CRP's/Platform's work, and **how things have changed**.*

- The Gender Youth and Inclusion team designed and implemented an end of program reflection and evaluation, which contributed to the CGIAR GENDER Platform's Alliances-module institutional change initiative, and was selected as a CRP Golden Egg to inform future One CGIAR innovations. Key outcomes have informed an upcoming paper.
- The Gender Youth and Inclusion team's two papers in the CGIAR GENDER synthesis were presented as best examples in a book-launch webinar.
- Flagship 4/IWMI supported research on why young people are leaving agriculture behind, which informed a report on youth in agriculture by the High Level Panel of Experts on Food Security and Nutrition (HLPE).
- The special issue of *Ecological Restoration* on the political ecology of land restoration, led by WLE/FTA/PIM, was translated into an opinion article for policy outreach.
- In Nepal, local FM stations were engaged to collect primary data through radio call-in programs for a migration project: a 4-part radio dialogue series and podcast were developed.
- In an Ethiopian project, a webinar series replaced primary research to map the gender dimensions of land restoration.

*c) Have any **problems arisen in relation to gender** issues or integrating gender into the CRP's /Platform's research?*

- In the Gulf of Mottama project in Myanmar, WLE developed a framework for inclusive restoration to support capacity strengthening of the local consultancy, pointB, to conduct primary research; a methodological workshop was held, but the work could not be completed due to the political situation in Myanmar.

1.3.2 Youth and other aspects of social inclusion/ "Leaving No-one Behind"

a) List any important CRP research findings, methods or tools, capacity development, policy changes or outcomes in the reporting year related to gender issues.

- To address the gap that youth received a lower profile than other cross-cutting issues in WLE in previous years, in 2021, Flagships 3 and 4 have specifically focused on youth as a key component of cross-cutting inequalities.
- Gender Youth and Inclusion's capacity strengthening on gender-transformative approaches included an intersectional focus on inclusion (gender, youth and other cross-cutting socio-political dimensions of inequality), which is reflected in revised WLE 2021 milestones, new projects, and knowledge and capacity strengthening of WLE researchers.
- Primary data on COVID-19, youth migration, gender and rural agrarian transformation in Nepal was generated through a 4-part radio dialogue series on local FM stations, captured in this podcast. Findings were published in the AGRUMIG newsletter.
- Under the same Flagship 4 project, a publication was produced on how COVID-19 has changed the context of global youth migrations.
- WLE research informed a WorldFish output, Reeling in economic opportunities for Africa's youth, published by the Kenya Broadcasting Corporation.
- Flagship 2 supported an analysis of the enabling environment for gender and youth inclusion in irrigated vegetable value chains in Mali and Ghana.

*b) Mention any **important findings** that have influenced the direction of the CRP's/Platform's work, and **how things have changed**.*

- **Flagship 1:** Adopting a social-ecological lens in restoration has required rethinking restoration planning, design and interventions by acknowledging the politics and diverse interests and mandates that shape restoration agendas.
- **Flagship 2:** Tackling core challenges of gender and social exclusions in land and water systems requires tackling often subconscious and deeply held values and norms that shape behavior. For example, through the session *Challenges of Interdisciplinary Projects* in the Cultivating Equality Conference, researchers and academics agreed that researchers' positionality influences methodological choices, research solutions and policy interests as a result.
- **Flagship 3:** Those left furthest behind, i.e. women, youth and children among migrant refugees, are also the most vulnerable to interlinked water, food and energy challenges.
- **Flagship 4:** Food systems challenges, aspirations and opportunities for women and marginalized groups are shaped by intersectional inequalities, poverty, gender, ethnicity and age, as well as by economic, social, political and ecological contexts.
- **Flagship 4:** Climate-related digital innovations can increase gender and social exclusion unless these issues are deliberately addressed. Transdisciplinary digital innovations and approaches can help unpack and address these challenges (see Doing Science with Society project).

*c) Have any **problems arisen in relation to youth** issues or integrating youth into the CRP's/Platform's research?*
N/A

1.3.3 Capacity Development

WLE prioritized capacity development in 2021; examples include:

- Flagship 1 trained 114 people including three masters students and a doctoral student on soil health monitoring.

- Twenty young people and selected farmers from Makueni county, Kenya were trained on subsurface water retention technology for sandy soils.
- Flagship 3 trained 16 trainers (7 female) to conduct community capacity development in home gardening, agroforestry and energy through RRR in Ugandan refugee camps and host communities.
- City teams in five cities received joint training and bi-weekly support under the Climate Resilient City Region Food Systems program.
- Flagship 3 trained 30 participants (10 female) on food and nutrition security in an urbanizing society, including sessions on CRFS and the MUFPP Indicator Framework.
- Flagship 3 enhanced the capacity of 50 Ghanaian local government officials in market-based sanitation initiatives.
- Flagship 3 trained 25 WaterAid staff on the application of RRR in sanitation service delivery in West Africa.
- Five hundred stakeholders in the MENA region were trained on agricultural use of wastewater.
- Following a 2020 Flagship 3 case study, over 600 sanitation officers have been trained in India by the WASH Institute.
- Flagship 4 facilitated a webinar on inclusive weather index insurance to share lessons on inclusion among stakeholders and partners, including insurers, donors and academia.
- Flagship 4 organized a training workshop on climate insurance solutions for industry professionals in Sri Lanka.
- A seven-unit online training course on wetland community management and monitoring was developed within the OpenLearn Create Platform, with translations into Sinhala and Tamil.
- Flagship 5 led a cross-CGIAR series of innovative learning modules on synergies and tradeoffs in food and agricultural systems.
- Flagship 5 contributed to university curricula and educational tools on landscapes, biodiversity and food systems transformations.

1.3.4 Climate Change

In Colombia and Peru, Flagship 1 identified management practices to reduce greenhouse gas emissions in cocoa and oil palm and co-designed and began piloting these in Colombia. In Peru, small-scale oil palm growers were trained on carbon market opportunities and cashew nut producers were supported with climate information to enhance their pest management capacities.

Flagship 2's business models to support scaling out solar-powered irrigation are a major contribution to helping smallholders adapt to climate change (OICR, OICR). The impacts of farmer-led irrigation on water use efficiency, reductions in conflict and improved agronomic and landscape management raise smallholder resilience to climate change impacts.

Flagship 3 developed methodological guidelines that include climate change vulnerability assessments. Risk assessment fact sheets are available for Tamale, Ghana and Colombo, Sri Lanka (also here).

The MENA ReWater project addresses water reuse as a climate change adaptation strategy. Factsheets, training materials, blogs and policy briefs are available on the project website.

Flagship 4 has scaled out a drought monitoring system in Africa and worked with the World Bank to develop drought-risk profiles for 16 Southern African countries. In Sri Lanka, VCR researchers participated with

business leaders in an online event, The business case for climate change adaptation for agribusinesses, and contributed to a South Asian regional webinar, Managing wetlands: Addressing the challenges of water security and climate change.

Flagship 5 led an evidence review that recommended integrating more biodiversity into agriculture to support healthy diets while sequestering substantial CO_2. This led to a call for action to integrate agriculture and biodiversity into climate, nutrition and food security, and has been feeding into the UNFSS, CBD and COP26. Flagship 5 has also integrated three global climate data layers into the Food Systems Dashboard and led development of climate change-focused learning modules on synergies and tradeoffs in food and agricultural systems.

2. Effectiveness and Efficiency

2.1 Management and governance

Izabella Koziell left WLE in March 2021, after more than three years as Program Director. Stefan Uhlenbrook (former FP2 Co-leader) took on the role of Program Director, working together with Claudia Ringler (FP4 Co-leader) as Deputy Program Director. Olufunke Cofie took over the role as the Co-leader of FP2.

As in the previous year, meetings of the Management Committee and Independent Steering Committee were virtual throughout 2021, due to continued COVID-19-related restrictions on travel. A format of more frequent, shorter meetings has remained in place, to ensure active engagement in virtual meetings. The end of the program was marked by a special program of meetings in November. First, those involved in the governance and management of the program shared experiences and lessons learned over the course of two reflection meetings. Lessons and recommendations from these meetings for future research ranged from the programmatic, e.g., adopting a more integrated systems approach, to the structural, e.g., developing structures and incentives to promote cross-Flagship and cross-CRP collaborative work. Second, a legacy symposium event virtually gathered more than 300 stakeholders to highlight the science-driven, practical innovations that WLE has generated to address critical climate challenges and advance the transition to more equitable, productive, sustainable and resilient food systems, with the aim to inform a wide range of stakeholders and influence future research, planning and investments.

The Program Management Unit continued to work remotely, with regular meetings and engagement. A key focus of the Program Management Unit in 2021 has been planning for the successful wrap-up of the program, in terms of data and knowledge management, synthesis, archiving, etc., as well as communication and reporting on the final year of activities.

The participation of women in the management of WLE remained good, with the Independent Steering Committee and Management Committee composed of 60% women.

2.2 Partnerships

2.2.1 Highlights of External Partnerships

WLE Flagships collaborate with many partners, often including combinations of government organizations, universities, development agencies, NGOs and private firms (Table 8). For example, RDL has multiple partners to deliver soil health-promoting practices in Tanzania. LWS is working with private firms to support scaling out ALWM solutions, especially solar-powered irrigation for smallholders, by piloting business models (OICR, OICR); and with governments to ensure policies are conducive to marketing affordable pumps. ESA works

with the World Business Council for Sustainable Development (WBCSD), a global organization of over 200 leading businesses collaborating to accelerate achieving a sustainable world. ESA provides decision support to the One Planet Business for Biodiversity (OP2B) Coalition. CoSAI has engaged with a diverse range of public and private partners to support its advocacy efforts.

To support implementation of site-specific fertilizer recommendations and develop advisory services for small-scale farmers in Ethiopia, RDL has collaborated with the Ministry of Agriculture, Addis Ababa University, Digital Green and GIZ. VCR has collaborated with two universities, City College New York and Arizona State University, and an NGO, Conservation International, to develop a proposal on "Resilience and reliability in water storage systems – Understanding how nature-based, engineered, and human infrastructures interact in southern sub-Saharan Africa".

WLE has also continued its strong partnerships with international organizations, UN agencies and major donors. For example, RUL, co-led by RUAF, has a very strong partnership on city regional food systems with FAO, the MUFPP Secretariat and the Global Alliance for Improved Nutrition (GAIN) MUFPP Secretariat. ESA and CoSAI collaborated with FCDO on an innovation investment gap study. Finally, WLE collaborated with multiple institutions to contribute to the UNFSS through global, national and regional dialogues and to multiple sessions at the Water Pavilion at COP26.

2.2.2 Cross-CGIAR Partnerships

WLE continued its close partnerships with five CRPs: A4NH, CCAFS, FISH, FTA and PIM (Table 9). Development of the site-specific fertilizer recommendation tool in Ethiopia was expanded by coupling it with other components such as best agronomic practices to support the Ethiopian Digital AgroClimate Advisory Platform (EDACaP). This expansion involved collaboration with Excellence in Agronomy, the Ethiopian Institute of Agricultural Research (EIAR), CIMMYT and AICCRA, led by CCAFS/Alliance/CIAT. WLE also collaborated with CCAFS to train young Ethiopian farmers on integrated land and water management.

WLE is collaborating with FTA on a project with refugees in East Africa aimed at improving refugee women's livelihood strategies while reducing land degradation. In Asia, WLE continued collaborating with FISH, including IRRI and WorldFish, on including fish in multifunctional landscapes such as irrigation schemes, and investigating how diets and food production impact water and carbon footprints. WLE worked with PIM on social learning interventions and co-published a paper titled Games for triggering collective change in natural resource management.

WLE, FTA, PIM and SPIA organized a workshop on Measuring impact of integrated systems research. It assessed existing and new methodological developments for monitoring, evaluation and impact assessment, and examined which are most suitable to evaluate complex, integrated systems research.
WLE, IWMI, IITA and IFPRI collaborated on agricultural intensification and small-scale irrigation in Mali.
WLE collaborated with A4NH to improve the Agrobiodiversity Index, along with private and public sector users. This included a global application, ten in-depth country profiles for the Mediterranean area, and advanced private sector use through the World Benchmarking Alliance (WBA), the Agrobiodiversity Accelerator and HowGood (OICR).

2.3 Intellectual Assets

N/A

2.4 Monitoring, Evaluation, Impact Assessment and Learning (MELIA)

In 2021, the unit co-hosted a four-day workshop entitled Measuring impact of integrated systems research with FTA, PIM and SPIA. The workshop took stock of existing and new methodological developments of monitoring, evaluation and impact assessment work, and examined which are most suitable to evaluate and assess complex, integrated systems research.

In our last year, the unit focused on producing a number of synthesis learning reports. The first paper, entitled Impact tracking: A practitioner-developed approach to scaling agricultural innovation in Ethiopia, fulfills a management response to our 2019 Outcome Evaluation. Two other papers document significant WLE research achievements. The first paper, entitled How agricultural research for development organizations achieve developmental outcomes: Learning lessons to inform technology policy, draws on primary research collected as part of WLE's previous evaluations. A second paper, entitled ''Resilience in Agro-ecological Landscapes: Process Principles and Outcome Indicators' validates core principles for landscape resilience and maps WLE projects against these principles. The paper brings together lessons spanning all WLE outcomes related to landscape resilience.

2.5 Efficiency

WLE encourages efficiency and development impact through collaboration with CGIAR Centers and CRPs on specific natural resource management and sustainable agricultural intensification issues. With this aim in mind, WLE furthered collective research and impact partnerships, described in Table 9 and section 2.2.2, such as the partnership with FISH and RICE to understand how integrating water, rice and fisheries management can achieve productivity gains and enhanced resilience for farmers in Southeast Asia; and the joint WLE/FTA initiative which seeks to improve refugee women's livelihood strategies. CoSAI completed a two-year body of research to bring together research on sustainable agricultural intensification solutions from inside and outside CGIAR, for greater efficiency in analyzing and promoting evidence.

The WLE/FTA/PIM/SPIA workshop Measuring impact of integrated systems research was a key example of a jointly organized initiative, bringing the experience of three CRPs to bear on improving impact measurement in future integrated initiatives. WLE also documented lessons learned from research data collection to feed into future One CGIAR data processes coordinated by the BIG DATA Platform.

The unintended efficiency gain of the reduction in travel due to COVID-19 restrictions continued in 2021. WLE held and participated in a variety of research, program and policy events, using virtual meeting tools and methods. These have allowed people to exchange ideas and publicize initiatives without the significant investment and environmental cost of extensive travel.

2.6 Management of Risks

Of 18 risks identified, four were considered to carry moderate residual risk:

Financial. Due to cancellation of travel and fieldwork because of COVID-19, the risks of under-expenditure and inability to deliver planned outputs became more significant during 2021. Uncertainty around W2 income

also brought a risk of overspend. Researchers planned alternative methods of delivery where possible, and expenditures were closely monitored each quarter with a view to adapting as needed.

Infrastructure. To mitigate the risk of perceived job insecurity post-2021, WLE worked with IWMI to develop plans for program staff, which was challenging given the uncertainty of the future structure and funding arrangements. The Program Director left in early 2021; arrangements were made to ensure responsibilities were effectively covered and WLE could continue to thrive.

CoSAI impact. CoSAI took a multifaceted approach to mitigating the risk of insufficient traction to make changes to investments in innovation, including increasing staffing for outreach, and close engagement with global and regional partners. CoSAI leveraged bilateral funding from two donors to support this, including a short extension to further publicize its results and continue advocacy in early 2022.

Gender research. COVID-19 and mobility restrictions were a particular risk to gender research outputs. GYI addressed this by focusing their research on the end of program reflection and evaluation and a special issue of *Ecological Restoration* co-developed with FTA and PIM on gender, inclusivity and restoration. The team also worked with Flagships to monitor output timelines, providing strategic support where needed to ensure timely completion.

2.7 Use of W1-2 Funding

W1/W2 funding was 30% of the 2021 WLE budget, allowing WLE researchers to progress on critical activities illustrated by the examples in Table 12, such as:

Influencing and stimulating dialogue, and engagement in policy process – e.g., bringing insights from all Flagships to policy and research forums such as COP26 and UNFSS. CoSAI established an international taskforce to propose principles and metrics for sustainable agri-food systems and produced evidence reviews and studies to stimulate debate on, and advance the case for, investment in sustainable agriculture. WLE researchers engaged with decision makers in Africa, e.g., the African Ministers' Council on Water on groundwater expansion.

Tailoring knowledge for delivery – translating research into investable processes or products, e.g., publishing guidelines for mainstreaming gender equality and social inclusion into landscape restoration, and the dissemination of tools and technologies to unlock the potential of rain-fed and irrigated agriculture in the Nile Basin.

Capacity Development – e.g., training officials in Uzbekistan and Sri Lanka on the Systematic Asset Management Software for Irrigation (SAMS) for improved irrigation performance, and incorporating lessons on the impacts of COVID-19 into training on the city region food systems process.

Discovery – testing new concepts, e.g., piloting components of the Ethiopian Digital Climate Advisory Platform and fertilizer recommendations with a private sector partner, piloting low carbon practices in cocoa plantations in deforested areas of the Amazon, and researching complex nature–society interrelations that shape the socio-ecological dimensions of wetlands in Myanmar.

3. Financial summary

2021 expenditure reports for all CRPs including WLE will be completed, audited and submitted by CRP Host Centers directly to the CGIAR SMO in April 2022.

Table 13 provides the original 2021 W1/2 budget from the 2021 Plan of Work and Budget. This budget included a 2020 W1/2 expenditure forecast of $9.1 million, which was accurate and reflected final expenditures that year. The 2021 W1/2 budget was $14.1 million, and the expected bilateral funding for 2021 was $31 million.

Part B: TABLES

Table 1: Evidence on Progress towards SLO targets

SLO Target (2022)	New evidence of CGIAR contribution
SLO1: Reduce Poverty	WLE research supports the achievement of a number of CGIAR System Level Outcomes. However no new high-level evidence has been produced in 2021
1.1. ADOPTION: 100 million more farm households have adopted improved varieties, breeds, trees, and/or management practices	
1.2. EXIT POVERTY: 30 million people, of which 50% are women, assisted to exit poverty	
SLO2: Improve Food and Nutrition Security for Health	
2.1. YIELD INCREASE: Improve the rate of yield increase for major food staples from current <1% to 1.2–1.5% per year	
2.2. MINIMUM DIETARY REQUIREMENTS: 30 million more people, of which 50% are women, meeting minimum dietary energy requirements	
2.3. MICRONUTRIENT DEFICIENCIES: 150 million more people, of which 50% are women, without deficiencies in one or more essential micronutrients	
2.4 WOMEN'S NUTRITION: 10% reduction in women of reproductive age who are consuming less than the adequate amount of food groups	
SLO3: Improve Natural Resources and Ecosystem Services	
3.1. WATER AND NUTRIENT EFFICIENCY: 5% increase in water and nutrient efficiency in agroecosystems	
3.2. REDUCED GREENHOUSE GAS EMISSION: Reduction in 'agriculturally'-related greenhouse gas emissions by 5%	
3.3. ECOSYSTEM RESTORED: 55 M ha degraded land area restored	
3.4. PREVENTION OF DEFORESTATION: 2.5 M ha forest saved from deforestation	

Table 2: Condensed list of policy contributions in this reporting year

Title of policy, legal instrument, investment or curriculum to which CGIAR contributed	Description of policy, legal instrument, investment or curriculum to which CGIAR contributed	Level of maturity	Link to sub-IDOs	CGIAR cross-cutting marker score				Link to OICR or evidence
				Gender	Youth	Cap Dev	Climate Change	
Peru's 2030 National Development Plan for the cacao and chocolate value chains (Plan Nacional de Desarrollo de la Cadena de Cacao y Chocolate al 2030) incorporates zero deforestation criteria	Incorporation of zero deforestation criteria into the 2030 National Development Plan for the cacao and chocolate value chains in Peru.	1	Reduced net greenhouse gas emissions from agriculture, forests and other forms of land use (mitigation and adaptation achieved)	0	0	1	2	https://drive.google.com/file/d/1CqStQaiR4Y-zEiqr3WhJsus7WcUVEsWo/view
Inclusion of new partners in agreement of actors in the dairy chain for the non-deforestation of forests and the non-transformation of the *páramo* in Colombia	The WLE/Sustainable Land Use Systems project coordinates the government-led agreement on zero deforestation in the dairy value chain. In 2021 it engaged new partners and contributed to national livestock actor dialogues.	1	Reduced net greenhouse gas emissions from agriculture, forests and other forms of land use (mitigation and adaptation achieved)	0	0	1	2	https://cgiar.sharepoint.com/:b:/s/WLE/EfcyZ-2UFtxKm6lwTwXmKUIBuJhuCxt6eCd3bePxn6L5gQ
Liquid waste service agreement between Tamale Metropolitan Assembly and private sanitation service providers, ensuring safely managed sanitation services for communities living in Tamale, Ghana	WLE/IWMI brokered an agreement to ensure that the firms desludging septic tanks dispose of sludge safely.	2	Increased capacity for innovation with partner development organizations and in poor and vulnerable communities	0	0	2	0	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4594&cycle=Reporting&year=2021
Adoption of National Roadmap to Urban Food Waste Prevention and Reduction in	A research-based strategy to reduce food waste and recycle it adopted by government.	1	Conducive agricultural policy environment	0	0	1	0	http://www.fao.org/srilanka/news/detail-events/en/c/1430231/

Title of policy, legal instrument, investment or curriculum to which CGIAR contributed	Description of policy, legal instrument, investment or curriculum to which CGIAR contributed	Level of maturity	Link to sub-IDOs	CGIAR cross-cutting marker score				Link to OICR or evidence
				Gender	Youth	Cap Dev	Climate Change	
Households, Food Services, Retailers and Wholesalers, Sri Lanka								
WLE/IWMI support for updated groundwater policies and implementation programs in Laos has led to new policies and investments in sustainable groundwater management	WLE/IWMI support for updated groundwater policies and implementation programs in Laos has led to new policies, investments and capacity development in sustainable, integrated groundwater management	2	More productive and equitable management of natural resources	0	0	2	1	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3364&cycle=Reporting&year=2021
Niger Basin Authority Operational Plan	The Niger Basin Authority adopted a framework proposed by WLE to mainstream water–energy–food–environment nexus indicators as part of its Operational Plan.	1	Enhanced capacity to deal with climatic risks and extremes	0	0	0	2	https://uploads.water-energy-food.org/GIZ_Factsheets_Niger_fev2021_EN.pdf
Bundled indexed crop insurance and technology practices piloted in Bangladesh, India and Sri Lanka	Based on successful piloting of bundled risk solutions in Bangladesh, India and Sri Lanka, new indexed crop insurance and technology practices are being scaled out by governments and insurance companies.	2	Enhanced capacity to deal with climatic risks and extremes	0	0	1	1	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=2899&cycle=Reporting&year=2021
Public Policy for Food and Nutritional Sovereignty and Security of Cali updated based on the Food System Profile of	A WLE/Alliance city food system profile is being used as a tool to influence public discourse, educate university students and strengthen	2	Conducive agricultural policy environment	0	0	2	1	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3363&cycle=Reporting&year=2021

Title of policy, legal instrument, investment or curriculum to which CGIAR contributed	Description of policy, legal instrument, investment or curriculum to which CGIAR contributed	Level of maturity	Link to sub-IDOs	CGIAR cross-cutting marker score				Link to OICR or evidence
				Gender	Youth	Cap Dev	Climate Change	
City of Cali	policy in the city of Cali, Colombia.							
Use of City Region Food Systems Toolkit by Tamale City, Ghana	Tamale City in Ghana is making use of climate change vulnerability assessments and applying the City Region Food Systems Toolkit to strengthen food security.	1	Increased capacity for innovation with partner development organizations and in poor and vulnerable communities	1	1	2	2	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4607&cycle=Reporting&year=2021
Guidelines adopted by World Bank to include nutrition in irrigation investments	The guidance highlights the pathways through which irrigation improves nutrition, intervention options, and indicators to measure food security and nutrition outcomes.	2	Agricultural systems diversified and intensified in ways that protect soils and water	1	0	0	0	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4401&cycle=Reporting&year=2021

Table 3: List of Outcome/Impact Case Reports from this reporting year

Title of Outcome/ Impact Case Report (OICR)	Link to full OICR	Maturity level: 1, 2, or 3
Farming based on flood-spreading weirs reduced land degradation and significantly increased diversified crop and fodder production in three agro-pastoral communities in Afar, Ethiopia	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4429&cycle=Reporting&year=2021	2
Improved livelihoods and food security for over 2000 households from rehabilitation of a degraded watershed is leading to scaling out of the model to other watersheds in Ethiopia	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4235&cycle=Reporting&year=2021	2
A liquid waste service agreement between the Tamale Metropolitan Assembly, Ghana, and private sanitation service providers is ensuring safely managed sanitation services for over 950,000 households living in the Tamale Metropolitan Area	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4594&cycle=Reporting&year=2021	2
WLE/IWMI support for updated groundwater policies and implementation programs in Laos has led to new policies and investments for sustainable groundwater management	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3364&cycle=Reporting&year=2021	2
The World Bank is using International Food Policy Research Institute research results to enhance nutrition outcomes of irrigation investments in sub-Saharan Africa	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4401&cycle=Reporting&year=2021	2
A water management investment decision-support tool developed by WLE/CIAT in Honduras was expanded to other Central American countries and is being disseminated to nine new countries	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3946&cycle=Reporting&year=2021	2
WeForest uses, and enables staff to apply, a WLE/ICRAF impact tool for holistic planning in the restoration of forest landscapes – considering synergies, tradeoffs and uncertainties – in Ethiopia	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4466&cycle=Reporting&year=2021	1
Farmer-led irrigation development has been boosted through value chain-based scaling partnerships established in four sub-Saharan African countries	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4604&cycle=Reporting&year=2021	2
Data-driven tools enable solar irrigation companies in three sub-Saharan African countries to target their products and services to the right farmers in the right way, boosting technology uptake and promoting gender equality	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4622&cycle=Reporting&year=2021	2
A growing number of cities worldwide are using the Milan Urban Food Policy Pact Monitoring and City Region Food System Indicator Framework to strengthen their food policy implementation	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4615&cycle=Reporting&year=2021	2
Tamale City in Ghana is making use of climate change vulnerability assessments and applying the City Region Food Systems toolkit to strengthen food security	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4607&cycle=Reporting&year=2021	1

Title of Outcome/ Impact Case Report (OICR)	Link to full OICR	Maturity level: 1, 2, or 3
A WLE/Alliance city food system profile is being used as a tool to influence public discourse, educate university students and strengthen policy in the city of Cali, Colombia	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3363&cycle=Reporting&year=2021	2
Youth and Small and Medium-sized Enterprise (SME) networks use and benefit from the Innovative Food Systems Solutions portal to connect, learn, share and move to action around the world	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4612&cycle=Reporting&year=2021	1
Guided by the Agrobiodiversity Index, nearly half of 350 keystone food and agricultural companies provide evidence that they are contributing towards improving soil health and increasing agrobiodiversity	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4010&cycle=Reporting&year=2021	1
The South Africa government invests in water resources, irrigation and infrastructure improvements and adopts policies for climate change resilience, supported by CGIAR and partners' research	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4613&cycle=Reporting&year=2021	2
Based on the successful piloting of bundled risk solutions in three South Asian countries, new indexed crop insurance and technology practices are being scaled out by governments and insurance companies, benefiting thousands of farmers	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=2899&cycle=Reporting&year=2021	2
The Niger Basin Authority has integrated Nexus Indicators into its operational and investment planning until 2024, covering 350 projects	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4614&cycle=Reporting&year=2021	2

Table 4: Condensed list of innovations by stage for this reporting year

Title of innovation with link to MARLO	Innovation Type	Stage of innovation	Geographic scope
2754 - Makueni County Resource Hub (Flagship 1)	Research and communication methodologies and tools	4	Sub-national (Kenya)
2755 - Regreening Africa Dashboard (Flagship 1)	Research and communication methodologies and tools	3	Regional (West and East Africa)
2756 - Decision dashboards to make evidence more accessible for decision makers through the Landscape Portal (Flagship 1)	Research and communication methodologies and tools	2	National and sub-national (Ethiopia, Kenya, Malawi, Tanzania, Zambia)
2112 - Agri-WorldSources, an open online platform that integrates	Research and communication	4	Regional (Latin America and the Caribbean/Central

Title of innovation with link to MARLO	Innovation Type	Stage of innovation	Geographic scope
hydrological models and environmental data to inform design of water harvesting for agriculture (Flagship 1)	methodologies and tools		America; and Africa)
1509 - Global Soil Data Manager platform maintained and enhanced with data access functionalities (Flagship 1)	Research and communication methodologies and tools	3	Global
2759 - Mbili-Mbili crop configurations, a maize–bean–pigeon pea intercropping system for Eastern Africa (Flagship 1)	Production systems and management practices	1	Regional (East Africa)
2596 – Stochastic impact evaluation tool to plan reforestation projects in Ethiopia (Flagships 1 & 5)	Research and communication methodologies and tools	4	National (Ethiopia)
2749 – Adaptive scaling framework for system transformation in One CGIAR (Flagship 2)	Research and communication methodologies and tools	1	Global
2814 – Data-driven tools for targeting irrigation products and services for Ethiopia, Ghana and Mali (Flagship 2)	Research and communication methodologies and tools	4	Multi-national (Ethiopia, Ghana, Mali)
2763 - Implementers' tool for analyzing the enabling environment to enhance the scaling of irrigation and water management tested in Ethiopia, Ghana, Mali and Nepal (Flagship 2)	Research and communication methodologies and tools	1	Multi-national (Ethiopia, Ghana, Mali, Nepal)
2594 - Flood-spreading weirs to irrigation fields and pastures in Ethiopia (Flagship 2)	Production systems and management practices	4	National (Ethiopia)
2748 – Conceptual framework detailing pathways from irrigation to nutrition (Flagship 2))	Production systems and management practices	4	Global
2746 - A Call Center Model for Fecal Sludge management (FSM) for Ghana (Flagship 3)	Production systems and management practices	1	Sub-national (Tamale, Ghana)
-2164 – The Approach, Process and Methodology document for City Region Food Systems (CRFS) now includes lessons on COVID19, responses to climate change and other actions related to vulnerability (Flagship 3)	Research and communication methodologies and tools	1	Global
2760 - Resource recovery and reuse (RRR) business models described	Research and communication	3	Global

Title of innovation with link to MARLO	Innovation Type	Stage of innovation	Geographic scope
for food waste management and wastewater-based aquaculture (Flagship 3)	methodologies and tools		
2757 - New methodology to assess the potential of solar versus diesel for groundwater irrigation (Flagship 4)	Research and communication methodologies and tools	1	Regional (sub-Saharan Africa)
2752 – Methodology on nexus indicator assessment at basin level (Flagship 4)	Research and communication methodologies and tools	2	Regional (sub-Saharan Africa)
2772 - Smart farming platform "GeoGoviya" launched in Sri Lanka (Flagship 4)	Research and communication methodologies and tools	1	National (Sri Lanka)
2762 - A global database of diversified farming effects on biodiversity and yield (Flagship 5)	Research and communication methodologies and tools	3	Global

Table 5: Summary of status of Planned Outcomes and Milestones

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
F1	F1 Outcome: 1.1: Better informed landscape restoration policies, approaches and interventions	Increased resilience of agro-ecosystems and communities, especially those including smallholders	The Restoring Degraded Lands (RDL) Flagship continues supporting policy processes that facilitate the use of, and obtain benefits from, neglected species in Nepal. Also, RDL proposed gender-sensitive and social inclusion approaches that inform restoration efforts in targeted countries and feed international dialogue. In addition, RDL supported specific	2021 – Building on previous work, stakeholder capacities and information platforms are developed in at least 2 additional countries (Ghana and Senegal), leading to more feasible, gender-responsive and locally-led restoration projects in productive landscapes	Complete	Policy dialogue report published on a multistakeholder platform approach to support feasible, gender-responsive and locally-led restoration in Ghana. (1) Expert System for Soil Nutrient Management developed in El Salvador; includes management recommendations for beans. Tool is being applied by the Agricultural Landscape Restoration Initiative. (2) AGRI web platform developed previously for Central America expanded to Ethiopia, Kenya and Rwanda (with FAO) and Grenada (with Caribbean Development Bank). (3)	(1) Synthesis on application of multi-stakeholder platforms for land restoration and sustainable land management in Tanzania https://hdl.handle.net/10568/116962 (2) Recomendaciones por sitio específico para el manejo de nutrientes para maíz y frijol en la subcuenca Agua Caliente, Ahuachapán – El Salvador https://experience.arcgis.com/experience/6f28779bea37436b8992f23e5bd8c5c3/page/page_0 (3) AGRI World Resources (registration required) https://agri-worldsources.com (4) Fortaleciendo capacidades en cacao libre de

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
			restoration interventions in Colombia, El Salvador, Ethiopia, Kenya, Peru and Tanzania. RDL continues development and expansion of soil and water information platforms and tools that support restoration in productive and non-productive lands, by informing efficient soil fertility management, water management and restoration interventions.			Cocoa and oil palm growers of Peru, participating in the co-design of zero deforestation business models in degrading landscapes, trained on low-emission management practices. (4, 5) Published guide for integrated landscape restoration interventions in Ethiopia. (6) Strong partnership platforms delivered proven soil health-promoting practices in the hands of smallholder farmers in Tanzania. (7, 8) Global Soil Data Manager platform maintained and enhanced with data access functionalities. (9) In Colombia, cocoa farmers of 2 departments trained on low emissions and restoration practices, and co-designed these for their specific conditions. (10) WeForest is using a stochastic impact evaluation tool to plan reforestation projects in Ethiopia. (11) Site-specific fertilizer optimization tool developed for Ethiopia (paper under review). (12)	deforestación https://ikiperu.com/fortaleciendo-capacidades-en-cacao-libre-de-deforestacion (5) Fortaleciendo capacidades en palma aceitera baja en emisiones GEI https://ikiperu.com/fortaleciendo-capacidades-en-palma-aceitera-baja-en-emisiones-gei (6) Developing gender-equitable ecological restoration initiatives: A synthesis of guidance to improve restoration practice https://hdl.handle.net/10568/117868 (7) Public and Private Partnerships improve smallholder farmer fortunes in Babati, Tanzania https://alliancebioversityciat.org/stories/public-and-private-partnerships-improve-smallholder-farmer-fortunes-babati-tanzania (8) Unlocking maize crop productivity through improved management practices in northern Tanzania https://doi.org/10.18697/ajfand.95.17965 (9) Global Soil Data Manager https://www.gsdm.online (10) Co-design of low emission and restoration practices in cocoa growers' farms in Caquetá and Cesar departments https://cgiar.sharepoint.com/:f:/s/WLE/Ep04_Nlw-aRMk2csrm70Gy0BTbvwrk21w2UUZBo-FM7mLw (11) WeForest OICR https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4466&cycle=Reporting&year=2021

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
F1	F1 Outcome: 1.1: Better informed landscape restoration policies, approaches and interventions	Increased resilience of agro-ecosystems and communities, especially those including smallholders		2021 – Guidance and tools for designing, implementing, monitoring and assessing gender-responsive landscape restoration interventions used in 2 additional countries (Burkina Faso and Ethiopia)	Complete	Gender and social inclusion in landscape restoration in Ethiopia completed; ready to inform future gender-responsive restoration interventions. (1) Equity implications in ecosystem restoration projects in Kenya assessed; recommendations to improve perceived equity provided. (2) Generated guidance and evidence on farmers' perceptions, preferences and co-benefits of different land management practices, using the Evaluating Land Management Options tool, for highlands of Ethiopia. (3) Presented findings from a study with FTA on gender, migration and restoration in Burkina Faso to key partners, who were involved in writing an article (submitted for peer-review). (4) Efforts to influence global discourse and practice on gender and restoration culminated in a double special issue (11 papers) guest edited by WLE/FTA/PIM; 2 webinars, a panel, and presentations; and a WLE/FTA/PIM-led paper with 47 influential co-authors in the field of restoration. (5-11) Produced evidence on the links between soils and gender, role of gender in building healthier soils, and influence of gender composition on socially sustainable outcomes. (12-13)	(1) Generating gender-equitable ecological restoration initiatives: A synthesis of guidance to improve restoration practice https://hdl.handle.net/10568/117868 (2) Equity in ecosystem restoration https://hdl.handle.net/10568/114721 (3) Assessment of farmers' perceptions and land management preferences using the participatory tool for evaluating land management options https://hdl.handle.net/10568/114913 (4) Gender in Burkina paper https://cgiar.sharepoint.com/:b:/s/WLE/Ec680_P5T-BPnCBPkNw3DR8BIG5aD2uOdP-HoaIlQdlRJw?e=WxwK3W (5) *Ecological Restoration*, Volume 39, Numbers 1-2. Special issue: Restoration for whom, by whom? http://er.uwpress.org/content/39/1-2.toc (6) Restoration for whom, by whom? A feminist political ecology of restoration https://doi.org/10.3368/er.39.1-2.3 (7) Disciplines, sectors, motivations and power relations in forest landscape restoration https://doi.org/10.3368/er.39.1-2.16 (8) Ramsar Convention and the wise use of wetlands: Rethinking inclusion https://doi.org/10.3368/er.39.01-02.36 (9) Exploring gender equity in ecological

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
							restoration: The case of a market based program in Kenya https://doi.org/10.3368/er.39.1-2.77 (10) Equitable and inclusive landscape restoration planning: Learning from a restoration opportunity assessment in India https://doi.org/10.3368/er.39.1-2.108 (11) Restoration of urban water commons: Navigating social-ecological fault lines and inequities https://doi.org/10.3368/er.39.1-2.120 (12) Ten people-centered rules for socially sustainable ecosystem restoration https://onlinelibrary.wiley.com/doi/pdf/10.1111/rec.13574 (13) Soil health and gender: Why and how to identify the linkages https://doi.org/10.1080/14735903.2021.1906575
F1	F1 Outcome: 1.1: Better informed landscape restoration policies, approaches and interventions	Increased resilience of agro-ecosystems and communities, especially those including smallholders		2021 – Building on previous work, national and sub-national strategies for restoration are improved to deliver food security and livelihoods co-benefits through the better use of local agrobiodiversity in at least 4 additional countries	Complete	Identified, characterized and registered 6 landraces of neglected species preferred by farmers in Nepal. Through registration, farmers and community seed banks can ensure the seed system sustainability and exercise rights to benefit from seed production. (1) Continued testing a water management strategy for drylands in Kenya and Zimbabwe. (2-4)	(1) Six farmer's varieties of neglected and underutilized crop species officially registered in Nepal http://himalayancrops.org/2021/06/01/six-farmers-varieties-of-neglected-and-underutilized-crop-species-officially-registered-in-nepal (2) Reclaiming the lost glory of sandy soils in Kenya https://alliancebioversityciat.org/stories/reclaiming-lost-glory-sandy-soils-kenya

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
							(3) From the field: Climate-smart agriculture in Zimbabwe https://alliancebioversityciat.org/stories/field-climate-smart-agriculture-zimbabwe (4) Towards provision of adequate food in Makueni County https://www.jkuat.ac.ke/towards-provision-of-adequate-food-in-makueni-county
F1	F1 Outcome: 1.2 Policies, strategies, and interventions investing in practices that rehabilitate or protect soil fertility and soil carbon	Reduced net greenhouse gas emissions from agriculture, forests and other forms of land use (Mitigation and adaptation achieved)	The Restoring Degraded Lands (RDL) Flagship informed policies oriented to enhance sustainability of value chains associated with deforestation and degradation (Colombia and Peru); continued advising UNCCD on guidance for integrated landscape management; produced scientific evidence on benefits of restoration on soil organic carbon via modeling and long-term trials; and evaluated lessons learned from restoration interventions in Ethiopia.	2021 – National and sectoral guidelines for the implementation of restoration/sustainable intensification efforts are amended, leading to improved investment options in specific contexts in at least 5 countries	Complete	The high-level working group for the National Plan for Sustainable Development of the Cocoa Value Chain (2020-2030) in Peru approved recommendations based on project findings, to include zero deforestation criteria. (1) Prepared a global report on integrated land use planning and landscape management for land degradation neutrality for the UN Convention to Combat Desertification (UNCCD). (2) Reviewed WLE-supported landscape restoration in Ethiopia using the experience capitalization approach, which provided lessons based on experiences during the restoration processes to inform future efforts. (3) Expanded Colombia's zero deforestation agreement in the dairy value chain, incorporating more public and private members. (4) Generated evidence of restoration practices to improve soil biodiversity and root microbiome and strengthened the case for conservation agriculture based on long-term experiments in Kenya. (5-7) Provided modeling approaches and practices	(1) Incorporación de la cero deforestación en el Plan Nacional de Desarrollo de la Cadena de oh Cacao y Chocolate al 2030 https://cgiar.sharepoint.com/:b:/s/WLE/EW9BSYQtt6pKtNfeNfyE1rEB1Yyc31mv3-N3JNBE66lyKw?e=MjEjyh (2) Integrated land use planning and landscape management for land degradation neutrality (LDN) https://www.unccd.int/sites/default/files/sessions/documents/2022-02/cst2-advance.pdf (3) Applying the experience capitalization process to landscape restoration in Ethiopia https://alliancebioversityciat.org/stories/applying-experience-capitalization-process-landscape-restoration-ethiopia (4) Acuerdo de voluntades de actores de la cadena láctea para la no deforestación de bosques y la no transformación de páramos https://cgiar.sharepoint.com/:b:/s/WLE/EcnTNoUYkQ5MvLNwPB9q-MgBiZgN1VwiPmeNPAlzNu9_BQ?e=8dR4rs (5) Application of residue, inorganic fertilizer and lime affect phosphorus solubilizing

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
						with good potential to reduce soil organic carbon losses. (8)	microorganisms and microbial biomass under different tillage and cropping systems in a Ferralsol 10.1016/j.geoderma.2021.114962 (6) Not all about diversity: What drives the invisible root-microbiome? https://alliancebioversityciat.org/stories/what-drives-root-microbiome (7) Optimizing interaction between crop residues and inorganic N under zero tillage systems in sub-humid region of Kenya https://doi.org/10.1016/j.heliyon.2021.e07908 (8) Simulating soil organic carbon in maize-based systems under improved agronomic management in Western Kenya https://doi.org/10.1016/j.still.2021.105000
F1	F1 Outcome: 1.2 Policies, strategies, and interventions investing in practices that rehabilitate or protect soil fertility and soil carbon	Reduced net greenhouse gas emissions from agriculture, forests and other forms of land use (Mitigation and adaptation achieved)		2021 – Policymakers weigh the tradeoffs of large-scale restoration efforts in Kenya and Ethiopia, leading to better targeting of investments that are gender-inclusive and maximize sustainable win–win efforts	Complete	Undertook a detailed assessment of tradeoffs between integrated management options and microbial functions and delivered it to GIZ in Kenya to guide soil health management strategies. (1) Delivered evidence on benefits, policy implications and socio-economic incentives for enhancing soil carbon. (2) Assessed the carbon sequestration potential of water-smart practices promoted by the long-term restoration project in El Salvador. This demonstrated other co-benefits of water-smart practices that need to be considered when evaluating tradeoffs of restoration. (3) Delivered evidence for negotiating ecosystem service and livelihood tradeoffs in sustainable	(1) Microbes matter: Unravelling trade-offs between integrated management options and microbial functions https://hdl.handle.net/10568/115527 (2) Enhancing soil carbon in East Africa: The biophysical evidence, socio-economic incentives, and policy implications https://pub.epsilon.slu.se/25186/1/nyawira_s_et_al_210903.pdf (3) Estimación del potencial de secuestro de carbono en paisajes agrícolas https://cgiar.sharepoint.com/:b:/s/WLE/EbU6_D0L4ABBiT7NfOVbIC4Bt55qxlPzpENJ9g02xQrUhA?e=l7w3Hi (4) Bringing evidence to bear on negotiating ecosystem service and livelihood trade-offs in

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
						agricultural intensification in Ethiopia, Tanzania and Zambia and discussed these with policymakers. (4) Analyzed agricultural extensification and associated socio-ecological tradeoffs in smallholder farming systems of Zambia. (5) Identified tradeoffs and synergies in the provision of various ecosystem services due to land use changes and compared these to farmers' preferences in Ethiopia. (6)	sustainable agricultural intensification in Tanzania, Ethiopia and Zambia https://hdl.handle.net/10568/91282 (5) Agriculture extensification and associated socio-ecological trade-offs in smallholder farming systems of Zambia https://doi.org/10.1080/14735903.2021.1907108 (6) Impacts of land use and land cover dynamics on ecosystem services in the Yayo coffee forest biosphere reserve, southwestern Ethiopia https://doi.org/10.1016/j.ecoser.2021.101338
F1	F1 Outcome: 1.3 Strengthen approaches to the monitoring and evaluation of land restoration and the assessment of land degradation risks	Increased capacity of partner organizations, as evidenced by rate of investments in agricultural research	The Restoring Degraded Lands (RDL) Flagship works on the application of technologies for monitoring land restoration through the use of soil-plant spectral technology in various international initiatives. RDL also produced global standards for the application of these soil monitoring technologies. In terms of evaluation, RDL developed a decision analysis framework for measuring performance of land restoration initiatives.	2021 – Land degradation and soil health decision dashboards are used at a national level to prioritize interventions aimed at improving land health in at least 2 countries	Complete	Makueni dashboard provides a platform for sharing and interaction with critically needed data and evidence on agroforestry systems and their distribution and spatial estimates of soil and land health in Makueni county, Kenya. (1, 2) Regreening Africa dashboard, managed by ICRAF, aims to reverse land degradation on 1 million hectares across 8 countries in sub-Saharan Africa. (3, 4)	(1) Makueni County Resource Hub https://dashboards.icraf.org/app/makueni_resource_hub (2) How online decision dashboards can make evidence more accessible for decision-makers https://wle.cgiar.org/thrive/2021/01/26/how-online-decision-dashboards-can-make-evidence-more-accessible-decision-makers (3) Regreening Africa decision dashboard https://dashboards.icraf.org/app/ra_dashboard (4) Regreening Africa https://regreeningafrica.org

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
F1	F1 Outcome: 1.3 Strengthen approaches to the monitoring and evaluation of land restoration and the assessment of land degradation risks	Increased capacity of partner organizations, as evidenced by rate of investments in agricultural research		2021 – WLE monitoring, evaluation, learning and impact assessment (MELIA) framework for evaluating long-term outcomes of landscape restoration used and adopted in 9 countries	Complete	Monitoring landscape restoration with government and NGOs in multiple African countries: Senegal, Rwanda, Chad (completed 2019-2020) (1-3) Kenya, Ethiopia, Ghana and other African countries for monitoring land restoration and soil quality in grazing lands (4-7) Capacity development in spectral laboratories establishment in South Africa, Rwanda and India (8-10)	(1) Using the land degradation surveillance framework to assess land health in Rwanda https://regreeningafrica.org/project-updates/using-the-land-degradation-surveillance-framework-to-assess-land-health-in-rwanda/ (2) Land degradation surveillance framework deployed in Senegal https://regreeningafrica.org/project-updates/land-degradation-surveillance-framework-deployed-in-senegal/ (3) Chad: Championing healthy soils and ecosystems through data https://www.worldagroforestry.org/blog/2020/09/17/chad-championing-healthy-soils-and-ecosystems-through-data (4) People, healthy soils and ecosystems in Africa https://www.worldagroforestry.org/blog/2020/11/25/people-healthy-soils-and-ecosystems-africa (5) Predicting economic impact from restoring forests and landscapes: Lessons from Ethiopia https://www.worldagroforestry.org/blog/2021/02/18/predicting-economic-impact-restoring-forests-and-landscapes-lessons-ethiopia (6) Managing soil organic carbon and nitrogen in African grazing land https://www.worldagroforestry.org/blog/2021/09/08/managing-soil-organic-carbon-and-nitrogen-african-grazing-land (7) Systematic monitoring and mapping techniques for land restoration

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
							https://www.worldagroforestry.org/blog/2022/01/28/systematic-monitoring-and-mapping-techniques-land-restoration (8) RwaSIS physical and online infrared spectroscopy training report RWaSIS INFRARED SPECTROSCOPY TRAINING REPORT FEB 2022.docx (9) Online training on infrared spectroscopy Africa Soils Initiative Project H2020 Project 2021 Activities Summary.docx (dropbox.com) (10) Andhra Pradesh soil spectroscopy training Andhra Pradesh Tirupati Training Report 16th - 20th Sept 2019 updated EW.docx
F1	F1 Outcome: 1.3 Strengthen approaches to the monitoring and evaluation of land restoration and the assessment of land degradation risks	Increased capacity of partner organizations, as evidenced by rate of investment in agricultural research		2021 – Soil-plant spectral technology for targeting and monitoring landscape restoration is scaled up by the private sector and governments in 5 countries	Complete	Soil-plant spectral technology for targeting and monitoring land restoration and agricultural intensification supports various initiatives, including Rwanda Soil Information Services, Soils4Africa, Excellence in Agronomy, and landscape-restoration Transformative Partnership Platform projects. (1, 2, 3) Developed spectroscopy software for quality control, calibration and prediction of soil and plant properties from mid-infrared spectra. (4) Developed global standards for soil spectroscopy under the Global Soil Laboratory Network. (5-10)	(1) Soils4Africa Soils4Africa | World Agroforestry | Transforming Lives and Landscapes with Trees (2) Transformative partnership platform (TPP): Generating and leveraging evidence for landscape restoration and resilient livelihoods Transformative Partnership Platform (TPP): Generating and leveraging evidence for landscape restoration and resilient livelihoods | World Agroforestry | Transforming Lives and Landscapes with Trees (3) Excellence in Agronomy for Sustainable Intensification and Climate Change Adaptation Excellence in Agronomy for Sustainable Intensification and Climate Change Adaptation - CGIAR

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
							(4) CIFOR-ICRAF Laboratory Information Management System (LIMS) https://speclim.icraf.org (5) Sample analysis using Bruker Multi-Purpose Analyzer (MPA) Fourier Transform Near-Infrared Spectrometer https://www.worldagroforestry.org/sites/agroforestry/files/SOP%20for%20sample%20analysis%20on%20Bruker%20Multi-Purpose%20Analyzer%20MPA.pdf (6) Sample analysis using Bruker Alpha Fourier Transform Mid-Infrared Spectrometer https://www.worldagroforestry.org/sites/agroforestry/files/SOP%20for%20sample%20analysis%20on%20Bruker%20Alpha%20Spectrometer_0.pdf (7) Elemental determination in soils, plants and manures using Bruker's Portable X-ray Fluorescence Analyzer (Tracer 5i) https://www.worldagroforestry.org/sites/agroforestry/files/SOP%20for%20sample%20analysis%20on%20Bruker%20Portable%20X-ray%20Fluorescence.pdf (8) Samples reception, processing, log-in, shipping, archiving and disposal https://www.worldagroforestry.org/sites/agroforestry/files/SOP%20for%20Sample%20Reception%2C%20Processing%2C%20Log-in%2C%20Shipping%2C%20Archiving%20and%20Disposal.pdf (9) Spectra data analysis using R-Script https://www.worldagroforestry.org/sites/agrof

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
							orestry/files/SOP%20for%20Spectra%20data%20analysis%20using%20R-Script%20.pdf (10) Spectra data analysis using SpecWeb https://www.worldagroforestry.org/sites/agroforestry/files/SOP%20for%20Spectra%20data%20analysis%20using%20SpecWeb.pdf
F1	F1 Outcome: 1.3 Strengthen approaches to the monitoring and evaluation of land restoration and the assessment of land degradation risks	Increased capacity of partner organizations, as evidenced by rate of investments in agricultural research		2020 Extended – WLE monitoring, evaluation, learning and impact assessment (MELIA) framework and methods, which explicitly consider changes in gender equality and social inclusion, piloted in the context of the Promise of the Commons initiative in at least one state in India	Complete	Developed a framework for evaluating long-term outcomes of landscape restoration, currently under active implementation. The framework is being scaled in the context of the Regreening Africa Project, which is being implemented in 8 countries: Ethiopia, Ghana, Kenya, Mali, Niger, Rwanda, Senegal and Somalia. (1)	(1) Stochastic simulation of restoration outcomes for a dry afromontane forest landscape in northern Ethiopia https://doi.org/10.1016/j.forpol.2021.102403
F2	F2 Outcome: 2.1 Policy and practice informed by more effective agricultural land and water management solutions and investment options	Reduced smallholders production risk	The Flagship on Land and Water Solutions (LWS) for Sustainable Intensification has been collaborating with 6 countries in Africa and South Asia to support implementation of innovative agriculture, land and water management (ALWM) solutions through private sector collaboration and piloting business models.	2021 – Successful business models for ALWM are adopted by the private sector and used in investment and/or policies in at least 3 countries	Complete	Documented successfully tested solar irrigation business models and disseminated them widely. Policy recommendations for outscaling farmer-led irrigation were developed. Several alternative financing mechanisms and business models were identified and tested elsewhere, and their utility in Ghana was examined. Recommendations to enhance the sustainable uptake of solar photovoltaic irrigation have been disseminated. (1-4) Boosted farmer-led irrigation through value chain-based partnerships in sub-Saharan African countries. (5)	(1) Solar PV technology for small-scale irrigation in Ghana: Suitability and business models https://cgiar.sharepoint.com/:w:/s/WLE/EclOGk3Q2-xIgZt1czE06gABba7PAzsqVLzntd3vw4Nemw (2) Solar for all: A framework to deliver inclusive and environmentally sustainable solar irrigation for smallholder agriculture https://doi.org/10.1016/j.enpol.2021.112313 (3) Solar for all: Enhancing access to affordable and sustainable solar-powered irrigation https://wle.cgiar.org/thrive/2021/05/06/solar-

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
			This includes facilitation of multistakeholder dialogues including the private sector, informing and influencing policies and scaling out watershed innovations. Various outreach activities with a range of stakeholders have led to uptake by the public and private sector.			Provided data-driven tools to scale solar irrigation in sub-Saharan African countries. (6) Published other recommendations related to this milestone, including on: • Solar irrigation in India (12) • Beneficiaries of farmer-led irrigation (, 8,9) • The enabling environment for scaling (10) • AquaCrop as a decision-support tool for small-scale irrigation systems in Ethiopia (11) • Groundwater-based solar pump sustainability for Africa (12) • Community-led multiple use water systems and their upscaling in South Africa (13-14) • Enabling gender and youth inclusion in value chains. (15-16)	all-enhancing-access-affordable-and-sustainable-solar-powered-irrigation (4) Adaptive scaling to achieve system transformation in One CGIAR https://hdl.handle.net/10568/113924 (5) OICR on value chain partnerships https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4604&cycle=Reporting&year=2021 (6) OICR on data-driven tools https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4622&cycle=Reporting&year=2021 (7) Compendium on solar powered irrigation systems in India https://hdl.handle.net/10568/109736 (8) Who is likely to benefit from public and private sector investments in farmer-led irrigation development? Evidence from Ethiopia https://doi.org/10.1080/00220388.2021.1939866 (9) Who benefits from farmer-led irrigation expansion in Ethiopia? https://www.afdb.org/en/documents/working-paper-341-who-benefits-farmer-led-irrigation-expansion-ethiopia (10) Analyzing the enabling environment to enhance the scaling of irrigation and water management technologies: A tool for implementers

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
							https://hdl.handle.net/10568/111237 (11) Using AquaCrop as a decision-support tool for small-scale irrigation systems https://hdl.handle.net/10568/114938 (12) Sustainable expansion of groundwater-based solar water pumping for smallholder farmers in sub-Saharan Africa https://storage.googleapis.com/e4a-website-assets/Sustainable-expansion-of-groundwater-based-solar-water-pumping-for-smallholder-farmers-in-Sub-Saharan-Africa.pdf (13) Multiple Use water systems lessons learnt documented https://cgiar.sharepoint.com/:b:/s/WLE/EWfJkhp9aXhPrdLHfGWLktgB-zqL1DziLKJmECDNkitm4A?e=z8ZkSB (14) Community-led water services for multiple uses https://cgiar.sharepoint.com/:b:/s/WLE/EXoMJYNsfUNPtqANwbx1tLMBfpcxiTbZ9ftkoTEips0bMw (15) The enabling environment for gender and youth inclusion in the irrigated vegetable value chain in Mali https://cgiar.sharepoint.com/:w:/s/WLE/Eb5Mx-rOastEhpAJHWgH3Q4BTy6pVqiTxWjkZzGQwEVkWA?e=G7u2wG (16) Demand-supply linkage pathway to scaling solar-based irrigation along irrigated vegetable value chains in Upper East Region, Ghana https://cgiar.sharepoint.com/:w:/s/WLE/EbPqz7

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
							B39NJPrZTlJGdKIE8BYD8EaXyqbCw8iXkLcMBWQ
F2	F2 Outcome: 2.1 Policy and practice informed by more effective agricultural land and water management solutions and investment options	Reduced smallholders production risk		2021 – Sustainable and inclusive ALWM solutions for landscape/watershed management are scaled via investments made by national governments and donors in 2 countries	Complete	Published synthesis, journal papers and viewpoints to stimulate discussion on integrating ALWM solutions into investments in Ethiopia, Mali and Tanzania, also taking lessons from India. Based on several years of demonstrations, learning sites and stakeholder engagement around the concept of integrated watershed management that supports sustainable landscape management and is closely linked to livelihoods, including gender equity, the work has resulted in high-impact changes in policy and investments by the Ethiopian government. These were supported by a synthesis and studies on rainwater harvesting, restoring degraded landscapes, and groundwater recharge in India (1-9). Scaled out flood weirs to promote agro-pastoralism in Ethiopia. (10-13) Conducted assessments of improving land management and restoration in Ethiopia. (14-18) Contributed a white paper to the Global Framework on Water Scarcity in Agriculture. (19) Established frameworks for drought-proofing of agriculture and achieving water security in ITC Ltd. project areas. (20) Analyzed willingness to pay for ALWM solutions.	(1) Restoring landscapes from the ground up https://wle.cgiar.org/solutions-and-tools/science-driven-solutions/restoring-landscapes-from-the-ground-up (2) Recommendation on procedures for building smallholders' livelihood resilience against drought in the upper Awash sub-basin of Ethiopia https://doi.org/10.3390/su13179764 (3) Effects of land management practices and land cover types on soil loss and crop productivity in Ethiopia: A review https://doi.org/10.1016/j.iswcr.2021.04.008 (4) Building climate resilience in degraded agricultural landscapes through water management: A case study of Bundelkhand region, Central India https://doi.org/10.1016/j.jhydrol.2020.125592 (5) Impact of rainwater harvesting on hydrological processes in a fragile watershed of South Asia https://doi.org/10.1111/gwat.13099 (6) Impact of land use changes and management practices on groundwater resources in Kolar district, Southern India https://doi.org/10.1016/j.ejrh.2020.100732 (7) Seeking sustainable pathways for fostering agricultural transformation in peninsular India https://doi.org/10.1088/1748-9326/abed7b

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						(21) Analyzed pesticide impacts and risks. (22) Published two papers on approaches to scaling ALWM innovations. (23-24)	(8) Building resilient agricultural system through groundwater management interventions in degraded landscapes of Bundelkhand region, Central India https://doi.org/10.1016/j.ejrh.2021.100929 (9) Impact of best management practices on sustainable crop production and climate resilience in smallholder farming systems of South Asia https://doi.org/10.1016/j.agsy.2021.103276 (10) Facilitating livelihoods diversification through flood-based land restoration in pastoral systems of Afar, Ethiopia https://doi.org/10.1017/S1742170520000058 (11) Water spreading weirs altering flood, nutrient distribution and crop productivity in upstream–downstream settings in dry lowlands of Afar, Ethiopia https://doi.org/10.1017/S1742170519000474 (12) Assessing potential locations for flood-based farming using satellite imagery: A case study of Afar region, Ethiopia https://doi.org/10.1017/S1742170519000516 (13) Link to OICR on flood weirs https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4429&cycle=Reporting&year=2021 (14) A meta-analysis of the effects of land management practices and land uses on soil loss in Ethiopia https://doi.org/10.1016/j.agee.2021.107635 (15) Assessing the impacts of watershed

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
							interventions using ground data and remote sensing: A case study in Ethiopia https://doi.org/10.1007/s13762-021-03192-7 (16) Mapping land suitability for irrigation in the Nile Basin https://cgiar.sharepoint.com/:b:/s/WLE/EcArrJoNTQ1FmTo4Mx8vumEBx2xEWcsaF3ZEwyDbHpSqRw (17) Impact of sustainable land management on vegetation cover using remote sensing in Magera micro-watershed, Omo Gibe Basin, Ethiopia https://doi.org/10.1016/j.jag.2021.102495 (18) Soil and water conservation and sustainable development https://doi.org/10.1007/978-3-319-70061-8_138-1 (19) Can water productivity improvements save us from global water scarcity? http://www.fao.org/3/cb3896en/cb3896en.pdf (20) Drought proofing in agri-catchments and water security assessment in the factory catchments of the ITC https://cgiar.sharepoint.com/:b:/s/WLE/EV2iQEn2h6JOgMsGBWW7MKQBYYNjvCWPJle9MDRsZgNwVg (21) Farmers' willingness to pay for alternative resource management practices in the Bale Eco-Region, Ethiopia: An application of choice experiment https://doi.org/10.1016/j.heliyon.2021.e08159 (22) Pesticides as water pollutants and level of

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
							risks to environment and people: An example from Central Rift Valley of Ethiopia https://doi.org/10.1007/s10668-021-01658-9 (23) Overcoming constraints of scaling: Critical and empirical perspectives on agricultural innovation scaling https://doi.org/10.1371/journal.pone.0251958 (24) Impact tracking: A practitioner-developed approach to scaling agricultural innovation in Ethiopia https://doi.org/10.5337/2021.226
F2	F2 Outcome: 2.2. Improved management of new and revitalized medium to large scale irrigation schemes	Agricultural systems diversified and intensified in ways that protect soils and water	The Flagship on Land and Water Solutions (LWS) for Sustainable Intensification further improved its understanding of the management of water systems for agricultural intensification in medium- to large-scale irrigation schemes. Evidence-based recommendations for scheme level governance and intersectoral cooperation (water–food–energy) were provided to investors, high-level policymakers and practitioners in Pakistan, South Africa, the Nile Basin and the Middle East and North Africa region, as well as globally through the UN Food Systems Summit dialogues on	2021 – WLE recommendations on improving inclusive water governance are incorporated in irrigation modernization projects by donors and national governments in at least 3 countries	Partially complete	Published a background paper on water in the Near East and North Africa for *State of Land and Water 2021*. (1) Convened, with partners, a series of UN Food Systems Summit Independent Global Dialogues on 'Water: The game changer for food systems' to inform a larger number of global actors; and on the importance of intersectoral cooperation (e.g., through the water–energy–food nexus). High-level policymakers participated in all regions. (2-6) Provided research-based recommendations to improve performance of large-scale irrigation in Khyber Pakhtunkhwa, Pakistan. (7-11)	(1) Addressing the water challenges for the agriculture sector in Near East and North Africa (NENA) https://cgiar.sharepoint.com/:b:/s/WLE/EUsc9o3XJA9CvoTK0yVcZJQB5YXU8Kcsw3mYJYUgDt1NaA (2) UNFSS Independent Dialogue in Pakistan: Role of Water-Energy-Food Nexus for achieving food security in a changing climate for Pakistan https://www.iwmi.cgiar.org/events/unfss-independent-dialogue-in-pakistan (3) Managing the water and energy we eat: Advancing Water-Energy-Food (WEF) Nexus approaches to achieve food systems transformation in Southern Africa https://summitdialogues.org/dialogue/7859/ (4) UNFSS Independent Dialogue: Advancing Water-Energy- Food (WEF) Nexus approaches to achieve food systems transformation in Central Asia https://summitdialogues.org/dialogue/8490/ (5) UNFSS Independent Dialogue in Egypt: The role of water security for food systems

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			water.				transformation https://summitdialogues.org/dialogue/10923/ (6) UNFSS Global Dialogue on Water – Water: The game changer for food systems https://wle.cgiar.org/event/unfss-global-dialogue-water (7) Using remote sensing in support of solutions to reduce agricultural water productivity gaps https://cgiar.sharepoint.com/:b:/s/WLE/EbemfHd-i5JDlpjiaFZh3dMB3wqZZOUs1sxHvtVYMcWn2Q?e=rxLXBx (8) Establish a water accounting and water audit system for Khyber Pakhtunkhwa (KP)-RI https://cgiar.sharepoint.com/:b:/s/WLE/ERnX6O2zchdPhLiWRSDJ49EBq0ZLqoC_Rl6FBnk6oSFPag (9) Agriculture water management index of canal command areas in KP https://cgiar.sharepoint.com/:b:/s/WLE/EWLn7H1WO_1IqHb6Q5dS0hQBYaaV61_6yvPryBOn_q2UKQ (10) WUA based solar power drip irrigation https://cgiar.sharepoint.com/:b:/s/WLE/ER3piFQ5KbxLiD0goOw_D14B3GB_sM-_Ej0geViswpZTnA 11) Study of KP irrigation and water laws – Status and options https://cgiar.sharepoint.com/:b:/s/WLE/EQFkidLl7uNEtLpMTgSdhqwBjd5MbFJlWoy-tZB1vpl_hg
F2	F2 Outcome: 2.2. Improved	Increased capacity of partner		2021 – WLE recommendations to improve irrigation	Complete	Demonstrated the potential of remote sensing to evaluate watershed interventions and irrigation. (1)	(1) Mapping irrigated and rainfed agriculture of Ethiopia in 2015-2016 using remote sensing methods

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	management of new and revitalized medium to large scale irrigation schemes	organizations, as evidenced by rate of investments in agricultural research		performance are part of the donor requirement to be implemented by national agencies in large-scale investments in at least 3 countries		Developed guidance on benchmarking irrigation system performance. (2-4) Developed water charge implementation strategy for the central Rift Valley in Ethiopia. (5-7) Implemented a series of outreach events on water for food and nutritional security, covering tools, approaches and technologies to understand and enhance water productivity for food and nutrition security; unlocking the potential of rain-fed agriculture in the Nile Basin; and understanding, valuing water and managing irrigated agriculture in the Nile Basin. (8-10) Developed the Gomal Zam Command Area Development (GZCAD) Management Information Plan for Pakistan and Afghanistan, and assessed sediment load in Goma River Basin. (11-12) Applied the Systematic Asset Management Software for Irrigation (SAMS) in Sri Lanka and Uzbekistan and held related training events to support irrigation performance. (13)	https://drive.google.com/file/d/1K4DAyPp1lDH04f-vWlGBV-GC5J-MJpa2 (2) Guidance for benchmarking irrigation performance in the Nile Basin https://cgiar.sharepoint.com/:b:/s/WLE/EZO5d5LH839MvHYCnRYHMmsBJwBkDRMD9XSlux23sRrr_Q (3) Irrigation development projection in the Nile Basin countries: Scenario based methodology https://nilebasin.org/index.php/information-hub/technical-documents/128-irrigation-development-projection-in-the-nile-basin-countries-scenario-based-methodology (4) Water availability concerns surface as irrigation area in Nile Basin projected to increase significantly by 2050 https://www.iwmi.cgiar.org/2021/10/water-availability-concerns-surface-as-irrigation-area-in-nile-basin-projected-to-increase-significantly-by-2050 (5) Implementation strategy for irrigation water charges in Ethiopia https://cgiar.sharepoint.com/:b:/s/WLE/Ef7gTGF-OmZLtX_Kn8UZyzgB0RICXU0aeYtqA6eJar9KJQ (6) Economic value of water for irrigation in the Nile Basin https://nilebasin.org/information-hub/technical-documents/110-economic-value-of-water-for-irrigation-in-the-nile-basin (7) Finding the economic value of irrigation water in the Nile Basin to enhance water saving https://www.iwmi.cgiar.org/2021/09/finding-

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							the-economic-value-of-irrigation-water-in-the-nile-basin-to-enhance-water-saving (8) Nile Basin Development Forum webinars – Water for food and nutritional security https://www.eventleaf.com/Attendee/Attendee/EventSessionsForTag?eId=BZZf8bIWkaAV%2FZI3jv545w%3D%3D&tgId=3510 (9) Nile Basin Development Forum webinars – Technical documents https://nilebasin.org/information-hub/technical-documents (10) How smarter water management can help strengthen food security for the 500 million people who call the Nile Basin home https://www.iwmi.cgiar.org/2021/11/how-smarter-water-management-can-help-strengthen-food-security-for-the-500-million-people-who-call-the-nile-basin-home (11) Management information plan https://cgiar.sharepoint.com/:b:/s/WLE/EWYHrXFIwtBCv_E1wSuinXgBuE2kB_G3C0ZF_ZtAqYH5nw (12) Soil erosion and sediment load management strategies for sustainable irrigation in arid regions https://doi.org/10.3390/su13063547 (13) SAMS training sessions https://cgiar-my.sharepoint.com/:f:/g/personal/l_mutuwatte_cgiar_org/EuEqA_LE_ahImAgqTSUb2KABvntdmrFGujT6Ze1MulbOHQ

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
F3	F3 Outcome: 3.1. Improved capacity of urban stakeholders to implement evidence-based policies and practices in support of urban food security and resilience	Conducive agricultural policy environment	Capacities of urban stakeholders have been improved in the past 5 years among RUAF cities, cities participating in the program and related projects, and through various events.	2021 – Development of capacities to assess and initiate action, strategies and policies in 15 towns and cities to improve resilience against climate change-related shocks and disasters affecting urban food supply and security	Complete	Enhanced capacities in Ghent, Belgium; Toronto, Canada; and Quito, Ecuador – RUAF partner cities, with Toronto and Quito also participating in City Region Food Systems (CRFS) work. Participated in CRFS projects with FAO in Antananarivo, Madagascar; Cali, Colombia; Colombo, Sri Lanka; Kigali, Rwanda; Kitwe, Zambia; Lusaka, Zambia; Medellin, Colombia; Melbourne, Australia; and Tamale, Ghana. Engaged in various webinars with CityFood, African CityFood, and Milan Urban Food Policy Pact Signatory City global and regional (African) meetings. (1-7)	(1) City Region Food Systems at the MUFPP Africa Forum 2021 https://ruaf.org/news/city-region-food-systems-at-the-mufpp-africa-forum-2021 (2) The 4th MUFPP Regional Forum in Africa https://mufpp-afrique.org/edition-2021 (3) #AfricanCITYFOODmonth 2021: Join us! https://ruaf.org/news/africancityfoodmonth-2021 (4) City region food systems: Building resilience to COVID-19 and other shocks https://doi.org/10.3390/su13031325 (5) Barcelona 2021 7th MUFPP Global Forum https://barcelona-milanpact2021.com (6) Building a climate resilient city region food system in Tamale https://youtu.be/tqRFcSF4ICI (7) Event: Building a climate resilient city region food system through innovative strategies and action planning in Tamale https://ruaf.org/news/event-building-a-climate-resilient-city-region-food-system-through-innovative-strategies-and-action-planning-in-tamale
F3	F3 Outcome: 3.1. Improved capacity of urban stakeholders to implement	Conducive agricultural policy environment		2020 Extended – 10 towns or cities create Urban Food Policies or Strategies with WLE facilitation, leading to improved food security and resilience in urban areas	Partially complete	Delayed substantially due to COVID-19. This milestone has evolved over time. The cities of Ghent, Belgium; Kitwe, Zambia; Lusaka, Zambia; Medellin, Colombia; Melbourne, Australia; Toronto, Canada; and Quito, Ecuador have advanced in creating Urban Food Policies, while Antananarivo, Madagascar; Cali, Colombia; Colombo, Sri Lanka; Kigali, Rwanda; and Tamale,	(1) Water Land and Ecosystems, F3 Rural Urban Linkages, Project 2133: D25995 A set of outreach engagements https://cgiar.sharepoint.com/:b:/s/WLE/EUO2FmLm35xJpN_zHgTDkz0BU20vDSjIeVTjBjDdJqTPhQ (2) OICR Milan Urban Food Policy Pact

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
	evidence-based policies and practices in support of urban food security and resilience					Ghana are in the process. In addition, RUAF supported Nairobi, Kenya and built the capacity of city stakeholders in various events. (1-4)	https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4615&cycle=Reporting&year=2021 (3) OICR Tamale Food System https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4607&cycle=Reporting&year=2021 (4) OICR Cali Food System https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3363&cycle=Reporting&year=2021
F3	F3 Outcome: 3.1. Improved capacity of urban stakeholders to implement evidence-based policies and practices in support of urban food security and resilience	Conducive agricultural policy environment		2020 Extended – Recommendations for gender-sensitive Milan Urban Food Policy Pact (MUFPP) indicators provided to global MUFPP Secretariat to inform its works across all 200 signatory cities	Complete	Included framework indicators, among them those with a gender lens, in a handbook developed with FAO on request by MUFPP. These indicators have also been launched in various meetings, including MUFPP, and are part of a virtual training (course in October and November 2021, with 30 participants). They were discussed at the MUFPP Africa meeting in Ouagadougou and tabled in the MUFPP annual meeting in Barcelona in November 2021. (1) Tested the gender-sensitive indicator framework draft in 3 cities – Antananarivo, Madagascar; Nairobi, Kenya; and Quito, Ecuador – before the results were included as Resource 11 in the MUFPP Monitoring Framework. (2)	(1) New publication: The Milan Urban Food Policy Pact Monitoring Framework Handbook and Resource Pack https://ruaf.org/news/new-publication-the-milan-urban-food-policy-pact-monitoring-framework-handbook-and-resource-pack (2) The Milan Urban Food Policy Pact Monitoring Framework – Resource 11: Gender and the MUFPP monitoring framework https://www.fao.org/3/CB4181EN/Resource11.pdf
F3	F3 Outcome: 3.1. Improved capacity of urban stakeholders to	Conducive agricultural policy environment		2019 Extended – Field tested methodology to assess and increase climate resilience in at least 3 city region food systems	Complete	Updated the Approach, Process and Methodology of the City Region Food System (CRFS) Toolkit. It includes assessment tools for the vulnerability to climate change and pandemic related indicators (based on lessons learned with COVID-19). The toolkit was launched in November 2021, and announced in	(1) City Region Food System Toolkit https://www.fao.org/in-action/food-for-cities-programme/toolkit (2) Risk and vulnerability assessment for resilience building in the Colombo city region food system (CRFS)

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	implement evidence-based policies and practices in support of urban food security and resilience					various meetings (including WLE, MUFPP 2021 in Barcelona). (1-4)	https://www.fao.org/fileadmin/user_upload/faoweb/ffc/docs/Climate%20Resilient%20CRFS%20in-depth%20assessment_IWMI.pdf (3) Assessing food systems risks in times of climate change and COVID-19 https://www.fao.org/3/cb6621en/cb6621en.pdf (4) Perfil del sistema alimentario de Cali, ciudad-región https://hdl.handle.net/10568/114362
F3	F3 Outcome: 3.2 Increased business capacities in nutrient, water and energy recovery from domestic and agro-industrial waste for intensified food crop production	Increased capacity for innovation in partner development organizations and in poor and vulnerable communities	While the food waste studies, stakeholder consultations and training in Sri Lanka could virtually continue under COVID-19 restrictions, the same was not possible in the East African refugee camps where the work remained severely challenged. The last milestone refers to a synthesis report on resource recovery and reuse (RRR) and gender, new FAO water quality guidelines (both in press) and our outreach to donors.	2021 – A national food waste reduction strategy established for Sri Lanka based on 10 Sustaining Rural-Urban Linkages (RUL) Flagship-facilitated case studies by public and private sector partners on improved organic waste management	Complete	Launched food waste reduction strategy (see FAO press release link). The strategy complements work on RRR by showing options for reducing waste creation, referred to as R+RRR: reduce before resource recovery and reuse. (1-4)	(1) FAO supports the Ministry of Environment on a national roadmap to tackle the urban food waste challenge in Sri Lanka http://www.fao.org/srilanka/news/detail-events/en/c/1430231 (2) Sri Lanka's road map on urban food waste prevention and reduction for households, food services, retailers and wholesalers https://cgiar.sharepoint.com/:b:/s/WLE/EVbiln6-p6ZCqGy5eQvGqc4BwuqoKOewnGMsHJ2kbAOfDw (3) Case studies on food waste quantification, characterization, and identification of prevention and reduction options in Colombo, Sri Lanka https://cgiar.sharepoint.com/:b:/s/WLE/EdZkclmHFa1AurU2lNKIUvsBImBLZWImVnHyFpb1VEpBeg (4) Food waste measurement as a tool for prevention and reduction: A case study from a hotel in Colombo, Sri Lanka

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							https://hdl.handle.net/10568/115189
F3	F3 Outcome: 3.2 Increased business capacities in nutrient, water and energy recovery from domestic and agro-industrial waste for intensified food crop production	Increased capacity for innovation in partner development organizations and in poor and vulnerable communities		2021 – Capacity of up to 3,600 women in refugee and host settlements in Eastern Africa developed using training materials suitable for further broadcasting to 100,000 inhabitants for increased food and energy security	Partially complete	There have been severe delays in conducting training in the refugee camps due to COVID-19. The training manual has been drafted and virtual training was performed for, so far, 16 community based trainers by the Danish Refugee Council between August 27 and September 3, 2021 on home gardening and agroforestry from permaculture principles in Uganda and Ethiopia. The same is still due in Kenya. Gender is integrated in all training modules. (1-3)	(1) Home gardening, agroforestry and energy through resource recovery and reuse (RRR) in refugee context in East Africa: A practical training manual (draft to be finalized in 2022 after adaptation in the field) https://cgiar.sharepoint.com/:b:/s/WLE/EdbUjjGwObtMk8GpTHtsJ9cB7_grGxxs7oEpHNidoY_g0Q (2) DRC Uganda training report: Gender-responsive innovations for soil rehabilitation, alternative fuel and agriculture for resilient refugee and host community settlements in East Africa (draft to be finalized in 2022) https://cgiar.sharepoint.com/:b:/s/WLE/EW1CeeCdzXNKrWqQoTE0rkEB8F_zk7BAPUBpCQpdhXyurA (3) How to build resilient landscapes and livelihoods in refugee settings https://forestsnews.cifor.org/73009/how-to-build-resilient-landscapes-and-livelihoods-in-refugee-settings
F3	F3 Outcome: 3.2 Increased business capacities in nutrient, water and energy recovery from domestic and	Increased capacity for innovation in partner development organizations and in poor and vulnerable		2021 – Investment strategies of 5 major donors in RRR have been informed by WLE, and 5 million households benefit from WLE-facilitated national sanitation guidelines	Complete	Over the last 5 years, WLE has tried to get major donors interested in its sanitation and RRR solutions. It has been successful in this regard since 2017, supporting investments by the Bill & Melinda Gates Foundation in Bangladesh, World Bank in Sri Lanka, Asian Development Bank in Nepal, International Development Research Centre and Bill & Melinda Gates Foundation in India, and more recently African Ministers' Council on Water and African Development	(1) Integrated rural urban water management for climate based adaptation in South Asian and African cities https://wle.cgiar.org/project/integrated-rural-urban-water-management-climate-based-adaptation-south-asian-and-african (2) New sanitation and wastewater management benchmark tool highlights opportunities to boost health and economic

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
	agro-industrial waste for intensified food crop production	communities				Bank/UN Environment Programme in Africa, and US Department of Agriculture/European Union in East Africa. (1-5) The Sri Lankan sanitation policy, thanks to WLE/IWMI, is addressing on-site sanitation (septage management) which benefits a population of nearly 20 million people or 5 million households. (6) The City of Tamale, Ghana, adopted new regulations on fecal sludge management, including piloting a call center. (7)	growth in Africa (key chapters by IWMI) https://www.afdb.org/en/news-and-events/press-releases/new-sanitation-and-wastewater-management-benchmark-tool-highlights-opportunities-boost-health-and-economic-growth-africa-40649 (3) The Sanitation and Wastewater Atlas of Africa: A key tool for sustainable wastewater management https://www.unep.org/events/unep-event/sanitation-and-wastewater-atlas-africa-key-tool-sustainable-wastewater-management (4) Sanitation and Wastewater Atlas of Africa https://www.afdb.org/en/documents/sanitation-and-wastewater-atlas-africa (5) Response to increased environmental degradation and promotion of alternative energy sources in refugee hosting districts (RED project) https://worldagroforestry.org/project/response-increased-environmental-degradation-and-promotion-alternative-energy-sources (6) WLE research aids in Sri Lankan national policy development https://wle.cgiar.org/news/wle-research-aids-sri-lankan-national-policy-development (7) OICR on liquid waste management in Tamale https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4594&cycle=Reporting&year=2021

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
F3	F3 Outcome: 3.2 Increased business capacities in nutrient, water and energy recovery from domestic and agro-industrial waste for intensified food crop production	Increased capacity for innovation in partner development organizations and in poor and vulnerable communities		2020 Extended – FAO adopts WLE revised water quality guidelines (starting with Central Asia)	Complete	This milestone is complete. Water quality guidelines have been written and are now with FAO for layout and publication. This document is forthcoming: FAO has not given permission to share the draft.	(1) Water Quality Guidelines document is forthcoming, pending formatting and publication by FAO. https://cgiar.sharepoint.com/:w:/s/WLE/EXOlvZPFBVlOn3i5IGFxNcQBSZ6e5cVvkKGt66z5MFPScA?e=uNeUkG
F3	F3 Outcome: 3.2 Increased business capacities in nutrient, water and energy recovery from domestic and agro-industrial waste for intensified food crop production	Increased capacity for innovation in partner development organizations and in poor and vulnerable communities		2019 Extended – Completion of analysis of gender dynamics in RRR and inclusive business models	Complete	Published report on gender dimensions of solid and liquid waste reuse in Africa and Asia. (1)	(1) Gender dimensions of solid and liquid waste management for reuse in agriculture in Asia and Africa https://doi.org/10.5337/2021.223
F4	F4 Outcome: 4.1 Uptake of solutions to enhance	Enhanced capacity to deal with climatic	WLE has worked with governments (e.g., Afghanistan, India and Sri Lanka), the private sector	2021 – Adoption by governments, multilateral agencies, NGOs and the private	Complete	Continued drought monitoring across South Asia (India, Nepal and Sri Lanka) and extended it to Afghanistan through development of a first-of-its-kind cloud-based system now being utilized	(1) Afghanistan Drought Early Warning Decision Support (AF-DEWS) Tool (demo) http://af-dews.demo.iwmi.org:3000

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
	resilience to extreme water variability at different levels	risks and extremes (Mitigation and adaptation achieved)	(e.g., insurance companies) and others to promote the adoption and uptake of innovations developed through this program of work. This includes transfer of innovations from Asia to Africa.	sector of innovative WLE solutions that enhance climate risk management at multiple scales across South and Southeast Asia, including: i) real-time flood and drought advisory services; ii) bundled weather insurance; and iii) managed aquifer recharge		by that government. (1) Extended this work to Africa, where drought-risk profiles were developed for 16 countries; in Zambia, work was conducted to provide extension services with access to the technologies and decision-making tools previously developed for Asia. (2, 3) Identified an approach to scaling index-based flood insurance. (4) Contributed, with CCAFS and other public and private sector institutions, to the development of bundled solutions of index insurance with climate information and seed technologies, disseminated directly to farmers' phones in India and Sri Lanka. (5,6) In India, extended rainfall products to landslide prediction. (7) In Sri Lanka, built the capacity of insurance companies to utilize satellite technology and worked with the government to develop a participatory smart farming advisory platform, GeoGoviya. (8-9) in 3 South Asian countries, governments and insurance companies are scaling out new indexed crop insurance and technology practices. (10)	(2) South Asian and African countries use data from space to act fast on drought https://wle.cgiar.org/news/south-asian-and-african-countries-use-data-space-act-fast-drought (3) Advancing research on climate change: World Bank grants $60 million to help strengthen the resilience of the agricultural sector in Africa https://www.worldbank.org/en/news/press-release/2020/12/10/advancing-research-on-climate-change-world-bank-grants-60-million-to-help-strengthen-the-resilience-of-the-agricultural-sector-in-africa (4) Scaling up index-based flood insurance (IBFI) for agricultural resilience and flood-proofing livelihoods in developing countries https://www.iwmi.cgiar.org/Publications/IWMI_Research_Reports/PDF/pub180/rr180.pdf (5) Hi-tech support helps Sri Lanka's farmers navigate the climate crisis https://youtu.be/wZUsKzQHDDU (6) Building climate resilience and adaptive capacity in Sri Lanka: The bundled insurance solution https://hdl.handle.net/10568/113763 (7) Satellite rainfall products outperform ground observations for landslide prediction in India https://hess.copernicus.org/articles/25/3267/2021/hess-25-3267-2021.html (8) Climate insurance solutions workshop held for industry professionals in Sri Lanka https://wle.cgiar.org/news/climate-insurance-

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
							solutions-workshop-held-industry-professionals-sri-lanka (9) Smart farming platform 'GeoGoviya' launched in Sri Lanka https://wle.cgiar.org/news/smart-farming-platform-%E2%80%98geogoviya%E2%80%99-launched-sri-lanka-0 (10) OICR on scaling bundled practices https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=2899&cycle=Reporting&year=2021
F4	F4 Outcome: 4.1 Uptake of solutions to enhance resilience to extreme water variability at different levels	Enhanced capacity to deal with climatic risks and extremes (Mitigation and adaptation achieved)		2021 – Strategies for greater inclusion within weather insurance schemes taken up by insurance and reinsurance companies, governments and donor agencies in India and Bangladesh	Complete	Worked with different insurers (i.e., Green Delta Insurance in Bangladesh, HDFC in India and SANASA Insurance in Sri Lanka) on the implementation of weather index insurance projects, helping develop increased awareness and knowledge of equity challenges as part of a longer-term business strategy. Green Delta published a WLE technical brief on challenges and potential solutions to inclusion in weather index insurance on their LinkedIn page and participated in a webinar (1, 2). Both Green Delta Insurance and SANASA Insurance shared their experiences in implementing inclusive index insurance products in a regional dialogue in October 2021. (3) In promoting and upscaling weather insurance products, IWMI has partnered with the Department of Agrarian Development of Sri Lanka and SANASA Insurance. The products were upscaled in 5 districts across the country. (4) A draft paper on willingness to adopt insurance	(1) Challenges and potential solutions to social inclusion in an aggregator model to promote weather index insurance in Bangladesh https://wle.cgiar.org/challenges-and-potential-solutions-social-inclusion-aggregator-model-promote-weather-index-insurance (2) Social dimensions of weather index insurance in reaching marginal stakeholders: Lessons from Asia and Africa. Webinar summary report https://hdl.handle.net/10568/114417 (3) Virtual regional dialogue on options to promote more inclusive weather index insurance: Workshop summary report https://cgiar.sharepoint.com/:b:/s/WLE/EWfE8E36OLxHut49J449NjIB1-S6luF8422vYD2rRlQwNA (4) How a new framework can provide flood insurance guidance to millions of farmers https://www.iwmi.cgiar.org/2021/08/how-a-new-framework-can-provide-flood-insurance-guidance-to-millions-of-farmers

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
						in Sri Lanka is under review by the journal *Climate Risk Management*. (5)	(5) Factors affecting willingness to adopt climate insurance among smallholder farmers in Sri Lanka (draft) https://cgiar.sharepoint.com/:b:/s/WLE/EQB03ikId8tCiSywrxLyWBkBB6bk1NJCxpDYx1UYdS7H-w
F4	F4 Outcome: 4.1 Uptake of solutions to enhance resilience to extreme water variability at different levels	Enhanced capacity to deal with climatic risks and extremes (Mitigation and adaptation achieved)		2020 Extended – Enhanced awareness and increased capacity within government, NGOs and the private sector (in India, Nepal, Bangladesh, Myanmar) to better manage gendered vulnerabilities in marginalized farming communities, associated with climate hazards and unequal access to resources	Partially complete	In Myanmar – the main focus of this research in 2021 – work has been restricted by COVID and a coup. (1) Contributed to the global debate on rethinking inclusion through a paper on wetland governance structures and gender. (2) Published a journal article on the role of social identity in improving water, sanitation and health access in Nepal. (3)	(1) An inclusive approach to wetlands governance: A conceptual framework (produced in late 2020 by the Gulf of Mottama project and not available for the 2020 report) https://cgiar.sharepoint.com/:b:/s/WLE/Ed2hDAioOpFIgdqZgOXcDY8BCTLsgtWloslv7W1VrIA7dw (2) Ramsar Convention and the wise use of wetlands: Rethinking inclusion https://muse.jhu.edu/article/793658 (3) The role of social identity in improving access to water, sanitation and hygiene (WASH) and health services: Evidence from Nepal https://doi.org/10.1111/dpr.12588
F4	F4 Outcome: 4.2. Uptake of solutions and investment options better able to address tradeoffs across competing water-energy-food needs	More productive and equitable management of natural resources	Research tools on more sustainable groundwater and surface management as well as on the water–energy–food nexus are directly used by next users to inform large investment decisions.	2021 – Sustainable surface water and groundwater management practices, informed by WLE research – in some cases in collaboration with other CRPs and including nature-based solutions – are scaled up in at least 3 countries of Asia and 3 countries in sub-Saharan Africa	Complete	A water accounting application, originally piloted with the Nile Equatorial Lakes Strategic Action Program, is being scaled to the Upper Niger to determine the potential for sustainable expansion of small-scale solar irrigation in Mali, as part of the USAID Innovation Lab for Small Scale Irrigation. (1, 2) Produced recommendations on how national governments in sub-Saharan Africa and key solar and agricultural industry stakeholders can maintain groundwater use within sustainable limits when solar water pumps are utilized. (3) Developed key messages to summarize current	(1) Mali – Innovation Lab For Small Scale Irrigation https://ilssi.tamu.edu/countries/mali/ (2) Assessing the potential for sustainable expansion of small-scale solar irrigation in Segou and Sikasso, Mali https://hdl.handle.net/10568/115062 (3) Sustainable expansion of groundwater-based solar water pumping for smallholder farmers in sub-Saharan Africa https://storage.googleapis.com/e4a-website-assets/Sustainable-expansion-of-groundwater-

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
						knowledge and capacity and outline a work plan to develop a global groundwater quality assessment network, including protection and management of groundwater quality, for the World Water Quality Alliance. (4) Collaborated on a document supporting the UN Food Systems Summit, focused on water-resilient food systems for future climates. (5) New research on groundwater governance in Ethiopia suggests that games can change mental models for increased sustainability. The research was widely shared through professional and other conferences and a short video was produced. (6, 7) Groundwater governance work continued to be scaled in India. (8) Supported updated policies for groundwater management in Laos. (9)	based-solar-water-pumping-for-smallholder-farmers-in-Sub-Saharan-Africa.pdf (4) Assessing groundwater quality: A global perspective. Importance, methods and potential data sources https://inweh.unu.edu/assessing-groundwater-quality-a-global-perspective-importance-methods-and-potential-data-sources (5) Water governance for resilient food systems for future climates https://www.globalresiliencepartnership.org/wp-content/uploads/2021/09/resilientfood_statement_final.pdf (6) Breaking new ground with groundwater games in Ethiopia https://ilssi.tamu.edu/2021/03/17/breaking-new-ground-with-groundwater-games-in-ethiopia (7) Games to stimulate groundwater governance: An introduction and example from Ethiopia (WLE-sponsored video) https://ilssi.tamu.edu/2021/12/09/games-to-stimulate-groundwater-governance-an-introduction-and-example-from-ethiopia (8) Games for triggering collective change in natural resource management: A conceptual framework and insights from four cases from India https://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/134238/filename/134450.pdf (9) Laos groundwater OICR

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
							https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3364&cycle=Reporting&year=2021
F4	F4 Outcome: 4.2. Uptake of solutions and investment options better able to address tradeoffs across competing water-energy-food needs	More productive and equitable management of natural resources		2021 – A water sustainability metric developed by WLE, in conjunction with FAO, is applied globally through the SDGs reporting process	Complete	Contributed the inclusion of e-flows and the Global Environmental Flow Information System (GEFIS) model for global reporting of e-flows as part of the SDG indicator 6.4.2 on water stress. The GEFIS data is being circulated to all countries by FAO as part of their data collection process, most recently in late 2021. (1-2)	(1) Progress on the level of water stress: Global status and acceleration needs for SDG indicator 6.4.2, 2021 https://www.fao.org/documents/card/en/c/cb6241en (2) Towards a global river health assessment framework https://cgiar.sharepoint.com/:b:/s/WLE/EbDg4oV1vpVEouNiVu6PT_4BN3SYtU5oLpV-UrpsklOoUg
F4	F4 Outcome: 4.2. Uptake of solutions and investment options better able to address tradeoffs across competing water-energy-food needs	More productive and equitable management of natural resources		2021 – Insights on increased sustainability, cost savings and equity from water–energy–food nexus analyses in Africa and Asia incorporated into new investment programs in at least 3 countries	Complete	Published a paper on the methodology of developing a water–energy–food–environment nexus indicator systems for the Niger Basin Authority, encompassing 9 countries in West Africa. (1) The Niger Basin Authority Ministerial Council validated the nexus indicator approach. (2) Held further dialogues on strengthening nexus approaches in the Southern African Development Community, at the UN Development Programme and in World Bank agricultural programs. (3, 4) Implemented a cost comparison analysis for groundwater-fed irrigation with either solar or diesel across sub-Saharan Africa and in greater detail in Ethiopia. A blog was published on *Africa*	(1) A semi-qualitative approach to the operationalization of the Food–Environment–Energy–Water (FE2W) Nexus concept for infrastructure planning: A case study of the Niger Basin https://doi.org/10.1080/02508060.2021.1956231 (2) The Nexus Regional Dialogue in the Niger Basin (Phase II): Achieving water, energy and food security by preserving the environment https://uploads.water-energy-food.org/GIZ_Factsheets_Niger_fev2021_EN.pdf (3) New project brief: Water and nutrient management solutions for smallholder farmers: Lessons from Ramotswa https://gripp.iwmi.org/2021/09/13/new-project-brief-water-and-nutrient-management-

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
						Energy Portal. (5, 6, 7) An event co-organized by WLE/IFPRI/IWMI with the African Ministers' Council on Water discussed job creation, poverty reduction and agricultural growth from groundwater development in Namibia and Uganda. Governments in both Senegal and Uganda have asked for additional analysis to strengthen sustainable groundwater development. (8) Contributed to a major policy reform for irrigation and water investments in South Africa. (9)	solutions-for-smallholder-farmers-lessons-from-ramotswa (4) The water-energy-food nexus: Scalable solutions https://www.slideshare.net/ifpri/the-waterenergyfood-nexus-scalable-solutions (5) Solar or diesel: A comparison of costs for groundwater-fed irrigation in sub-Saharan Africa under two energy solutions https://doi.org/10.1029/2020EF001611 (6) Productive uses of energy in Ethiopia's agriculture (World Water Week session) https://www.worldwaterweek.org/event/9846-productive-uses-of-energy-in-ethiopias-agriculture (7) Solar or diesel? Unlocking groundwater's potential in sub-Saharan Africa https://africa-energy-portal.org/blogs/solar-or-diesel-unlocking-groundwaters-potential-sub-saharan-africa (8) Transforming food systems from the ground up: The potential of groundwater in achieving food security and prosperity in Africa https://sc-fss2021.org/wp-content/uploads/2021/07/029_GroundWater_0607_1300_HL.pdf (9) OICR on South African water reform https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=4613&cycle=Reporting&year=2021

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
F5	5.1 Policymakers have improved access to evidence, tools and expert advice to design and manage agriculture and natural resource interventions sustainably	Increased capacity for innovation in partner development organizations and in poor and vulnerable communities	Decision makers in at least 10 countries and from at least 7 global and regional organizations have been equipped with WLE decision-support tools, business models and investment strategies that help identify and support tailored sustainable agricultural and natural resource interventions. The organizations include the International Union for Conservation of Nature (IUCN), African Green Revolution Forum (AGRF), Global Forum for Rural Advisory Services (GFRAS), Tropical Agriculture Platform (TAP), Asia-Pacific Association of Agricultural Research Institutions (APAARI), Regional Fund for Agriculture Technology (FONTAGRO) and Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA).	2021 – At least 5 global investors, including One CGIAR, indicate influence of decision making through Commission on Sustainable Agriculture Intensification (CoSAI) reports, principles and metrics related to global funding of agricultural innovation	Complete	Published major CoSAI reports and policy briefs. (1-3) Achieved communication and outreach through AGRF, IUCN, regional organizations (FONTAGRO, APAARI, Forum for Agricultural Research in Africa), TAP, FAO, Global Forum on Agricultural Research and Innovation, UN Food Systems Summit, UN Climate Change Conference of Parties (COP26), opinion pieces, various social media channels, and partnership activities such as a page on the Innovative Food Systems Solutions portal. (4-6)	(1) Emerging evidence from CoSAI's studies and activities https://wle.cgiar.org/cosai/evidence (2) Innovation investment study https://wle.cgiar.org/cosai/innovation-investment-study (3) Investment gap study https://wle.cgiar.org/cosai/investment-gap (4) Understanding investment gaps in innovation https://ifssportal.nutritionconnect.org/Investmentlandscape (5) Policies for agroecology: An online event from the TPP on agroecology https://glfx.globallandscapesforum.org/events/62489 (6) Agroecologically-conducive policies: A review of recent advances and remaining challenges https://d1c2gz5q23tkk0.cloudfront.net/assets/uploads/3134042/asset/Agroecology_TPP_-_Agroecologically-conducive_policies_paper_DRAFT_13-07-2021_DEF_%281%29.pdf
				2020 Extended to 2021 – CoSAI launched with strong Southern engagement, and dialogues conducted during at least 2 high-level events	Complete	All evidence for this extended 2020 milestone has been reported under the 2021 milestone: "At least 5 global investors, including One CGIAR, indicate influence of decision making through Commission report, principles and metrics related to global funding of agricultural innovation."	

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
F5	Outcome: 5.1 Policymakers have improved access to evidence, tools and expert advice to design and manage agriculture and natural resource interventions sustainably	Increased capacity for innovation in partner development organizations and in poor and vulnerable communities		2021 – Decision makers in at least 5 countries (total) are equipped to use WLE landscape decision-support tools that analyze tradeoffs and identify sustainable agricultural or natural resource management (NRM) interventions	Complete	Enhanced the Agrobiodiversity Index with a global application and interactive Diversity Lighthouse portal. (1-2) Expanded the Food Systems Dashboard with environmental dimensions and country engagements in Ethiopia and Senegal. (3, 4) Launched innovative e-learning modules on synergies and tradeoffs in food, land and water systems. (5) Published a review of the use of integrated landscapes approaches. (6) Launched the Innovative Food Systems Solutions portal, with new partnerships and testimonials. (7) Created the Sustainable Foods Global Database and portal. (8) Conducted an agriculture and biodiversity evidence review. (9)	(1) Agrobiodiversity Index scores show agrobiodiversity is underutilized in national food systems https://doi.org/10.1038/s43016-021-00344-3 (2) Diversity Lighthouse https://diversitytst.alliance.cgiar.org (3) Food Systems Dashboard https://foodsystemsdashboard.org (4) Food Systems Dashboard country engagement reports https://www.dropbox.com/sh/5nkf1givg9w46dw/AAAUyljCAL_XxRNboy3ECfxja (5) Interactive learning modules: Synergies and tradeoffs in food, land and water systems https://agrolandscapes.org/tosa-page/home (6) Managing Agro Landscapes for greater impact https://agrolandscapes.org (7) Innovative Food Systems Solutions portal https://ifssportal.nutritionconnect.org (8) A global database of diversified farming effects on biodiversity and yield https://doi.org/10.1038/s41597-021-01000-y (9) Biodiversity and agriculture: Rapid evidence review https://www.iwmi.cgiar.org/Publications/wle/corporate/biodiversity_and_agriculture_rapid_evidence_review.pdf

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
F5	Outcome: 5.1 Policymakers have improved access to evidence, tools and expert advice to design and manage agriculture and natural resource interventions sustainably	Increased capacity for innovation in partner development organizations and in poor and vulnerable communities		2021 – A compilation of business options is published for decision makers in NRM to guide investments toward considerations of environmental sustainability, gender and youth inclusiveness	Complete	Generated guidelines based on a review of business models and scaling approaches for business investments in resource recovery and reuse in Africa and Asia. (1)	(1) A guide to scaling resource recovery & reuse (RRR) business innovations in Africa and Asia https://hdl.handle.net/10568/116184
F5	Outcome 5.2: Natural and agricultural resource interventions are more cost-effective by minimizing negative tradeoffs that degrade landscapes	Increased capacity for innovations in partner research organizations Enhanced individual capacity in partner research organizations through training and exchange	The Flagship on Enhancing Sustainability Across Agricultural Systems (ESA) completed case studies on use of ESA tools in 10 agricultural and natural resource management programs, supporting tradeoff and risk–return analysis.	2021 – The use of WLE decision-support tools in at least 5 agricultural or natural resource management programs supports tradeoff and risk–return analysis and contributes to the identification and implementation of sustainable and inclusive landscape management options	Complete	Some case studies were published and reported in 2020. The following were published in 2021: • Uganda case study on unsustainable intensification with European Union STEP-UP program (1) • Ethiopia case study with WeForest program (2) • Limpopo case study with USAID program in Botswana, Mozambique, South Africa and Zimbabwe (3) • Lessons learned from application of indicators of resilience in social-ecological production landscapes and seascapes (4) • Application of varietal threat index in India. (5) Case studies were also compiled in e-learning modules. (6)	(1) Predictable patterns of unsustainable intensification https://doi.org/10.1080/14735903.2021.1940731 (2) Stochastic simulation of restoration outcomes for a dry afromontane forest landscape in northern Ethiopia https://doi.org/10.1016/j.forpol.2021.102403 (3) E-flows in support of the sustainable intensification of agriculture in the Letaba River Basin (draft) https://www.dropbox.com/s/v22jz2b9hmk195w/Letaba%20Report_December%202021.docx (4) For West African farmers, reservoirs hold much more than just water https://wle.cgiar.org/thrive/2019/11/04/west-african-farmers-reservoirs-hold-much-more-just-water

FP	2021 Outcome	Sub-IDO	Summary narrative on progress against each FP outcome this year	2021 Milestone	2021 milestone status	Evidence for completed milestones	Links to evidence
							(5) Varietal threat index for monitoring crop diversity on farms in five agro-ecological regions in India https://doi.org/10.3390/d13110514 (6) Learning module 3: Concrete examples (in Interactive learning modules: Synergies and tradeoffs in food, land and water systems) https://agrolandscapes.org/tosa-page/learning-module-3-concrete-examples

Table 6: Numbers of peer-reviewed publications from current reporting period

	Number	Percent
Peer-Reviewed publications	136	100%
Open Access	114	84%
ISI	130	96%

Table 7: Direct participants in CGIAR training/knowledge sharing activities

Number of trainees	Female	Male
In short-term programs facilitated by CRP	2,131	3,941
In long-term programs facilitated by CRP	165	681
PhDs	0	0

Table 8: Key external partnerships

Lead FP	Brief description of partnership aims	List of key partners in partnership	Main area of partnership
1	Delivery of soil health-promoting practices in Tanzania	Minjingu Fertilizer Company Ministry of Agriculture, Tanzania Meru Seed Co.	Research and delivery
1	Co-implementing integrated land and water management (including feed/forage) in Ethiopia with the Africa RISING (Africa Research in Sustainable Intensification for Next Generation) program	Africa RISING (Africa Research in Sustainable Intensification for Next Generation) USAID	Research
1	Co-implementing site-specific fertilizer recommendations and developing advisory services for small-scale farmers in Ethiopia	GIZ Ethiopian Institute of Agricultural Research Digital Green Addis Ababa University, Ethiopia	Research
1	Co-developing sustainable land management options and developing a soil resources map using legacy data	Ministry of Agriculture, Ethiopia	Delivery and extension
1	Researching and scaling climate-smart agricultural practices in WLE's learning watersheds in Ethiopia	Inter Aide	Research and delivery
1	Implementing soil restoration/soil conservation practices and zero deforestation commitments in cocoa systems of farmer organizations in the Peruvian Amazon	KAOKA Foundation Conservation International Foundation – Colombia Program	Research and capacity development
2	Scaling solar-powered irrigation in Ghana via market segmentation and mapping pump suitability	Pumptech Ghana Ltd.	Delivery
2	Scaling solar-powered irrigation in Mali and using data-driven tools to link supply and demand for solar-powered irrigation pumps, equipment and services in Ethiopia	EMICOM (Malian Engineering, Construction and Maintenance Company) EcoTech, Mali World Vegetable Centre, Mali Rensys, Ethiopia	Research and delivery

Lead FP	Brief description of partnership aims	List of key partners in partnership	Main area of partnership
2	Researching landscapes, agricultural land and water management intensification and ecosystem impacts and solar suitability mapping	Ministry of Agriculture, Ethiopia GIZ	Research
2	Co-organizing regional dialogue on the climate change, migration and social transformation nexus	International Organization for Migration UN Educational, Scientific and Cultural Organization	Research and capacity development
2	With partners, actively participating in UN Food Systems Summit Action Track 3, Land-Freshwater Nexus Solution Cluster, Action Track 5, Global and Independent Summit Dialogues, and the Finance Forum	UN Water Food and Agricultural Organization of the United Nations, including the Tropical Agriculture Platform IFAD – International Fund for Agricultural Development WFP - World Food Program AGRA - Alliance for a Green Revolution in Africa FCDO – Foreign Commonwealth and Development Office of the United Kingdom	Policy
3	Working for increased urban resilience through strengthened city region food systems	Food and Agriculture Organization of the United Nations	Policy and capacity development
3	Strengthening the Milan Urban Food Policy Pact indicator framework for investments in over 200 cities	Milan Urban Food Policy Pact Secretariat	Delivery and capacity development
3	Developing website Food Action Cities (https://foodactioncities.org)	Global Alliance for Improved Nutrition Milan Urban Food Policy Pact Secretariat	Development of a website for cities with lessons on food policy work
3	Conducting training and outreach based on WLE research	WASH Institute, India	Capacity development
3	Conducting national food flow survey and analysis in Sri Lanka	University of Peradeniya, Sri Lanka	Research
3	Turning research on food waste into a national strategy in Sri Lanka (road map)	Food and Agriculture Organization of the United Nations	Policy
3	Collaborating across CGIAR Centers to develop the One CGIAR Initiative Design Team on Resilient Urban Food Systems	World Vegetable Center RUAF Foundation Food and Agriculture Organization of the United Nations Milan Urban Food Policy Pact Secretariat	Research

Lead FP	Brief description of partnership aims	List of key partners in partnership	Main area of partnership
4	Researching resilience and reliability in water storage systems – understanding how nature-based, engineered and human infrastructures interact in southern sub-Saharan Africa, with the aim of developing a National Science Foundation proposal	City College New York, USA Arizona State University, USA Conservation International	Research
4	Joining the UN Food Systems Summit Alliance on Climate Resilient Development Pathways	World Food Program	Research
4	Developing a new Agroecology Initiative with the One CGIAR Agroecology Initiative Design Team	BioVision Incorporated GIZ FCDO - Foreign, Commonwealth and Development Office CIRAD - Centre de coopération internationale en recherche agronomique pour le développement	Research
4	Developing a new Resilient Aquatic Food Systems Initiative with the One CGIAR Resilient Aquatic Food Systems Initiative Design Team	Australian Centre for International Agricultural Research	Research
5	Co-developing innovative learning modules on synergies and tradeoffs in food and agricultural systems	Wageningen University, Netherlands The Landscape Academy	Capacity development
5	Co-developing innovative food systems solutions platform and related services	Global Alliance for Improved Nutrition	Delivery, capacity development and partnership building for sustainability
5	Using and advancing decision analysis in program development, management and capacity building	WeForest	Delivery
5	Using and advancing decision support for the One Planet Business for Biodiversity coalition and other People & Nature programs	World Business Council for Sustainable Development	Policy (private sector policy)
5	Hosting of secretariat for Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services assessment	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services University of Montpellier, France	Research

Lead FP	Brief description of partnership aims	List of key partners in partnership	Main area of partnership
5	Establishing regional and global platforms to utilize and own the CoSAI evidence portfolio	Global Forum on Agricultural Research and Innovation Tropical Agriculture Forum of the Food and Agriculture Organization of the United Nations Asia-Pacific Association of Agricultural Research Institutions Regional Fund for Agriculture Technology (FONTAGRO) Forum for Agricultural Research in Africa	Delivery, policy, capacity development and resource mobilization

Table 9: Internal Cross-CGIAR Collaborations

Brief description of the collaboration	Name(s) of collaborating CRP(s), Platform(s) or Center(s)
The development of the site-specific fertilizer recommendation tool started in previous years with WLE and GIZ's support. In 2021, it was expanded by coupling this with other components such as best agronomic practices and wheat rust surveillance (using application programming interfaces), which together will support the Ethiopian Digital AgroClimate Advisory Platform (EDACaP). This expansion has been through a collaboration with Excellence in Agronomy (Incubation Phase), Ethiopian Institute of Agricultural Research, CIMMYT, and more recently with the project Accelerating Impacts of CGIAR Climate Change Research for Africa (CCAFS).	CCAFS CIMMYT IITA
Training young Ethiopian farmers on integrated land and water management, as an opportunity to engage youth effectively on farming, was conducted in collaboration with CCAFS.	CCAFS
The new One CGIAR Initiative Design Team on Resilient Urban Food Systems, which will continue any unfinished work of Flagship 3 and build on the Flagship for its own work, includes several CGIAR Centers and other partners (e.g., CIP, IWMI, ILRI, IFPRI, IITA, World Vegetable Center, RUAF).	ILRI IITA CIP
WLE continued to work closely with FISH on fish in multifunctional landscapes, including on two policy briefs and two sessions at World Water Week. In Myanmar they continued the WLE funded joint project (with WorldFish and IRRI) investigating how diets and food production impact water and carbon footprints.	FISH IRRI WorldFish
WLE continued to work with PIM on research focused on social learning interventions and co-published a discussion paper titled Games for triggering collective change in natural resource management.	PIM
WLE and IITA co-developed a cross-CGIAR and partners series of innovative learning modules on synergies and tradeoffs in food and agricultural systems.	IITA

Brief description of the collaboration	Name(s) of collaborating CRP(s), Platform(s) or Center(s)
Together with A4NH, WLE progressed on advances and use of the Agrobiodiversity Index with private and public sector users, including a global application, 10-country report for the Mediterranean area, and advanced private sector use by the World Benchmarking Alliance, HowGood and Olam (OICR)	A4NH
WLE contributed to One CGIAR Initiatives with work packages on decision support for synergies and tradeoffs (NEXUS Gains, 'SHIFT' - Sustainable Healthy Diets), systems metrics (Foresight, Digital inclusion), landscape approaches (NEXUS Gains, Agroecology, regional initiatives in Latin America and the Caribbean, Eastern and Southern Africa and Western and Central Africa), and focus on agrobiodiversity (Nature-Positive Solutions Initiative, Agroecology)	IRRI ILRI

Table 10: Monitoring, Evaluation, Learning and Impact Assessment (MELIA)

Studies/ learning exercises planned for this year	Status	Type of study or activity	Description of activity / study	Links to MELIA publications
Landscape impact assessment methods workshop	Complete	Other MELIA activity	Measuring the impact of integrated systems research has been a challenge for CGIAR since it expanded into natural resources management research in the early 1990s. Demand for evidence of impact on development outcomes has only increased, as have calls for greater methodological rigor in impact assessment. At the same time, there is greater recognition of the complex, systemic nature of many problems facing society today. The emerging field of "sustainability science" raises new questions about the way that we think about and implement impact evaluations. To provide pragmatic guidance to One CGIAR and others on how to address these issues, WLE and its partners held the workshop Measuring the Impact of Integrated Systems Research in September 2021. Participants took stock of past experiences and reviewed existing and new tools and approaches with the potential to overcome conceptual and empirical challenges.	https://wle.cgiar.org/event/measuring-impact-integrated-systems-research
Landscape restoration tools compendium, with FTA and PIM	Complete	Synthesis (secondary) study	This compendium on land restoration tools summarizes the main tools developed over the last decade. Although not a complete list, it gives a glimpse of the holistic approach WLE and FTA applied in their research and the landscape approach used.	https://cgspace.cgiar.org/handle/10568/117975
Outcome evaluation workshop	Cancelled	Other MELIA activity	This workshop was cancelled due to COVID-19-related travel restrictions.	
Outcome synthesis review	Complete	Synthesis (secondary) study	How agricultural research for development achieves developmental outcomes: Learning lessons to inform technology policy.	https://doi.org/10.5337/2022.201nk
Evaluation synthesis review	Complete	Synthesis (secondary)	The evaluation review synthesis focused on how programmatic research has achieved	https://www.iwmi.cgiar.or

Studies/ learning exercises planned for this year	Status	Type of study or activity	Description of activity / study	Links to MELIA publications
		study	impact at scale, resulting in the report "First order control principles for resilience building in agroecological landscapes: Lessons for CGIAR's outcomes and impacts".	g/publications/wle-legacy-series/wle-legacy-series-4/
Synthesis of essential steps for designing and implementing an integrated landscape initiative	Complete	Synthesis (secondary) study	Co-identification of the essential steps for designing and implementing an integrated landscape initiative, including monitoring strategies, incentive mechanisms, tools and models for measuring progress and impact of integrated landscape approaches in the short and long term. A paper entitled 'Measuring the Impact of Integrated Systems Research: Promising Approaches and Why CGIAR Needs to Care" was developed following a multi-partner workshop.	https://doi.org/10.5337/2022.203
Synopsis paper on the contribution of urban agriculture and the potential for investment	Complete	Synthesis (secondary) study	Paper commissioned in collaboration with Commission for Sustainable Agricultural Intensification (CoSAI) (Forthcoming, paper being formatted)	https://wle.cgiar.org/cosai/urban-and-peri-urban-agriculture-study
WLE Reflection Workshop	Complete	Other MELIA activity	Facilitated online discussion around key research themes defined in the Flagships and program implementation-related activities (program management, governance, communications, monitoring and evaluation, etc.). The meeting was divided into relatively short, focused sessions and a science writer captured discussions and key lessons.	https://hdl.handle.net/10568/117863
WLE end of program reflection and evaluation on gender and inclusion	Changed, Partially complete	Program/project evaluation or review	The Gender, Youth and Inclusion team conducted an internal review of the most impactful gender and inclusion projects. This review analyzed the experience and research outputs of select projects that apply a gender lens through different entry points (design, data collection, implementation and outcomes/outputs) in different contexts. It identified structural challenges to conducting gender-responsive research, such as organizational cultures, disciplinary silos, and limited research capacities and resources. This evaluation contributes to planned One CGIAR GENDER Platform institutional change and capacity development outcomes. It also highlights likely high-impact future research areas that will make research for development in One CGIAR more gender-transformative in nature.	https://www.iwmi.cgiar.org/publications/wle-legacy-series/wle-legacy-series-5/
Lessons learned from WLE on sharing research data	Complete	Other MELIA Activity	WLE compiled a brief of lessons learned on collecting, managing and utilizing research data from its 10-years of operation. While institutional changes will take time, the brief advocates an integrated approach as a more immediate solution for managing large	https://wle.cgiar.org/sharing-research-data-connected-world-

Studies/ learning exercises planned for this year	Status	Type of study or activity	Description of activity / study	Links to MELIA publications
			amounts of research data – from the outset of projects until the end with a specific focus on data ethics and reusability. Resources, capacities and organizational structures and norms must be built around these objectives.	connected-decisions-lessons-learned-cgiar-research-program
Storing water: A new integrated approach for resilient development (Global Water Partnership Perspectives Paper).	Complete	Synthesis (secondary) study	This synthesis study examines types of water storage and associated issues; the paper recommends that the storage of water should be recognized as a service, rather than only a facility.	perspectives-paper-on-water-storage.pdf (gwp.org)
White paper on water productivity to cope with water scarcity.	Complete	Synthesis (secondary) study	The authors aim to increase awareness and action by agriculture and related ministries for more sustainable agricultural water use to address water scarcity and enhance food security and nutrition. The paper synthesizes the current state of knowledge and makes recommendations for sustainable water use.	https://www.fao.org/3/cb3896en/cb3896en.pdf
Synthesis on investment in nature-based solutions for water to address the climate crisis.	Complete	Synthesis (secondary) study	Accelerating rural energy access for agricultural transformation: contribution of the CGIAR Research Program on Water, Land and Ecosystems to transforming food, land and water systems in a climate crisis	https://doi.org/10.5337/2022.202
Review of the role of renewable energy for water and food security, agricultural growth and women's empowerment	Complete	Other MELIA activity	Full synthesis canceled in favor of a blog and op-ed on why research is important in Nature Based Solutions	https://theglobepost.com/2022/01/31/nature-based-solutions-climate-crisis/ https://www.iwmi.cgiar.org/2022/01/to-protect-the-worlds-vital-wetlands-we-must-invest-in-science/
Stakeholder reflection on visions for change and addressing bottlenecks in integrated landscape initiatives.	Complete	Other MELIA activity	This study was changed from a synthesis paper to a guide to facilitate multi-actor theory of change development. The authors also published a short blog on their reflections related to visions of change, related to their ToC experience.	Understanding behavioral change for improved water governance: Reflecting on ongoing development interventions in India –

Studies/ learning exercises planned for this year	Status	Type of study or activity	Description of activity / study	Links to MELIA publications
				IASC Europe (iasc-commons.org)
Monitoring of the impacts of restoration options on soil organic carbon and soil biological activity.	Complete	Program/project adoption or impact assessment	A total of 665 households participated in the planting basin planned comparison trials during the OND rains of 2018 and 842 households participated in the OND rains in 2019. Farmers tested different sizes of basins comparing the yield performance and uptake of the basin options. The current activity aims to assess the impact of these planting basins with and without composted manure application, compared to normal farmer practice (with and without manure on ox-ploughed fields) on soil function. Key soil health variable monitored included soil organic carbon, soil pH, and infiltration capacity.	https://www.dropbox.com/s/iuda1e418bafrbo/ICRAF_Planting%20Basin%20SOC%20Report%20Jan%202021_final%20WLE%20report.docx?dl=0

Table 11: Update on Actions Taken in Response to Relevant Evaluations

Name of the evaluation	Recommendation number	Text of recommendation	Status of response to recommendation	Concrete actions taken for this recommendation	By whom	When	Link to evidence
CGIAR Research Program 2020 Reviews: Water, Land and Ecosystems	3	Synthesize and analyze WLE results and learning at the outcome level, including with reference to the WLE theory of action, to serve as a documented program legacy.	Completed	WLE commissioned a number of synthesis products in 2021. WLE Outcome Impact Case Reports are produced each year specifically to synthesize outcome-level results and learning.	Program Management Unit	2021	Restoring Degraded Landscapes https://hdl.handle.net/10568/117676 WLE Reflections https://hdl.handle.net/10568/117863 Lessons learned on data sharing https://hdl.handle.net/10568/117675 Lessons on achieving outcomes https://doi.org/10.5337/2022.201 Energy synthesis https://doi.org/10.5337/2022.202 Measuring Impacts doi.org/10.5337/2022.203

Name of the evaluation	Recommendation number	Text of recommendation	Status of response to recommendation	Concrete actions taken for this recommendation	By whom	When	Link to evidence
							Outcome indicators for resilience https://cgiar.sharepoint.com/:b:/s/WLE/EcapwYLX7fdBoKDKDVBAriQBYdlcwrmdoKE2dpBpCA_NOQ?e=3YHHs9
Outcome Evaluation of the work of the CGIAR Research Program on Land, Water and Ecosystems (WLE) on soil and water management in Ethiopia	2	The emergent WLE-Ethiopia approach of 'impact tracking' described by key staff during the evaluation should be systematized and promoted as an international public good, applicable to other programs seeking to trigger major change with relatively little funding.	Completed	Accepted in full. WLE commissioned a communications product to publicize our approach to impact tracking.	Program Management Unit	2021	Impact tracking: a practitioner-developed approach to scaling agricultural innovation in Ethiopia https://doi.org/10.5337/2021.226

Table 12: Examples of W1/2 Use in this reporting period (2021)

Specific examples (including through set aside strategic research funds or partner funds)	Broad area of use of W1/2
Program Level – Tailoring knowledge for delivery: 26 summaries of WLE solutions and innovations, 5 legacy reports, and 3 legacy briefs produced and disseminated	Delivery
Program Level – Influencing and stimulating dialogue: WLE Symposium event held to celebrate the science-driven, practical innovations that the program has generated. A wide range of stakeholders participated and discussed the use of WLE results for future investments, planning and research	Partnerships
Program Level – Learning: WLE reflection meetings and workshop summary document capturing key lessons from program implementation	Delivery
Program Level – Stimulating investment: Support to the development of One CGIAR Initiatives that will further WLE research from 2022 onwards, notably the NEXUS Gains and Agroecology Initiatives, led by WLE Management Committee members, as well as contributions to Nature-Positive Solutions and several other Initiatives	Partnerships

Specific examples (including through set aside strategic research funds or partner funds)	Broad area of use of W1/2
Program Level – Policy engagement: Evidence review produced with FCDO which suggested how the agricultural sector could move toward more nature-positive production through delivery of integrated agricultural solutions on climate, biodiversity, nutrition and livelihoods	Policy
Program Level – Policy engagement: Cross-Flagship contributions to the UN Food Systems Summit and the UN Climate Change Conference of the Parties (COP26)	Policy
Program Level – Learning: Cross-Flagship team lessons on data collection summarized in a WLE brief, with key recommendations for future programs	Other Monitoring, learning, evaluation and impact assessment (MELIA)
Gender, Youth and Inclusion – Tailoring knowledge for delivery: WLE end of program reflection and evaluation on gender and inclusion	Other Cross-Cutting Issues
Flagship 1 – Discovery: Development of a site-specific fertilizer recommendation tool in Ethiopia	Research
Flagship 1 – Discovery: Climate-smart agriculture options implementation and analysis in two Ethiopian learning sites	Research
Flagship 1 & Gender, Youth and Inclusion – Tailoring knowledge for delivery: Guidelines for mainstreaming gender equality and social inclusion in landscape restoration	Other Cross-Cutting Issues
Flagship 1 & Gender, Youth and Inclusion – Discovery: Working with PIM and FTA to provide evidence on how restoration impacts gender and other social inequalities, and with FTA to demonstrate that enhancing capacities of marginalized groups results in greater gains to land restoration interventions	Partnerships
Flagship 1 – Discovery: Testing and piloting components of the Ethiopian Digital Climate Advisory Platform (EDACaP) and fertilizer recommendations together with private sector partner Digital Green	Research
Flagship 1 – Tailoring knowledge for delivery: Development of a soils/agronomy database for Ethiopia	Research
Flagship 1 – Discovery: Adoption study of silvopastoral systems in deforested lands of the Colombian Amazon	Research
Flagship 1 – Discovery: Design and initiation of pilots for the implementation of low carbon practices in cocoa plantations in deforested areas in the Amazon	Research
Flagship 1 – Discovery: Design and implementation of survey on the impacts of land restoration	Research
Flagship 2 & 4 – Influencing and stimulating dialogue: UN Food Systems Summit independent series of regional dialogues on the role of water security for food systems transformation in Southern Africa, MENA, Central Asia and Pakistan; and on water–food security linkages (Egypt) as well as associated blogs and briefs	Policy

Specific examples (including through set aside strategic research funds or partner funds)	Broad area of use of W1/2
Flagship 2 – Influencing and stimulating dialogue: Special WLE session on 'Scaling up landscape interventions based on sustainable intensification and diversification approaches for improving rural livelihoods in South Asia and sub-Saharan Africa' at Landscape 2021 – Diversity for Sustainable and Resilient Agriculture	Research
Flagship 2 – Tailoring knowledge for delivery: Dissemination of tools, approaches and technologies to unlock the potential of rain-fed and irrigated agriculture in the Nile Basin	Delivery
Flagship 2 – Tailoring knowledge for delivery and capacity development: Systematic Asset Management Software for Irrigation (SAMS) applied in Sri Lanka, Ethiopia, India and Uzbekistan with training of officials for improved irrigation performance; online tutorials also developed	Capacity Development
Flagship 3 – Policy: Release of the Milan Urban Food Policy Pact Indicator Framework Handbook, including lessons from three cities on gender, climate change and pandemics	Policy
Flagship 3 – Discovery: Several publications on lessons regarding impacts of COVID-19 and response actions related to vulnerability of city region food systems published in the journal *Sustainability* and various blogs	Research
Flagship 3 – Training and tailoring knowledge for delivery: Training materials and tools on the City Region Food Systems process further updated with lessons on the impact of COVID-19. Local teams in five cities were supported in implementation and stakeholder meetings to stimulate action planning were organized	Capacity Development
Flagship 3 – Tailoring knowledge for delivery: Continued publication of synthesis reports, in 2021 on resource recovery and reuse business models (food waste, wastewater aquaculture, sewage sludge), urban food systems and controlled environment agriculture	Other MELIA
Flagship 3 & Gender, Youth and Inclusion – Discovery: Extensive review on gender, waste management and resource recovery documenting the gender roles and hierarchy in informal waste management institutions, practices and outcomes	Other Cross-Cutting Issues
Flagship 4 – Discovery: Collaboration with FISH on integrating fisheries into irrigation and rice-fish systems	Partnerships
Flagship 4 & Gender, Youth and Inclusion – Discovery: Research highlighting that complex nature-society interrelations shape the socio-ecological dimensions of wetlands	Research
Flagship 4 – Influencing and stimulating dialogue: Support to the global discourse on the importance of water resilience for food system transformations linked to the UN Food Systems Summit	Policy
Flagship 4 – Policy engagement: Engagement with key bodies concerned with groundwater expansion in Africa, including engaging with the African Ministers' Council on Water and exploring solar irrigation, as part of the Groundwater Solutions Initiative for Policy and Practice	Policy

Specific examples (including through set aside strategic research funds or partner funds)	Broad area of use of W1/2
Flagship 4 – Policy engagement: Assessment of poverty, growth and job creation linkages to sustainable groundwater development and support to new groundwater policies and investments in Laos (OICR)	Policy
Flagship 4 – Discovery: Assessment of the costs and benefits of solar versus diesel powered irrigation in sub-Saharan Africa and recommendations on avoiding groundwater depletion	Research
Flagship 4 – Discovery: Recommendations developed for a global groundwater quality assessment	Delivery
Flagship 4 – Tailoring knowledge for delivery: Development of a water–energy–food–environment nexus framework led for the Niger Basin Authority	Delivery
Flagship 4 – Influencing and stimulating dialogue: Dialogues with key investors and governments to strengthen water, energy and food security and ecosystem health.	Policy
Flagship 5 – Training: Learning modules co-developed on synergies and tradeoffs in food, land and water systems, along with contributions to curricula on landscape, biodiversity and food system transformations	Capacity Development
Flagship 5 – Discovery: Compiling and review of landscape approaches across and outside CGIAR	Research
Flagship 5- Tailoring knowledge for delivery: Flagship tools used and advanced in development programs, e.g., decision analysis to support WeForest and USAID programs, FarmDesign to support integrated landscapes initiatives	Partnerships
Flagship 5 – Scaling: Review of scaling approaches for business investments in natural resource recovery and reuse	Delivery
Flagship 5 – Tailoring knowledge for delivery: Support for expansion of the Innovative Food Systems Solutions portal	Partnerships
Flagship 5 – Policy engagement and influencing and stimulating dialogue: Baseline study produced by the Commission on Sustainable Agriculture Intensification on the current level of investment in innovation in agri-food systems in the Global South	Policy
Flagship 5 – Policy engagement and influencing and stimulating dialogue: Evidence reviews produced by the Commission on Sustainable Agriculture Intensification on *innovation priorities:* mapping global agricultural research, financial instruments and urban and peri-urban agriculture (jointly with Flagship 3); and on *innovation approaches*: pathways for innovation and approaches and instruments for innovation	Policy
Flagship 5: Tailoring knowledge for delivery - Establishment by the Commission on Sustainable Agriculture Intensification of an international taskforce to propose principles and metrics for innovation for sustainable agri-food systems	Partnerships
Program Monitoring, Evaluation and Learning – Tailoring knowledge for delivery: Landscape impact assessment methods workshop	Other Monitoring, learning, evaluation and impact assessment (MELIA)

Specific examples (including through set aside strategic research funds or partner funds)	Broad area of use of W1/2
Program Monitoring, Evaluation and Learning – Tailoring knowledge for delivery: MELIA Synthesis Learning Reports on: 1) scaling agricultural innovation in Ethiopia; 2) lessons on achieving development outcomes; and 3) building resilient landscapes	Other Monitoring, learning, evaluation and impact assessment (MELIA)
Program Communications and Outreach: Multiple webinar series held, including a series of eight webinars to present key results to policymakers, donors, investors etc.	Capacity Development
Program Communications and Outreach: Investment in social media, the website and Thrive, resulting in (as of 31 December 2021): • **233,009** visits to the WLE website **125,279** Thrive page views; **21,886** Content page views; **40,657** Solutions page views; **19,328** Research page views; **48,387** News page views; **36,359** CoSAI page views Social media followers • **25,577** on Twitter (4.2% increase from 2020) • **13,865** on Facebook (1.7% increase from 2020) • **8,145** on LinkedIn (102.8% increase from 2020) Social media impressions/reach • **1,082,566** on Twitter (30.9% decrease from 2020) • **351,860** on Facebook (81.7% decrease from 2020) • **303,222** on LinkedIn (164.2% increase from 2020)	Delivery
Program Management: Extensive program support including Strategic Management and Partnerships; Planning and Reporting; Coordination and Administration; Communications and Knowledge Management; Monitoring, Evaluation and Learning; and Gender, Youth and Inclusivity. Support to management and synthesis functions of all Flagships	Delivery

Table 13: CRP Financial Report

The following is the 2021 Budget, in USD 000's, provided in the WLE Plan of Work and Budget from January 2021.

	2020 forecast (W1/W2)	2021 budget (W1/2)
Personnel	4,510	6,068
Consultancy	1,020	2,408
Travel	76	248
Operational expenses	3,293	4,526
Collaborators and partnerships	198	336
Capital and equipment	4	14
Closeout cost	-	500
CRP total budget	**9,101**	**14,100**

* Source: WLE Plan of Work and Budget, 2021