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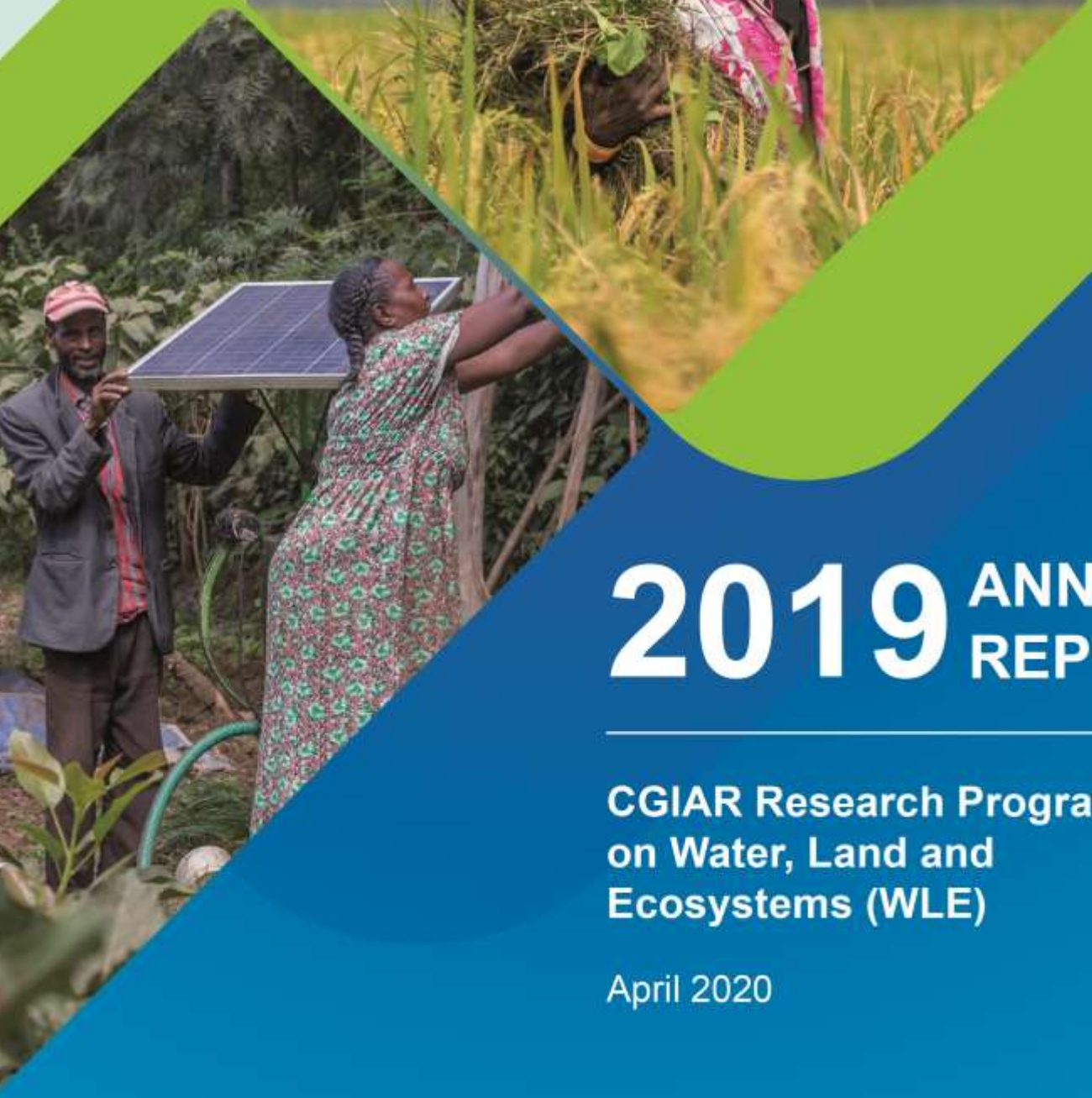
RESEARCH PROGRAM ON Water, Land and Ecosystems

LED BY: IWMI International Water Management Institute



# 2019 ANNUAL REPORT

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

April 2020

# CGIAR Research Program on Water, Land and Ecosystem (WLE)

*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.

Visit the online version of this report to read related outcome stories: wle.cgiar.org/AR2019

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LED BY:

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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Participating Centers: Alliance of Bioversity-CIAT, ICARDA, ICRAF, ICRISAT, IFPRI, IWMI, RUAF

| | |
|---|---|
| A4NH | CGIAR Research Program on Agriculture for Nutrition and Health |
| AfSIS | Africa Soil Information Service |
| AMR | Antimicrobial Resistance |
| CapVal | Creating and Capturing Value |
| CCAFS | CGIAR Research Program on Climate Change, Agriculture and Food Security |
| CIAT | Centro Internacional de Agricultura Tropical (International Center for Tropical Agriculture) |
| CoSAI | Commission on Sustainable Agricultural Intensification |
| CRP | CGIAR Research Program |
| FABLE | The Food, Agriculture, Biodiversity, Land-Use, and Energy (FABLE) Consortium |
| FAO | Food and Agriculture Organization |
| FES | Foundation for Ecological Security |
| FTA | CGIAR Research Program on Forests, Trees and Agroforestry |
| GIZ | Gesellschaft für Internationale Zusammenarbeit GmbH |
| GLOSOLAN | Global Soil Laboratory Network |
| GTA | Gender transformative approach |
| GYI | Gender, Youth and Inclusion |
| ICRAF | World Agroforestry Centre |
| ICRISAT | International Crops Research Institute for the Semi-Arid Tropics |
| IFPRI | International Food Policy Research Institute |
| ILRI | International Livestock Research Institute |
| IP | Innovation platform |
| IPBES | Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services |
| ISC | Independent Steering Committee |
| IWMI | International Water Management Institute |
| MARLO | Managing Agricultural Research for Learning and Outcomes |
| MELIA | Monitoring, Evaluation, Impact Assessment and Learning |
| MUFPP | Milan Urban Food Policy Pact |
| NRM | Natural Resource Management |
| OICR | Outcome Impact Case Report |
| PIM | CGIAR Research Program on Policies, Institutions and Markets |
| POWB | CGIAR CRP Plan of Work and Budget |
| RRR | Resource recovery and reuse (WLE Flagship 3 Research Theme) |
| SAI | Sustainable Agricultural Intensification |

| | |
|---|---|
| SDC | Swiss Agency for Development and Cooperation |
| SDG | Sustainable Development Goal |
| Sida | Swedish International Development Cooperation Agency |
| SLO | System Level Outcome |
| SMO | CGIAR System Management Office |
| SOC | Soil Organic Carbon |
| SRF | Strategic Results Framework |
| TEEB | The Economics of Ecosystems and Biodiversity |
| ToC | Theory of Change |
| UN | United Nations |
| UNCCD | United Nations Conference on Combating Desertification |
| UNECE | United Nations Economic Commission for Europe |
| USAID | United States Agency for International Development |
| USD | United States Dollar |
| W1/W2 | Windows 1 / Windows 2 funding sources |
| WHO | World Health Organization |
| WLE | CGIAR Research Program on Water Land and Ecosystems |
| WUA | Water Users' Association |

# EXECUTIVE SUMMARY

**Results from the CGIAR Research Program on Water Land and Ecosystems (WLE)** demonstrate how new evidence and innovations contribute to sustainable intensification of agriculture at landscape level. WLE's solutions support producing more nutritious food while managing natural resources more productively and sustainably in the face of critical climate change, health, demographic, and economic challenges.

WLE's interconnected flagship programs[1] address all CGIAR impact areas and support managing tradeoffs and synergies among them:

- **Environment:** WLE's primary focus is on turning food systems from major drivers of degradation to being part of the solution. 2019 results include: increased capacity in resource recovery and reuse through curriculum uptake; directly influencing national water management policies in Laos [OICR] and Nepal [OICR]; improving water governance by bringing experiential games to 245,000 Indian households [OICR]; supporting a policy that helps Ethiopia improve landscape health through data-driven fertilizer decisions [OICR]; scaling soil spectral technology from Africa to global use to improve restoration strategies [OICR]; and influencing the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) to focus on interdependencies of biodiversity and food production [OICR].
- **Climate:** WLE's work improves agroecosystems and carbon management. Results include: leading a soil carbon sequestration report for the United Nations Convention to Combat Desertification (UNCCD) which generated policy recommendations accepted by 197 country parties [Short OICR]; bundling effective satellite data-based insurance products with climate information and seed systems to help farmers facing climate-related events; assisting city regions with food security strategies and tools [OICR]; and expanding solar irrigation innovations to more communities and countries (Section 1.3.4).
- **Poverty:** WLE's solutions enhance smallholder opportunities and reduce poverty. Outcomes include: the Laos and Nepal water management policies; watershed restoration bringing prosperity to Indian communities [OICR]; and combining agricultural social networks with smart water management tools to increase incomes in rural Zimbabwe [OICR].
- **Gender:** WLE interventions highlight why gender-equal and socially inclusive food solutions are critical to addressing poverty and hunger. Projects informed by Gender Transformative Approaches have influenced discourse to put social equity at the heart of restoration. Globally, the UNCCD parties adopted a gender and youth inclusive recommendation to achieve the Land Degradation Neutral target (Section 1.3.1); gender dimensions now inform the Milan Urban Food Policy Pact (UNFPP); and WLE developed guidance to help South Asian policymakers target satellite-based climate risk insurance to the most marginalized.
- **Nutrition:** WLE supports changing food systems to produce more diverse, nutritious food. Results include: increased urban food system resilience through strategy development; leading the development of World Bank Guidance on nutrition-sensitive irrigation and water

[1] Flagship 1: Restoring Degraded Lands; Flagship 2: Land and Water Solutions; Flagship 3: Rural Urban Linkages; Flagship 4: Variability, Risks and Competing Uses; Flagship 5: Enhancing Sustainability Across Agricultural Systems.

management; and taking a lead role in the EAT Lancet Commission study to transform dietary guidelines [OICR].

To achieve these outcomes, WLE delivered:

- 10 fully evidenced strategic outcomes, 9 policy contributions, and 16 innovations.
- Nearly 200 publications, of which 115 were peer-reviewed journal articles, including high impact biodiversity and crop production, and groundwater and climate variability articles.
- Training to over 9,600 policymakers, smallholders, practitioners and others.
- 34 external partnerships supporting development, adoption or scaling of solutions.

*NOTE: The data in this document represents MARLO data as at 15 May 2020*

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# PART A: NARRATIVE

## 1. Key Results

### *1.1 Progress Towards SDGs and SLOs (sphere of interest, with research results frequently predating the CRP)*

WLE primarily contributes to System Level Outcome (SLO) 3, "improving natural resource systems and ecosystem services" and SLO 1, "reduced poverty". WLE also contributes to the health and nutrition benefits of SLO 2. Impacts within the natural resource sector often take many years to mature before being measurable (Table 1), and impact measurement in this sector is methodologically challenging. Thus, WLE prioritizes the completion of outcome level assessments for accountability and learning.

Nevertheless, substantive evidence indicates that WLE-supported research is contributing to the SLO target of helping 21 million farm households to adopt improved water and land management practices, which will bring longer term gains for health and nutrition. Experiential games for strengthening groundwater governance in India, for example, led to adoption of better practices and scaling to more than 245,000 farm households. [OICR].

Related to the SLO target of assisting 5.74 million people (50% women) to exit poverty, WLE-supported water management interventions in Central India significantly impacted farmers' livelihoods. In pilot communities, the income of participating households nearly tripled, and ecosystem services such as tree biomass and carbon sequestration significantly increased. In 2020, the Government of Uttar Pradesh, working with WLE partners, will scale the model out to cover 35,000 ha [OICR]. In Zimbabwe, research combined technical and institutional innovations to improve irrigation management, increasing water productivity by 100%. These results are now being upscaled to 30 more irrigation schemes [OICR].

WLE contributes to the SLO target of restoring 7.7 million ha of degraded land. WLE's pioneering work on using soil spectral technologies to target investments in land restoration is now going global through the Global Soil Laboratory Network [OICR]. WLE-led recommendations on soil carbon sequestration were adopted by the United Nations Conference on Combating Desertification (UNCCD). WLE's land restoration assessment, mapping and monitoring tools are being applied in a growing number of African countries (Section 1.2.2.1).

WLE also contributed to the crosscutting SLO on capacity development. For example, WLE supported the adoption of soil spectroscopy resulting in better evidence-based decisions and investments. In 2019, 17 African countries were using the technology; 2) four African countries had established national digital soil information systems through the Africa Soil Information Service (AfSIS), and 3) NGOs and the private sector delivered soil testing services to smallholder farmers. WLE supported a training program to scale out this tool in India.

### *1.2 CRP Progress towards Outputs and Outcomes (spheres of control and influence)*

#### *1.2.1 Overall CRP progress*

WLE's most direct contributions towards CGIAR's impact areas are, firstly, through developing actionable **diagnostic, planning and monitoring/evaluation tools and models** that can be used to inform decisions both on restoring degraded landscapes and on managing complex agro-ecosystems to be more productive while maintaining the sustainability of land and water resources. WLE also invests heavily in **building capacity for local, national, regional and global partners** to use these

tools. Secondly, but extremely important, in designing and targeting effective interventions and investments, our **tools support policymakers and investors to make difficult decisions** on interventions in complex agro-ecosystems that often require significant tradeoffs. WLE work has informed the development of various **local and national policies on water and soil management**, as well as the agenda of i**nternational commissions and processes**. WLE contributes most effectively and directly to the *Environmental Health and Biodiversity* and *Climate Adaptation and Greenhouse Gas Reduction* impact areas. In addition, WLE designs these contributions to have important spinoff impacts on *poverty, livelihoods and jobs*, *gender equality, youth and social inclusion*, and *nutrition and food security*.

### *1.2.2 Progress by Flagships*

#### 1.2.2.1 Flagship 1: Restoring Degraded Lands (RDL)

RDL's innovative **decision support tools** address the production-conservation challenge, and inform landscape restoration policies and interventions (**outcome 1.1**). WLE/CIAT produced an assessment tool and business models for landscape restoration; digital soil maps for land use planning in El Salvador (Short OICR); and guidelines for integrating gender into land restoration (Section 1.3.1). In Ethiopia and Uganda, community seed banks improved local systems (Short OICR1, Short OICR2).

WLE/ICRAF soil management and carbon findings (**outcome 1.2**) influenced the UNCCD CoP14 which adopted WLE-led soil organic carbon (SOC) recommendations [Short OICR]. WLE/CIAT evaluated SOC sequestration adoption evidence, identified factors influencing farmers' decisions, and mapped potential Kenyan SOC hotspots. WLE/ICRAF soil fertility work went global with a new soil spectroscopy capacity development network through Global Soil Laboratory Network (GLOSOLAN). Further, investors committed to scaling spectroscopy in Africa through a USD 40 million initiative (OICR). And, the Ethiopian Ministry of Agriculture's adoption of a WLE/CIAT-influenced data sharing policy facilitates better fertilizer recommendations [OICR].

RDL is strengthening **monitoring and evaluating of land restoration** and degradation risks (**outcome 1.3).** In Ethiopia, we assessed the multi-billion dollar Sustainable Land Management program, documenting significant benefits but highlighting maintenance needs.

#### 1.2.2.2 Flagship 2: Land and Water Solutions for Sustainable Intensification (LWS)

LWS develops and supports scaling of agricultural land and water management solutions (**outcome 2.1).** WLE/IWMI progressed **solar irrigation** work to develop a **suitability mapping tool** in Mali, Ghana and Ethiopia which is being applied to sub-Saharan Africa; and established partnerships to scale investments in Africa and South Asia. The work was disseminated through a policy brief and in forums (link, link, link).

In the highly degraded hotspot of Bundelkhand, India, a multistakeholder **watershed learning site** significantly improved productivity, sustainability and livelihoods. The Uttar Pradesh Government asked WLE/ICRISAT/partners to scale the model to over 35,000 ha (OICR), with field research enabling better targeting of women (Section 1.3.1), and featuring in a UNCCD meeting session.

LWS is **improving the performance of irrigation schemes (outcome 2.2**). In Zimbabwe, WLE/ICRISAT's integration of agricultural innovation platforms and smart water management tools brought major improvements in productivity and incomes. A new project scales this to 30 more irrigation schemes (OICR). In Uzbekistan, **water-saving tools** developed by WLE/IWMI/partners to improve irrigation were prioritized in the 2020-2030 national agricultural development strategy

(Short OICR). A new Water Users' Associations handbook supports upgrading Myanmar's aging irrigation systems.

#### 1.2.2.3 Flagship 3: Sustainable Rural Urban Linkages (RUL)

RUL strengthens **urban food security (outcome 3.1)** through improved policy and practice. WLE/CIAT supported the City of Cali, Colombia to adopt a municipal food policy, to help improve access to nutritious food for poor consumers and support urban farming (OICR). Workshops with other municipalities will encourage replication. FAO, WLE/RUAF/IWMI field-tested an assessment of **urban food systems' resilience** to climate and other shocks in five cities; the Milan Urban Food Policy Pact (MUFPP) will enable outreach to over 200 cities. A gender analysis of MUFPP indicators in three cities provides evidence that gender must be central in the framework.

WLE/IWMI continued providing advisory services in **resource recovery** from human waste for agricultural reuse (RRR) (**outcome 3.2).** In India, with PricewaterhouseCoopers, 179 master trainers were equipped to support 5000 people across three states. In Sri Lanka, WLE/IWMI advised a USD 250 million World Bank investment. So far seven universities and schools have implemented the curriculum on RRR and business development. WLE/IWMI, ICRAF and CIAT initiated a project on **nutrient and energy recovery for refugee and host communities** in three East African countries. Finally, an external evaluation found RUL to be achieving significant outcomes.

#### 1.2.2.4 Flagship 4: Managing Variability, Risks and Competing Uses for Increased Resilience (VCR)

Working with governments, private sector and CCAFS, VCR is building farmer resilience to water risks **(outcome 4.1**) through scaling-out innovative **satellite-data based approaches** for disaster preparedness, response and recovery across South Asia. WLE/IWMI contributed mapping guidelines to the ASEAN Humanitarian Centre emergency response and was recognized by the United Nations.

**Groundwater irrigation** is key to climate change adaptation. WLE/IWMI played a leading role in the international groundwater call to action. Lao PDR adopted WLE/IWMI recommendations for its **national groundwater action plan** (OICR). Similarly, the Vietnamese Government endorsed **recommendations to augment groundwater resources** for coffee irrigation (Short OICR). In India, WLE/IFPRI/ICRISAT obtained funding to scale up **experiential games** for groundwater governance to 245,000 households (OICR).

WLE/IWMI/partners developed **decision support tools (outcome 4.2**) to improve understanding of: i) co-dependencies between natural and built infrastructure (Tana River, Kenya); ii) water-energy-food nexus (Mekong River tributaries); and iii) the potential of clean energy solutions in Ethiopia and Egypt. In Nepal, WLE/IWMI model results (OICR) will help transform irrigation development. WLE/IWMI also contributed *a background* paper to inform the **Global Commission on Adaptation**'s call to invest over USD 650 million in the CGIAR system.

#### 1.2.2.5 Flagship 5: Enhancing Sustainability Across Agricultural Systems (ESA)

ESA is integrating **decision-support tools** into a cross-CGIAR knowledge brokering framework for agricultural landscape management **(outcome 5.1).** A decision support framework was applied to identify synergies and trade-offs among intervention options in Ethiopia. In Kenya and Vietnam, opportunities and tradeoffs in crop diversification whilst meeting nutritional and environmental requirements were modeled. ESA tools also helped assess inherent uncertainties about likely outcomes of: 1) restoring a degraded community-managed forest in northern Ethiopia; 2)

intervention options to prevent reservoir sedimentation in Burkina Faso; and 3) investment options in a Kenyan honey value chain.

ESA contributed to several **international policy processes**: focusing the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) on the critical **interdependencies of biodiverse ecosystems and food production** in its Nexus Assessment on Biodiversity, Food, Health and Water (OICR). ESA contributed to the highly influential **EAT-Lancet Commission's** review defining a universal healthy diet (OICR). This triggered the Commission on Sustainable Intensification (CoSAI), which aims to **guide investments to transform food systems while supporting livelihoods**. Finally, ESA contributed to the FABLE Consortium Report on pathways to sustainable land use and food systems finding that country targets are not yet aligned with global targets.

### *1.2.3 Variance from Planned Program for this year*

WLE continues to be on target overall with respect to its 2019 Plan of Work and Budget. In some cases, we are doing more than planned, and in a few areas, there have been minor reductions or focus changes.

***(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 extended its work on monitoring and evaluating land restoration and degradation risks to include more approaches and increased local government engagement.

LWS initiated a new program in South Asia with multiple partners focusing on social inclusion and groundwater sustainability. LWS also demonstrated the potential to use shallow groundwater in mountainous areas for (supplementary) irrigation in Ethiopia; and in Mali, showed that contour bunding and management of runoff improves access to groundwater. Groundwater is a largely untapped resource in these regions.

RUL initiated discussion for a multi-partner program testing waste-based fertilizers in Ghana.

VCR strengthened collaboration with WorldFish and RICE in Myanmar to identify how their innovations can contribute to healthier and more environmentally sustainable food systems.

ESA expanded the application of its tools to Burkina Faso, Vietnam, Kenya, and India, and strengthened its focus on anticipating and addressing trade-offs and synergies in agricultural development and natural resource management.

***(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?***

In 2019, responding to an opportunity, VCR re-orientated W1/W2 funds from supporting research into water storage and malaria to improving data and information exchange in transboundary rivers and aquifers. This work is progressing well. The most rigorous known assessment of data exchange in transboundary waters is complete and has been submitted for publication. Furthermore, its findings were absorbed into the United Nations Economic Commission for Europe (UNECE) Guidance on data exchange in transboundary waters. "Blue Peace" has expressed an interest in using our data

exchange indicators in its broader water cooperation index. IHE-Delft plans to develop a module on data exchange using our case study.

***(c) Have any Flagships or specific research areas changed direction? If so, please describe how, and the reason.***

N/A

### *1.2.4 Altmetric and Publication highlights*

WLE research supported production of 193 publications (this includes book chapters, journal articles, conference papers, briefs), of which 115 were noted as peer reviewed journal articles.

Since CGIAR adopted Altmetrics as an indicator in 2017, systems are still being improved by Centers and CRPs to bolster results and ensure reliable measurement.

Journal articles and other publications can be found embedded as Evidence in the Milestones Table (5) and throughout the narrative and tables.

**Highlights from 2019 include:**

High performing journal articles mapped to WLE, as measured by Altmetric scores:

1. A global synthesis reveals biodiversity-mediated benefits for crop production, in *Science Advances*, compiling an extensive database comprising 89 studies measuring richness and abundance of pollinators, pest natural enemies, and associated ecosystem services at 1475 sampling locations around the world. Cited in news, blogs and shared via hundreds of social media posts. (Score of 538)
2. Observed controls on resilience of groundwater to climate variability in sub-Saharan Africa, in *Nature,* a paper discussing the importance of precipitation–recharge relationships for informing reliable predictions of climate-change impacts and adaptation strategies. (Score of 221)
3. Understanding rivers and their social relations: A critical step to advance environmental water management, journal article shared widely on social media. (Score of 101)
4. Supporting sustainable expansion of livestock production in South Asia and Sub-Saharan Africa: Scenario analysis of investment options, in *Science Direct*, mentioned widely in social media. (Score of 97)

To promote solutions and research insights to broader audiences, three new WLE publications were launched in the Resource, Recovery and Reuse Reports series:

- Assessing the value of resource recovery and reuse: social, environmental and economic costs and benefits
- Guidelines and regulations for fecal sludge management from on-site sanitation facilities
- Global experiences on waste processing with black soldier fly (*Hermetia illucens*)

And three on index-based crop insurance and equity, profiled here: New guidance for policymakers on supporting farmers through satellite-based crop insurance

High profile resource books WLE contributed to or published include:

- Farming systems and Food Security in Africa

- Water for food security, nutrition, and social justice
- A handbook for establishing water user associations in pump-based irrigation schemes
- Drought challenges: policy options for developing countries (chapter, chapter, chapter)

WLE scientists led or contributed to publications related to various international processes, including:

- IPBES Nexus Assessment on Biodiversity, Food, Health and Water (OICR)
- EAT-Lancet Commission review (OICR).
- FABLE Consortium Report
- Global groundwater statement
- UNCCD Science Policy Brief: Soil Organic Carbon

## *1.3 Cross-cutting dimensions (at CRP level)*

### *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.***

A four-country comparative analysis showed that structural barriers keeping marginalized women and men food insecure complicate the links between food security and women's empowerment. This analysis reflects the **gender transformative approach (GTA) adopted by WLE** to go beyond addressing the symptoms to tackling structural causes of marginalization. Examples:

- RDL/Bioversity found that the socio-political dimensions of ecological interventions are often overlooked in interpretations of sustainability.
- An 'inclusive restoration' project will collate lessons from multiple restoration projects to enable Ethiopian stakeholders to co-learn from and apply transformative restoration interventions.
- RDL/Bioversity/IFPRI developed a conceptual framework consolidating evidence on the linkages among gender, soil health and poverty dynamics and identified good practices through Innovation Platforms for integrating gender into soil restoration. Globally, a **gender and youth inclusive recommendation** to achieve the Land Degradation Neutral target was adopted by the UNCCD parties.
- RDL/IWMI identified ways to incorporate gender in key phases of mathematical modeling, an important tool that rarely incorporates gender.

LWS research shows how gender inequalities crosscut by other disparities hinder the participation of marginalized women, exacerbating drought and other impacts:

- Women and resource-poor farmers – primarily in sub-Saharan Africa – continue to be excluded from irrigation and agricultural value chains. Investments in irrigation infrastructure are unlikely to optimally benefit the poorest, because small plot sizes necessitate diverse livelihood strategies of rural households. WLE-supported Innovation Platforms in Burkina Faso enabled around 50 women, young men and marginal reservoir users to participate in management decisions.
- Four gender indicators were integrated into the Online Irrigation Benchmarking Services (OIBS), a publicly accessible tool for irrigation performance comparisons. The Gender in Irrigation Learning Tool (GILIT) tool is now multi-language to support gender-inclusive irrigation in Haiti, Madagascar and elsewhere.

RUL is analyzing and addressing gender inequality in rural-urban food, water and waste circular economy value chains:

- RUL/RUAF field-tested the Milan Urban Food Policy Pact (MUFPP) monitoring framework in three cities, Nairobi, Quito and Antananarivo, to show how gender norms and cultural barriers impact implementing gender-responsive approaches to rural-urban food systems.
- RUL/IWMI organized a Gender Mainstreaming Workshop in Cairo to support ReWater-MENA partners address gender inequalities.
- RUL/IWMI/ICRAF/CIAT are implementing a project on nutrient and energy recovery in six refugee camps in Kenya, Uganda and Ethiopia. The project aims to reduce women's domestic work burdens.

VCR research provides evidence of contextual gender inequalities shaping interventions at scale:

- Lessons from pilot interventions to manage drought and flood risks show how inequality and exclusion impact outcomes, and provide guidance to government, private sector and nongovernmental stakeholders in India and Bangladesh on **inclusive climate-risk insurance products**.
- In Myanmar, VCR/IWMI supports official and non-governmental stakeholders to address socially inclusive and transformative approaches that can reduce exclusions in wetlands management.

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

In 2019, the GYI team started supporting Flagships to **integrate gender into multiple projects and overall Flagship milestones and outcomes**. VCR's work on **index-based flood and drought insurance in India** was reoriented to be more gender equitable and socially inclusive. In Bangladesh we identified barriers and opportunities to target a market-led inclusive insurance program to smallholders and agricultural laborers.

- LWS integrated capacity strengthening and policy outreach on gender transformative approaches into its collaboration with the Government of India and other partners to scale out an **inclusive watershed restoration** program in Bundelkhand (OICR).
- Preliminary LWS/IWMI findings in India show that women and youth tend to be excluded from solar irrigation interventions, but early results also suggest that with focused support, **women farmers can become successful solar irrigation entrepreneurs and managers**. A new project in South Asia will address these challenges and opportunities.
- On the 'inclusive restoration' project, RDL/CIAT is strengthening technical capacity of key Ethiopian stakeholders (Environment Forestry and Climate Change Commission, Sustainable Land Management Program of the Ministry of Agriculture) for integrating gender into landscape restoration projects and programs.

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

RUL initially struggled to identify entry points for gender inclusiveness in its RRR work. The recent focus on resource reuse as energy has opened new avenues for women entrepreneurs.

### *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 youth issues***

Contributions to knowledge, advocacy and youth training opportunities included:

- WLE/PIM/FTA co-organized a special session '**Restoration for whom, by whom?**' at the Society for Ecological Restoration (SER). The proceedings are forthcoming as a special issue in the journal *Ecological Restoration*.
- WLE/IWMI organized two workshops on Inclusion in Sustainable Intensification of Agriculture (Canberra Seeds of Change Conference, 2019) and at the Institute for Development Studies.
- RDL's **capacity building strategy** targeted youth to use crop and pasture genetic diversity to buffer and rehabilitate saline and water-scarce lands in Central Asia, and included: i) schools for young breeders and planting material suppliers in Uzbekistan to create jobs for youth; and ii) development of an university curriculum on using crop diversity for productivity and resilience.
- RDL/CIAT in partnership with the Ministry of Agriculture and Irrigation in Babati (Tanzania) **exposed 175 primary and secondary school students to sustainable intensification technologies** during field days. Through these activities, youth benefited from trials held in their school compounds, exposing them to practices they can implement now or post-graduation.
- RUL/IWMI developed **training material for a** course on Youth Employment on Waste Businesses (including resource recovery and reuse lessons) provided by RUAF in Bamako, Mali.
- In Ghana, RUL/IWMI's Creating and Capturing Value (CapVal) project will informally offer direct **employment opportunities to local youth** (representing at least 60% of appointed workers) when a new plant to convert waste into compost and briquettes is completed.
- LWS/ICRISAT/IWMI studied farmers' perceptions of changes in average annual temperature (as a proxy indicator for climate change), and **adaptive strategies used by men, women, and youth** in Kafr El-Sheikh, Egypt. Respondents noted rising temperatures resulting in challenges that are lowering productivity. Respondents' adaptation strategies varied across sex and age, with young men and women having less financial and technical capability to deal with increased production costs.
- LWS/IWMI leads a new study on the **gendered dimensions of youth migration and agrarian transformation in Nepal** which is linked to the AGRUMIG project, a European Union funded seven-country comparative research to investigate how youth migration is changing rural agriculture.

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

While policy interventions tend to aggregate target populations into groups such as women, youth and marginalized people, WLE field research has shown an overlap and intersection of multiple factors - for example, how gender and youth are crosscut by disability, ethnicity, caste, poverty and religion. The adoption of a Gender Transformative Approach overcomes these flaws and WLE GYI outputs and outcomes will increasingly take into account a more nuanced response to what are contextual and complex experiences of exclusion and inequality. For example, VCR/IWMI research in the Gulf of Mottama (Myanmar) wetlands that started in late 2019 recognizes that intersections

among gender and other social identities, including age, ethnicity, class and religion - affect how people utilize wetland resources in socially heterogeneous and diverse local communities. This study adopts a gender transformative approach and has been designed to be more holistic for more effective, inclusive and pro-poor development planning.

WLE is also increasingly ensuring that evidence on gender inequality and exclusion are translated into capacity building initiatives and policy-impact relevant outcomes.

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

A lack of clear-cut definition of youth: most governments and international organizations use varying ages to define youth plus the fact that there is little data.

### *1.3.3 Capacity Development*

WLE collaborates with partners to strengthen application of our tools and build research capacities. Table 7 documents 9645 trainees in 2019: 244 in long-term training (32% women), 9388 in short-term training (36% women) and 13 PhD students (6 women). These data gathered from MARLO project reports may understate the true reach of our capacity development programs. Highlights:

- **Capacity to deploy WLE/ICRAF soil spectroscopy techniques** is being scaled out. National and state governments have requested support; this work is now supported by new USD 40 million investment plans (OICR).
- RUL/IWMI collaborated to develop Solid-Liquid Waste Management training guidelines and material in rural areas of three Indian states,, and to provide training for Youth Employment in Waste Businesses by RUL/RUAF in Mali. In Ghana, business model workshops reached 125 participants (30% female) from municipalities and universities.
- RUL/IWMI work was adapted into an online course; separately, seven universities now use our RRR modules. RUL/RUAF also supported training of teams in three cities implementing the MUFPP Indicator Framework.
- LWS's **solar irrigation** suitability and business model report led to an invitation to join the Water Mission's Solar Technical Working Group and to provide inputs to Cap-NET's online course Solar Powered Water Systems. Over 800 applied for 100 seats. WLE/IWMI facilitated two modules, *Enabling Environment* and *Leaving No One Behind*. We also partnered with a solar cooperative in Gujarat, India to organize a Farmers' Awareness Summit attended by more than 2,500 farmers.
- **Outreach results** included ThriveNet sustainable agriculture research network growing by 50%, sharing regular development opportunities, supporting eight travel grants on gender/equity research (including blog coaching), and training journalists through an Ethiopian landscape story lab. WLE contributed knowledge sessions to dozens of high profile events including Seeds of Change, Climate Smart Agriculture, UN Climate COP, World Water Week, and published over 50 science blogs/Op-Eds.

### *1.3.4 Climate Change*

WLE addresses climate change through: solar irrigation; climate-smart agriculture and sustainable intensification; rural-urban food systems; water risk management; and soil carbon management.

On ***solar-powered irrigation***, a win-win solution producing energy with low emissions and operating costs, LWS/IWMI:

- Applied a **solar irrigation mapping tool** in Mali, Ghana and Ethiopia and is upscaling to sub-Saharan Africa.
- Demonstrated solar irrigation can substantially increase farmers' incomes.
- Launched public-private partnerships for scaling solar irrigation in Africa and South Asia (Section 1.2.2.2).
- **Widely disseminated** our solar irrigation research (link, link, link)**.**

On ***climate-smart land and water management practices,*** *LWS/VCR/IWMI*:

- Documented effects of climate change on shallow groundwater irrigation in Ghana.
- Applied a tool for prioritizing land and water interventions in India.
- Identified factors affecting farmers' investment in climate-smart land management.
- Demonstrated the value of sustainable groundwater management for agricultural production in policies in Lao PDR and for coffee farmers in Vietnam.
- Developed advisory services and commercially viable disaster insurance for South Asian farmers.

*On* ***city-region food systems***, RUL/RUAF/CIAT:

- Tested a methodology to assess and increase climate resilience in five city-region food systems (Section 1.2.2.3).
- Produced a paper and two draft city reports on enhancing urban and peri-urban agriculture for climate change adaptation.

On ***soil organic carbon (SOC) storage****, RDL/ICRAF/CIAT:*

- Developed a multi-criteria decision-support system that showed about **148 million tons of carbon can be stored through land exclosure in Ethiopia**.
- Produced guidelines for estimating SOC in reversing land degradation (media link).
- Completed mapping **SOC benefits from sustainable land management in six watersheds in Ethiopia**.
- Mapped achievable soil carbon sequestration hotspots in Kenya and Ethiopia.
- UNCCD parties adopted **WLE's soil carbon management and monitoring recommendation** in its decision 16/COP14 to achieve Land Degradation Neutrality (SDG15.3) targets (Section 1.2.2.1).

## 2. Effectiveness and Efficiency

### *2.1 Management and governance*

2019 was a year of transition for the WLE's Independent Steering Committee (ISC). Ann Tutwiler took on the role as Chair from March, picking up from Barbara Schreiner who served as Interim Chair after the departure of Johan Rockström. Diane Holdorf replaced Peter White as the representative of the World Business Council for Sustainable Development, while Sasha Koo-Oshima took over the role of FAO representative, following the retirement of Olcay Unver. Evaluation expert Jyotsna Puri also joined the ISC. The ISC now operates on a reduced membership, following the ToR and membership review process initiated in 2018 and finalized in 2019. This allows the ISC to operate more efficiently and cost effectively, with in-person meetings now taking place just once per year.

Within the WLE Management Committee (MC), Stefan Uhlenbrook took as co-leader of Flagship 2, following the departure of Jennie Barron, and Roseline Remans took over leadership of Flagship 5, from Daniel McGonigle, with Natalia Estrada as a co-leader.

The participation of women across the WLE ISC, MC and PMU was very healthy in 2019, composed of 63% women.

WLE participated in the CGIAR program management pilot assessment exercise. Although the detailed results of this pilot assessment are confidential, WLE is pleased to note that it met the necessary criteria showing that processes and criteria are in place, used systematically and with documentation available. This was the result of a concerted effort to improve processes for planning, reporting, assessment and data management since 2018.

Please see: Members of the ISC, MC and PMU.

### *2.2 Partnerships*

#### *2.2.1. Highlights of External Partnerships*

Demonstrating the most important partnerships from over 250 partners, Table 8 shows that WLE has established an effective network of partners, from grassroots organizations, NGOs and local government, through regional and national governments, private firms, donors and international financial institutions, and global institutions such as United Nations agencies. The value of this network is enhanced by the resulting synergies: having roots at field level enables us to share lessons learned with higher level entities; and lessons emerging at higher levels shape our local level work.

These synergies can be illustrated by our work on solar irrigation: we work with local women and men in poor areas such as Bihar, India and rural Ethiopia, with private sector pump manufacturers and distributors, government (e.g. the Ethiopia Agricultural Transformation Agency), and UN agencies to share experiences widely, as well as investors such as the World Bank to finance scaling out.

Similarly, our work on sustainable groundwater irrigation involves working with farmers (e.g. in Laos, India, Myanmar and Ghana), NGOs such as Foundation for Ecological Security (FES) in India, government agencies (e.g. Andhra Pradesh Drought Mitigation Program and the Laotian Ministry of Natural Resources and Environment), local universities and training institutes (e.g. National Institute of Agricultural Extension Management in India, National University of Laos) as well as internationally recognized universities (e.g. Wageningen, Arizona State, Khon Kaen Universities), and donors such as

Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) and Australian Centre for International Agricultural Research (ACIAR).

Building on its grassroots and national experiences and its repertoire of modelling tools and frameworks, WLE plays an active role in numerous global networks. Examples include our influence on UNCCD, IPBES and Food and Land Use Coalition (FOLU); our role in the EAT-Lancet Commission's report on nutritious sustainable diets; and RUL's active participation in WHO-FAO expert groups and supporting revision of FAO guidelines on water quality and agriculture.

### *2.2.2. Cross-CGIAR Partnerships*

WLE fosters **strong collaboration among cooperating CGIAR centers**. Under LWS, ICRISAT and IWMI are collaborating to implement small-scale irrigation development projects in Myanmar and Ethiopia. Under RUL, CIAT, ICRAF and IWMI are collaborating to pilot and scale out gender responsive circular economy interventions in refugee settlements in East Africa. Through ESA, Bioversity and CIAT Alliance, ICRAF, IWMI and external partners developed a cross-CGIAR knowledge-brokering framework for facilitating integrated landscape management. WLE/IWMI was a winner of the CGIAR Inspire Challenge (USD 100,000 award) managed by the CGIAR Big Data Platform for its Real-time East Africa live groundwater use database proposal. These examples are evidence that WLE is indeed fostering stronger linkages, and creating synergies, among CGIAR centers.

Table 9 also demonstrates **growing partnerships with other CRPs**. CCAFS is a long-standing partner on solar irrigation and linking insurance products with drought-tolerant wheat and flood-tolerant rice (Bihar, India). This project includes partnerships with IRRI and CIMMYT. WLE collaborates with PIM through IWMI, IFPRI and ICRAF to support scaling out experiential games used to improve groundwater governance in India. A joint session on the relevance of gender and social inclusion in landscape restoration interventions was co-convened by WLE, FTA and PIM at the 8th World Conference on Ecological Restoration. The WLE, FISH and RICE partnership on the Myanmar Landscapes Transformation Project will form the basis for further collaboration in the development of the Mega Delta Grand Challenge of the Two Degree Initiative. WLE supported ICRAF to assist CIMMYT with soil spectroscopy training in India. WLE was involved in developing the new CGIAR Excellence in Agronomy Initiative.

Finally, the Commission on Sustainable Agricultural Intensification (CoSAI), whilst comprising multiple external partners, is a cross-CGIAR initiative. We believe this Commission will set the agenda for investments in the management of water and land systems in agriculture during the decade of the 2020s.

## *2. 3. Intellectual Assets*

N/A

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

In 2019 WLE implemented a complexity-aware evaluation approach that seeks to provide both evidence for accountability purposes and learning opportunities for more effective management. Two evaluations were completed in 2019, while a third is in progress. The first evaluation on our Resource, Recovery and Reuse (RRR) work in Ghana and Sri Lanka produced five recommendations that have been accepted in whole or in part. The second evaluation of our water and soil management work in Ethiopia was completed in December and produced a set of three

recommendations, which were accepted in full. In both cases, the evaluations confirmed the programs were achieving significant outcomes with potential for large-scale impacts. The third evaluation of WLE's climate-smart research on solar-powered irrigation in India was started in late 2019 and is ongoing. This evaluation is co-funded in partnership with CCAFS and the CGIAR System Management Office (SMO), and will be used to develop a pragmatic, theory of change based methodology for estimating projected benefits up to 2030.

Other MELIA activities focus on building internal reporting systems, including an annual review of WLE's Results Framework. The results of this internal review are evidenced by the 2020 Plan of Work and Budget, which provides an improved set of milestones to guide WLE toward the achievement of planned outcomes.

### *2.5 Efficiency*

As a cross-cutting CRP, WLE collaborates with CGIAR Centers and CRPs to address specific natural resources management and sustainable agricultural intensification issues. The assumption is that collective effort delivers results more efficiently. WLE has adopted the concept of an 'area of change' which is defined as one or more complementary research streams combining synergistically to produce a greater impact than could be expected if they worked alone. For example, in Ethiopia, WLE research combined the work of three different centers. Using big data as part of a broader attempt to provide farmers and governments with site-specific soil fertility and agronomy recommendations, maps and databases could potentially save the Ethiopian government billions of dollars. In Southeast Asia WLE collaborates with FISH and RICE to understand how integrating water, rice and fisheries management can achieve productivity gains and enhanced resilience for farmers. Enhanced efficiencies and added development impacts are gained through combined research efforts.

The launch of CoSAI brings together research on Sustainable Agricultural Intensification solutions from across the CGIAR, and outside. This is intended to bring greater efficiency in analyzing, showcasing and promoting evidence to influence global discussions.

In management, WLE continues to invest into development and data entry efficiency for MARLO. This is starting to show some results in terms of efficiency, however evolving demands, and the timing of reporting and planning still make it a challenge to use MARLO to its full potential. WLE will continue to explore options for improving on this in 2020.

### *2.6 Management of Risks to Your CRP*

Following IWMI's Risk Management structure, WLE monitors risks based on four categories: 1) Research and Science Risks; 2) Financial Risks; 3) Infrastructure and Capability Risks; and 4) Reputational Risks. WLE's management reviews the register at least twice a year, identifying appropriate mitigation actions. 19 risks were identified in 2019, two were considered to be inherently high-risk. One of these was financial, relating to a potential W1/W2 funding cut, with mitigation measures put in place including scenario planning and establishing a process to avoid instability due to reductions late in the year. The second was research-based, relating to the risk of lower than expected delivery on gender targets. To mitigate this, the Gender, Youth and Inclusion Leader developed and began implementing a plan to meet targets.

Of the residual risks, twelve were minor and seven were moderate. Of those classified as moderate, funding risks continue. Some partner Centers are having difficulty maintaining target levels of bilateral funding - measures discussed in 2018 were instituted with these Centers. The issuance of a

three-year CGIAR Financial Plan for 2019-2021 has greatly helped with medium-term forecasting, allowing WLE to provide some assurance to W1/W2 supported projects intending to continue into the coming years.

### *2.7 Use of W1-2 Funding*

W1/W2 constituted 24% (USD 7.8million) of total 2019 expenditure. It is channeled towards several areas: (i) *discovery* entailing supporting testing of new concepts, such as business models for land restoration (ii) *tailoring knowledge for delivery*, translating research into a investable process or product, such as working with the World Bank to get resource recovery and reuse into an investment program (iii) *influencing and stimulating dialogue* to support engagement in multiple policy and research fora promoting findings, and, for instance, supporting the Comprehensive Africa Agriculture Development Programme (CAADP) in understanding how to make a transition to renewable energy in its agricultural transformation plans; (iv) *policy engagement*, whereby research and knowledge is actively feeding a specific policy processes, such as influencing the UNCCD CoP decisions and papers; (v) *training* to take research findings into university curricula; and, finally, (vi) scaling promising tools, such as expanding use of M&E tools in land management in India and Kenya. Refer to Table 12 for examples.

In 2019, WLE launched new W1/W2-funded initiatives, selected based on criteria including a strong outcome focus, addressing critical gaps in the program and looking strongly towards sustainability options. These projects kicked off in the latter part of the year on: Gender and Decision Making in Landscape Restoration; Sustainable Foods; Business Models in Natural Resource Management; Resource Recovery and Reuse Partnerships with FAO; and Gender and Wetlands in Myanmar. WLE also launched the Commission on Sustainable Agricultural Intensification (CoSAI) project in 2019.

## 3. Financial Summary

The 2019 expenditure budget included in WLE's Plan of Work and Budget (POWB) was USD 32m, comprising USD 9.2m of W1/W2 funds, and USD 23m in W3/ Bilateral/ Center funds. W1/W2 total expenditure was USD 7.8m. The balance of W1/W2 funding has been allocated to the Commission on Sustainable Agricultural Intensification (CoSAI) and a series of new strategic research initiatives, launched in late 2019.

Bilateral expenditure was USD 24m. Flagships 2, 4 and 5 all showed an increase in bilateral funding compared to the POWB. Although this is denoted in the reporting format of Table 13 by a negative balance, this is considered a gain, since bilateral funding was higher than anticipated. Flagships 1 and 3 leveraged lower amounts of bilateral funding than expected, denoted in Table 13 by a positive balance. The bilateral expenditure recorded is that which is directly received, used and accounted for in the financial reports of our partners. Many WLE partners have successfully leveraged bilateral funding via co-investment by project partners - such funding is not accounted for in CGIAR accounting or in Table 13.

Late in 2019, Swedish International Development Cooperation Agency (Sida) announced that it would allocate funds to WLE via Windows 2. This has allowed for an increase in budget and scope of COSAI, as well as the development of a series of further initiatives to be supported by WLE in 2020. This late allocation increased WLE's total 2019 W1/W2 allocation to USD 10.5m, from the planned USD 9.2m. Ultimately the 2019 allocation was USD 2.5m higher than the 2018 allocation. This represents a significant growth to WLE which has always been one of the smaller CRPs. Windows 1

funding to WLE continues to be low, as a proportion of W1/W2, and is likely to remain as such, since Sida has just announced (in April 2020) that it will continue to support WLE until the end of the current CRP business cycle.

# PART B: TABLES

**Table 1: Evidence on Progress towards SRF targets (Sphere of interest)**

| SLO Target (2022) | Brief summary of new evidence of CGIAR contribution | Expected additional contribution before end of 2022 |
|---|---|---|
| 100 million more farm households have adopted improved varieties, breeds, trees, and/or improved management practices. | No new evidence in 2019 | |
| 30 million people, of which 50% are women, assisted to exit poverty | No new evidence in 2019 | |
| 2.5 million ha of forest saved from deforestation | No new evidence in 2019 | |
| Improve the rate of yield increase for major food staples from current < 1% to 1.2-1.5% per year | No new evidence in 2019 | |
| 30 million more people, of which 50% are women, meeting minimum dietary energy requirements | No new evidence in 2019 | |
| 150 million more people, of which 50% are women, without deficiencies of one or more of the following essential micronutrients: iron, zinc, iodine, vitamin A, folate, and vitamin B12 | No new evidence in 2019 | |
| 10% reduction in women of reproductive age who are consuming less than the adequate number of food groups | No new evidence in 2019 | |
| 5% increase in water and nutrient (inorganic, biological) use efficiency in agro-ecosystems, including through recycling and reuse | No new evidence in 2019 | |
| Reduce agriculturally-related greenhouse gas emissions by 0.2 Gt CO2-e yr–1 (5%) compared with business-as-usual scenario in 2022 | No new evidence in 2019 | |
| 55 million hectares (ha) degraded land area restored | No new evidence in 2019 | |

## Table 2: Condensed list of policy contributions in this reporting year (Sphere of Influence)

| Title of policy, legal instrument, investment or curriculum to which CGIAR contributed (max 30 words) | Description of policy, legal instrument, investment or curriculum to which CGIAR contributed (30 words). See guidance for what to cover. | Level of Maturity | Link to sub-IDOs (max. 2) | CGIAR cross-cutting marker score | | | | Link to OICR (obligatory if Level of Maturity is 2 or 3) or link to evidence (e.g. PDF generated from MIS) |
|---|---|---|---|---|---|---|---|---|
| | | | | Gender | Youth | Capdev | Climate Change | |
| 396 - Support for development of new National Seed Policy aimed at improving food production in Uganda | To guide and regulate the seed sub-sector to ensure availability and access of safe, high quality seed to all stakeholders for increased food/nutritional security, household income, wealth creation/export earnings. | Level 1 | • Reduced market barriers<br>• Conducive agricultural policy environment<br>• Appropriate regulatory environment for food safety | 1 - Significant | 1 - Significant | 1 - Significant | 1 - Significant | This document is a description of the policy change process, along with supporting evidence. It contains responses for several Outcome Impact Case Report (OICR) questions, but WLE decided not to submit a full OICR this year. Contents below have been collated and reviewed by WLE's MELIA representative and an external reviewer. LINK TO SHORT OICR: https://cgiar.sharepoint.com/:w:/s/WLE/Ecx8xe6y4FtClJpED1jN3JIBF8CLGp-vWZ0ZEALk5PGQHQ?e=pbgtAL |
| 399 - Recommendations on soil carbon management and monitoring accepted by the United Nations Convention to | WLE/ICRAF co-led technical report team on improving soil carbon management and monitoring. Recommendations adopted by the 197 Conference of the | Level 1 | • Land, water and forest degradation (Including deforestation) minimized and reverse | 0 - Not Targeted | 0 - Not Targeted | 0 - Not Targeted | 1 - Significant | This document is a description of the policy change process, along with supporting evidence. It contains responses for several Outcome Impact Case Report (OICR) questions, but WLE decided not to submit a full OICR this year. Contents below have been collated and reviewed by WLE's MELIA representative and an external reviewer. LINK TO SHORT OICR: |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Combat Desertification (UNCCD) Conference of the Parties | Parties at the UNCCD COP14. | | | | | | | https://cgiar.sharepoint.com/:w:/s/WLE/EeWenaTKpplCsb_YQGOMUhEBKQf2RH-B9k7adSeOn5_ifg?e=PAPnpv |
| 417 - Support to the Government of Ethiopia's Soil and Agronomic Data Sharing Policy | CIAT/WLE with GIZ supported the Government of Ethiopia to develop and launch data sharing policy. The policy will improve sharing/access problems that result in duplication of efforts and undermine innovation. | Level 2 | • Closed yield gaps through improved agronomic and animal husbandry practices<br>• Conducive agricultural policy environment<br>• Increased capacity of partner organizations, as evidenced by rate of investments in agricultural researc | 0 - Not Targeted | 0 - Not Targeted | 1 - Significant | 0 - Not Targeted | OICR3257 |
| 502 - Availability models and tool for irrigation planning incorporated into Nepal's National Irrigation Master Plan | Nepal's new irrigation master plan incorporated WLE/IWMI models and environmental flow calculator. This will revolutionize irrigation planning by ensuring it accounts for | Level 2 | • Enhanced capacity to deal with climatic risks and extremes (Mitigation and adaptation achieved) | 0 - Not Targeted | 0 - Not Targeted | 0 - Not Targeted | 1 - Significant | OICR3360 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | upstream/downstream linkages and multiple water uses | | | | | | | |
| 505 - Uzbekistan agricultural development strategy 2020-2030 | The new strategy incorporates innovative water measurement and accounting tools developed by WLE/IWMI | Level 1 | • Agricultural systems diversified and intensified in ways that protect soils and water<br>• Conducive agricultural policy environment<br>• Enhanced conservation of habitats and resources | 0 - Not Targeted | 0 - Not Targeted | 0 - Not Targeted | 1 - Significant | This document is a description of the policy change process, along with supporting evidence. It contains responses for several Outcome Impact Case Report (OICR) questions, but WLE decided not to submit a full OICR this year. Contents below have been collated and reviewed by WLE's MELIA representative and an external reviewer. LINK TO SHORT OICR: https://cgiar.sharepoint.com/:w:/s/WLE/EcXCMZC7QR1Ng9WMy6QU3hgBIidK13dlZRV21Uu2NABLkQ?e=LhKGuS |
| 506 - Municipal Food Security Policy for a more integrated food security plan for the Cali urban region, Colombia | Cali, Colombia, adopted a comprehensive municipal food security policy. This plan emerged from WLE/CIAT research and consultations, to improve the food security of the poorest consumers in the region | Level 2 | • Conducive agricultural policy environment | 1 - Significant | 1 - Significant | 1 - Significant | 1 - Significant | OICR3363 |
| 507 - Laos national | New law and groundwater action | Level 2 | • Enhanced capacity to | 1 - Significant | 0 - Not Targeted | 1 - Significant | 1 - Significant | OICR3364 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| groundwater action plan and irrigation strategy & revised water resources law | plans and strategies were informed by WLE/IWMI research and capacity building. These will enable sustainable productive use of groundwater for irrigation | | deal with climatic risks and extremes (Mitigation and adaptation achieved) | | | | | |
| 508 - The Vietnam Ministry of Agriculture and Rural Development has endorsed the policy recommendations on managed aquifer recharge (MAR) as a new agricultural extension tool | WLE/IWMI several years work on managed aquifer recharge has taken a major step towards sustainable management of groundwater for irrigation | Level 1 | • Enhanced capacity to deal with climatic risks and extremes (Mitigation and adaptation achieved) | 0 - Not Targeted | 0 - Not Targeted | 1 - Significant | 1 - Significant | This document is a description of the policy change process, along with supporting evidence. It contains responses for several Outcome Impact Case Report (OICR) questions, but WLE decided not to submit a full OICR this year. Contents below have been collated and reviewed by WLE's MELIA representative and an external reviewer. LINK TO SHORT OICR: https://cgiar.sharepoint.com/:w:/s/WLE/EffW0egILjFPvXw6UCAohNMBAEXTDVUvSqgGVo6TXedUYA?e=GFDWuv |
| 509 - Research feeds into World Bank guidance on irrigation-nutrition linkages | The World Bank developed new guidance for irrigation task team leads on nutrition-sensitive irrigation and water resources management based on WLE/IWMI research (Projects P490 and P492 have both contributed). | Level 1 | • Increased availability of diverse nutrient-rich foods | 1 - Significant | 0 - Not Targeted | 1 - Significant | 0 - Not Targeted | http://hdl.handle.net/10986/32309 |

## Table 3: List of Outcome/ Impact Case Reports from this reporting year (Sphere of Influence)

| Title of Outcome/ Impact Case Report (OICR) | Link to full OICR | Maturity level | Status |
|---|---|---|---|
| OICR3226 - Experiential games developed by WLE/PIM/IFPRI/ICRISAT are being scaled out to almost 250,000 households to improve ground and surface water governance in India | Link | Level 2 | New Outcome/Impact Case |
| OICR3257 - New Ethiopian Ministry of Agriculture data sharing policy supported by WLE/CIAT and GIZ to improve food production while building landscape health | Link | Level 2 | New Outcome/Impact Case |
| OICR3337 - WLE/ICRAF soil spectral technology impacting soil restoration strategies and investments are being scaled up from Africa to global use | Link | Level 2 | Updated Outcome/Impact case at same level of maturity |
| OICR3338 - WLE/Bioversity influenced the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) to focus on critical interdependencies of biodiverse ecosystems and food production | Link | Level 1 | New Outcome/Impact Case |
| OICR3339 - With strong WLE/Bioversity support, the EAT Lancet Commission study is transforming international food system and dietary guidelines for health and sustainability | Link | Level 1 | New Outcome/Impact Case |
| OICR3348 - Building community prosperity through scaling out WLE/ICRISAT agricultural water management interventions for sustainable crop intensification in Central India | Link | Level 2 | New Outcome/Impact Case |
| OICR3360 - Nepal's National Irrigation Master Plan adopts WLE/IWMI water availability calculations and tools | Link | Level 2 | New Outcome/Impact Case |
| OICR3362 - WLE/ICRISAT integrates smart water management tools and Innovation Platforms in small-scale Zimbabwean irrigation schemes to deliver enhanced water productivity, incomes, and conflict reduction | Link | Level 2 | New Outcome/Impact Case |

| | | | |
|---|---|---|---|
| OICR3363 - WLE/CIAT facilitated development and approval of the first municipal food security policy for Cali (Colombia) to support an integrated action plan | Link | Level 2 | New Outcome/Impact Case |
| OICR3364 - WLE/IWMI research and capacity building to support sustainable groundwater development and management in Laos influences policies and implementation programs | Link | Level 2 | New Outcome/Impact Case |

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

| Title of innovation with link | Innovation Type | Stage of innovation | Geographic scope (with location) |
|---|---|---|---|
| 1194 - Contour bunding has been a useful technology, preferred by farmers, to improve agricultural productivity and socio-economic gains | Production systems and Management practices | Stage 3: available/ ready for uptake (AV) | National, Mali |
| 1334 - Ethiopian Ministry of Agriculture's first data sharing policy put in place, showing benefits of data analytics on food security and landscape health issues including fertilizer dosage | Research and Communication Methodologies and Tools | Stage 2: successful piloting (PIL - end of piloting phase) | National, Ethiopia |
| 1335 - Building on the social capital of Community Seed Banks to go beyond seed dissemination for multiple uses including landscape management (eg. participatory selection of genetically diverse crops, landscape restoration) | Production systems and Management practices | Stage 1: discovery/proof of concept (PC - end of research phase) | National, Ethiopia |
| 1346 - Framework to assess data exchange in transboundary waters piloted in 25 river basins. Interest in adoption has been indicated by international agencies | Research and Communication Methodologies and Tools | Stage 2: successful piloting (PIL - end of piloting phase) | Global |
| 1354 - Developing government capacity in geospatial tools for land water analysis in Myanmar, enabling rice crop flood-damage prevention measures to be taken, based on up-to -date data | Other | Stage 3: available/ ready for uptake (AV) | National, Myanmar (Burma) |
| 1497 - Business model for landscape restoration called LandscapeCPR developed for Kenya (Makueni County). This business model was selected as one of 8 finalists of the Climate Lab. | Other | Stage 1: discovery/proof of concept (PC - end of research phase) | National, Kenya |
| 1498 - Cropping system sustainability tool 'CROSST' is an Excel-based tool assessing both agro-environmental and socio-economic impacts of Green Manure Cover Crop (GMCC) technologies | Production systems and Management practices | Stage 3: available/ ready for uptake (AV) | Regional, Sub-Saharan Africa |

| | | | |
|---|---|---|---|
| 1499 - Suitability of solar irrigation mapping tool tested in Mali, Ethiopia and Ghana, rolling out for sub-Saharan Africa | Production systems and Management practices | Stage 2: successful piloting (PIL - end of piloting phase) | Regional, Sub-Saharan Africa |
| 1501 - Use of experiential games as a tool to help communities improve groundwater governance | Production systems and Management practices | Stage 4: uptake by next user (USE) | National, India |
| 1502 - Diversity assessment tool for agrobiodiversity and resilience (DATAR) | Research and Communication Methodologies and Tools | Stage 1: discovery/proof of concept (PC - end of research phase) | Global |
| 1505 - Resource Recovery and Reuse business models have been incorporated into university curricula | Research and Communication Methodologies and Tools | Stage 3: available/ ready for uptake (AV) | Global |
| 1506 - City Region Food System toolkit (RUAF/FAO) has been tested, with climate change vulnerability included in the assessment. Studies focus on 5 pilot cities. | Research and Communication Methodologies and Tools | Stage 1: discovery/proof of concept (PC - end of research phase) | Global |
| 1507 - Guideline on setting up Water User Associations and supporting institutions in pump based irrigation schemes | Production systems and Management practices | Stage 3: available/ ready for uptake (AV) | National, Myanmar (Burma) |
| 1508 - A Knowledge brokering framework for integrated landscape management | Production systems and Management practices | Stage 1: discovery/proof of concept (PC - end of research phase) | Global |
| 1509 - The Royal Swedish Academy of Engineering Sciences selected the Global Soil Data Manager application as one of the top 60 innovative ideas. | Research and Communication Methodologies and Tools | Stage 1: discovery/proof of concept (PC - end of research phase) | Global |
| 1521 - Milan Urban Food Policy Pact (MUFPP) Indicator Framework with gender lens, field tested | Research and Communication Methodologies and Tools | Stage 2: successful piloting (PIL - end of piloting phase) | National, Kenya |

## Table 5: Summary of status of Planned Outcomes and Milestones (Sphere of Influence-Control)

| FP | FP Outcomes 2022 | Sub-IDOs | Summary narrative on progress against each FP outcome this year. | Milestone | 2019 milestones status | Provide evidence for completed milestones (refer back to means of verification, and link to evidence wherever possible) or explanation for extended, cancelled or changed | Link to evidence |
|---|---|---|---|---|---|---|---|
| F1 | F1 Outcome: 1.1: Better informed landscape restoration policies, approaches and interventions<br><br>[related WLE sub-IDO indicator: Number of countries in which governments, agencies and local stakeholders invest in research based strategies and programs targeting adoption of | • Increased resilience of agro-ecosystems and communities, especially those including smallholders | Development of a variety of decision support tools, investment options, business cases and pilots proceeded to inform and influence application of sustainable intensification, soil management and application of agrobiodiversity in land restoration in 10 countries (Kenya, Benin, Ethiopia, Tanzania, Bangladesh, Uzbekistan, Jordan, Colombia, Peru and El Salvador). There was special attention paid to how a focus on gender and equity issues can positively impact restoration and soil health interventions. | 2019 - Empirical evidence on good practices for gender-equitable restoration consolidated and shared with restoration practitioners (in at least 12 projects, 3 countries) | Complete | Collected (1) cross-country comparative data on gender (Kenya and Burkina Faso), and (2) compiled practical strategies for enhancing gender equality in innovation platforms; and (3) considered how to integrate gender and social inclusion considerations in mathematical modeling focused on agriculture and natural resource management and (4) held dialogues on inclusion in restoration. | (1) Protocols and database: https://cgiar.sharepoint.com/:f:/s/WLE/Eh0tiXwn_CpGvyWroOv02vsB4w52meE2mmV-qJw7oJuDGA?e=3HAQI1 (confidential unprocessed data not for wider circulation) (2) Practical strategies for Innovation platformshttps://cgspace.cgiar.org/handle/10568/105448 (3) Integrating gender into modelling https://cgspace.cgiar.org/handle/10568/105449?show=full (4) Why gender matters in forest restoration workshop: https://www.bioversityinternational.org/news/detail/why-gender-matters-in-forest-restoration/ |
| | | | | 2019 - Decision support tools for targeting restoration interventions finalized and presented to key stakeholders to inform restoration plans or investments in at least two countries (e.g. Ethiopia, Kenya, El Salvador | Complete | Decision tools presented to decision makers: (1) for soil health management, globally; (2) in Africa; (3) for improving seasonal cropping choices in Bangladesh; (4) in El Salvador, digital soil and hydrological assessments for land restoration; (5) guidelines on sustainable intensification, conservation and restoration in Ethiopia; and, (6) a model for | (1) Global Soil Data Manager (GSDM) application: http://gsdm.ciat.cgiar.org and documentation here:http://gsdm.ciat.cgiar.org/docs/index.html. Blog: https://blog.ciat.cgiar.org/simplyfying-soil-data-management-in-sub-saharan-africa/ GSDM abstract: https://www.dropbox.com/s/qvooaa6o9khkztu/africagis2019_GSDM_John_Mutua.pdf?dl=0 (1) Certificate of Royal Swedish Academy of Engineering Sciences top 60 innovative idea: (https://www.dropbox.com/s/018enp08zgwvi6e/iva.pdf?dl=0) and |

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| | restorative and preventative practices against land degradation] | | | | | ecosystem service valuation in soil fertility in Kenya. | (https://www.dropbox.com/s/4mldl44k9qsn78m/iva.mp4?dl=0) (2) Presentation of African Soil Data Manager https://www.dropbox.com/s/ptbmer1uj4426lj/Programme_Mapping%20in%20R.pdf?dl=0 and the Agri4D 2019 conference, abstract and Rwanda abstract: https://www.dropbox.com/sh/krful20r9qzko4w/AAB5SKtAo-_v1gsaSHcUO5lta?dl=0 and on translating science to policy and practice. https://www.dropbox.com/s/hae0o1v4rara18y/GSDM2.pptx?dl=0 (3) New InVEST model application to improve seasonal cropping allocation decisions in Bangladesh for food and environmental security, abstract for 2020 Agricultural and Applied Economics Association https://www.dropbox.com/s/ygl0kerl9l5vmtn/AAEA_BGD_abstract%202020.pdf?dl=0 (4) Presentation of a Digital Soil Mapping (DSM) tool https://hdl.handle.net/10568/106784 and https://hdl.handle.net/10568/106786 with recommendations on how to mitigate erosion https://hdl.handle.net/10568/106788 and a hydrological assessment https://hdl.handle.net/10568/106791 and outcomes in short 2019 OICR https://cgiar.sharepoint.com/:w:/s/WLE/Ea7AwPYbWt5CrHycfJnE19IB9eqeEFnQh3LMYFcPqPiQrw?e=9QQgf1 (5) Models and guidelines for implementing production-conservation synergies in natural reserve of Ethiopia: https://bit.ly/34ZJgjr https://bit.ly/2VRmeHl https://bit.ly/2XZCZ67 (6) 2020 Natural Capital Symposium poster (paper in prep) on ecosystem services valuation in Kenya https://www.dropbox.com/s/so8e5483qe1dtob/NatCap%20symposium%20poster%20abstract_31Jan2020_submit.docx?dl=0 |
| | | | | 2019 - Land restoration investment cases, built on scientific evidence generated from pilots | Complete | Business models and investment cases built and shared with decision makers in three countries: (1) for silvopastoral systems in degraded | (1) Colombian financial case: https://cgiar.sharepoint.com/:p:/s/WLE/EevTzLkRYtBHmaJ184VZH3YByL8Oio4bXTnb8bjBlYqUJg?e=eQtswd and Bancolombia's (with CIAT inputs) presentation of |

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| | | | | implemented during 2016-2018, are finalized and shared with key public/private sector stakeholders in two countries (Kenya, Colombia and Peru). | | landscapes in Colombia; (2) for landscape restoration in Makueni District in Kenya; (3) to support zero deforestation in Peru through value chain strategies. | the financial instrument for silvopastoral systems: https://cgiar.sharepoint.com/:p:/s/WLE/Ecjd4pq6dzBEu0duh0-LL9oB_JdTkl4KAemxfyoOcxO0dg?e=TjcsGR (2) Makueni business model: https://hdl.handle.net/10568/106710; Video: https://youtu.be/CegAwV5vbk4 were widely shared. Also a Climate Lab finalist and announcement: http://ow.ly/oKPK50yDdHg with Lab 2020 Ideas landing page and description of business model: http://ow.ly/ppQB50yDLTZ and a paper on links between adaptation, disaster risk reduction, and land restoration in Kenya: https://hdl.handle.net/10568/107739 (3) Zero-deforestation value chain strategies for restoring degraded lands in Ucayali, Peru. Cacao: https://cgiar.sharepoint.com/:w:/s/WLE/ESm8h9Tw-jpMm-slbkqMVWkBqrZ_rgDXtG3XY3q01dRpow?e=U5tjNA (not for wider circulation - under review by government). For oil palm: https://cgiar.sharepoint.com/:w:/s/WLE/EQnUvxjHZEZHnivSk1-C42QBuWrdeDAwaXkZKsmMKnHx8w?e=SAYes5 (not for wider circulation under review by government). Promotional materials: training workshop on value chain strategy methods https://www.facebook.com/region.deucayali/videos/vb.1557935697858127/354027755141803/?type=2&theater and https://www.facebook.com/1557935697858127/posts/2280589858926037/?sfnsn=mo and https://twitter.com/CIAT_/status/1131236800763170816 with creation of platforms for designing value chain strategies and business models https://twitter.com/CIAT_/status/1146790910564478977?s=19; https://twitter.com/CIAT_/status/1148286791449026560?s=19 and blog https://blog.ciat.cgiar.org/es/avanza-proyecto-sab-en-peru-con-talleres-de-actores-en-cacao-y-palma-de-aceite/ |

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| | F1 Outcome: 1.2 Policies, strategies, and interventions investing in practices that rehabilitate or protect soil fertility and soil carbon.<br><br>[related WLE sub-IDO indicator: Number of countries where climate financing, national strategies and programs invest in research based practices to | • Reduced net greenhouse gas emissions from agriculture, forests and other forms of land-use (Mitigation and adaptation achieved) | Practices for improving soil fertility and soil carbon were assessed in Ethiopia, Tanzania, Southern Africa and Sub-Saharan Africa. Soil carbon sequestration potential and micronutrients deficiencies mapped at the regional and continental level in Africa. Guidelines for soil carbon assessments adopted by United Nations Convention to Combat Desertification (UNCCD). | 2019 - Strengthened capacity of national science institutions to monitor and verify soil carbon stocks and measure soil health in land restoration and management projects in two East African countries. | Complete | Capabilities in soil health strengthened through (1) recommendations on sustainable fertilizer use based on evidence of crop non-responsiveness to fertilizers; (2) strengthening crop nutritional quality through analyses of links between micronutrient deficiencies and soil quality management; (3) assessing tillage and residue management on runoff, soils, and yield in Ethiopia; (4) validation of a soil fertility decision guide in Tanzania; and (5) support to the adoption of a new data sharing policy in Ethiopia. | (1) Non-responsiveness of crops to fertilizers in sub-Saharan Africa https://doi.org/10.7910/DVN/GXUNAZ, and lessons from sub-Saharan Africa on soil health and ecosystem services (under review please do not distribute): https://www.dropbox.com/s/nllneaq0xnnut7w/GEODER_2019_1577_Revision%201_25022020.pdf?dl=0 (2) Micronutrient deficiencies in African soils and links to human nutrition https://link.springer.com/article/10.1007/s10653-019-00499-w and a blog: https://www.slu.se/globalassets/ew/org/andra-enh/uadm/global/agrifose/outputs/briefs/biofortification-sept19.pdf and a keynote presented at Naivasha Kenya: http://www.kalro.org/soilscienceconference/wp-content/uploads/2019/11/Book-of-Abstract-and-Programme.pdf (3) Effects of tillage and crop residue management in the Humid Highlands of Ethiopia. https://doi.org/10.1016/j.agsy.2018.10.007 (4) Farmer decision guide on site-specific nutrient management https://cgspace.cgiar.org/handle/10568/107779 (5) Full 2019 OICR on new Ethiopian Ministry of Agriculture Data Sharing Policy. https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3257&cycle=Reporting&year=2019 |

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| | build soil fertility and soil carbon, providing food security, adaptation and mitigation benefits] | | | 2019 - Mapping, quantification and technical analysis of soil carbon sequestration benefits from sustainable land management (SLM) in six watersheds in Ethiopia is completed and made available for policymakers at UNCCD CoP14 and UNFCCC COP. | Complete | Building on soil carbon and land management work (1) outputs fed the UNCCD soil carbon management recommendation and (2) gender-youth recommendations; (3) achievable soil carbon sequestration was mapped in Kenya and Ethiopia; (4) soil structure degradation risks mapped for Southern Africa; (5) land restoration impacts on ecosystem services were assessed in Ethiopia; and (6) an assessment of land degradation management measures. | (1) UNCCD report of the Conference of the Parties 14, Decision 16, pp. 46-49 (WLE author E Aynekulu) (https://www.unccd.int/sites/default/files/sessions/documents/2019-12/ICCD_COP%2814%29_23_Add.1-1918355E.pdf), on soil carbon and land management (http://catalogue.unccd.int/1209_UNCCD_SPI_2019_Report_1.1.pdf), and soil carbon estimation tools (https://knowledge.unccd.int/publication/tools-soil-organic-carbon-estimation-and-management-science-policy-brief), and publicity https://www.downtoearth.org.in/news/environment/unccd-cop-14-report-on-soil-organic-carbon-released-66490 and a short 2019 OICR (https://cgiar.sharepoint.com/:w:/s/WLE/EeWenaTKplCsb_YQGOMUhEBKQf2RH-B9k7adSeOn5_ifg?e=5E0Xnj). (2) UNCCD document (P. 46-49) https://www.unccd.int/sites/default/files/sessions/documents/2019-12/ICCD_COP%2814%29_23_Add.1-1918355E.pdf (3) Hotspots mapping for achievable soil carbon sequestration: http://catalogue.unccd.int/1209_UNCCD_SPI_2019_Report_1.1.pdf and an evaluation of a model of SOC dynamics in western Kenya: https://cgiar.sharepoint.com/:b:/s/WLE/EV0TP0Y8DgROnQVcRJ6Jza8B7OdwX4KmpHnMfeSFO6KDXg?e=m8NFhm and adoption of technologies that enhance soil carbon sequestration in East Africa https://www.sciencedirect.com/science/article/pii/S2095633919301972 and a systematic review of barriers and enablers of adoption of soil carbon enhancing practices https://link.springer.com/article/10.1007/s42452-019-1747-y (4) Soil structural degradation and nutrient limitations in Southern Africa: https://onlinelibrary.wiley.com/doi/abs/10.1002/ldr.3302 (5) Land restoration in Ethiopia pays off but climate change necessitates many strategies: https://onlinelibrary.wiley.com/doi/full/10.1002/ldr.3424 and: https://phys.org/news/2019-10-ethiopia- |

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| | | | | | | | climate-necessitates-strategies.html (6) https://cgspace.cgiar.org/handle/10568/106885?show=full |
| | | | | 2019 - National level engagement with key stakeholders in Uganda around the results of a soil health, land management and gender analysis leading to an improved understanding of how to deliver more gender responsive land management policies and decisions. | Complete | Linkages (1) between gender, soil health and poverty dynamics clarified and, (2) shared with policymakers and (3) university researchers. Considerable media exposure raised awareness. | (1) 'Gender, soil fertility management, and poverty dynamics in Uganda' and 'Soil health and gender: why and how to identify the linkages' under review at International Journal of Agricultural Sustainability. Earlier version: http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/133203/filename/133414.pdf. (2) A Blog and local media interviews by New Vision (Uganda) and a news article on the soil fertility research: https://www.ifpri.org/news-release/how-agro-forestry-restores-soil-fertility-new-vision (3) Presentation to Makerere University attended by over 80 participants and the media. https://www.dropbox.com/s/4w2tvviv2pxrziq/Ephraim%20presentation_gender%20%26%20soil%20fertility%20mngt%20%26%20povery%20dynamics%20in%20Uganda.pdf?dl=0 |
| | F1 Outcome: 1.3 Strengthen approaches to the monitoring and evaluation of land restoration and the assessment of land degradation risks.<br><br>[related WLE sub-IDO indicator: | • Increased capacity of partner organizations, as evidenced by rate of investments in agricultural research | WLE's decision analysis frameworks for planning and performance measurement of land restoration efforts were further developed and applied with local partners in Burkina Faso, Ethiopia (2), Kenya, and India. The Burkina Faso case evaluated alternative interventions for protecting a reservoir from siltation. The Ethiopia cases evaluated alternatives for forest landscape restoration and irrigation developments. In Kenya there was close partnership with county-level government and stakeholders to target and co-design land restoration investments. In India, an integrated framework was tested for monitoring, evaluating, and | 2019 - Integrated monitoring and evaluation approach, tools and analysis that builds on existing development activities for three land restoration initiatives scaled out in two countries (India and Mali). | Changed | M&E tools development continued with (1) co-design of stakeholder and cross-sectoral engagement processes in Kenya for better targeting of land restoration investments (2) co-design of an integrated framework for monitoring, evaluating, enhancing effectiveness of degraded land restoration in India; (3) exploration of mitigation benefits from expansion of trees on rangeland in Colombia and Sierra Leone (Mali replaced by other countries). | (1) Summary of work in Makueni County [Kenya] Government https://www.dropbox.com/s/u51uor40vl4jq0c/Makueni%20Land%20Health%20Stakeholder%20Engagement_oct2019_Tor.pdf?dl=0 (2) Integrated framework https://www.dropbox.com/s/sv71uxng0fzl9qp/RDL%20-%20MEL%2C%20Hughes.pptx?dl=0 (3) A proof of concept of mitigation benefits from tree expansion on rangeland, Colombia. (https://cgspace.cgiar.org/bitstream/handle/10568/106727/Aynekulu%20et%20al_2019_CCAFS%20WP%20295_silvopastoral%20systems%20Colombia.pdf?sequence=5&isAllowed=y) and the relationship between carbon stocks and tree species diversity in Northern Sierra Leone https://www.tandfonline.com/doi/abs/10.2989/20702620.2018.1555947 |

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| | Number of countries that adopt and have trained staff in land restoration surveillance, planning and verification frameworks] | | enhancing the effectiveness of initiatives designed to restore degraded land in commonly managed land. | | | | |
| | | | | 2019 - Decision Analysis Framework and tools for Planning and Performance Measurement of Land Restoration is extended to three land restoration initiatives in two countries (Ethiopia and Kenya) leading to more contextually relevant restoration investment decisions. | Complete | Decision analysis tools applied to improve the effectiveness and efficiency of development interventions. Applied to evaluate (1) forest restoration and irrigation development outcomes in Northern Ethiopia; (2) to improve reservoir management in Burkina Faso; and, (3) global forest restoration potential for carbon management. | (1) Stochastic Decision Support Tools in Northern Ethiopia. Draft. https://www.dropbox.com/s/0m5wx2ywcj2rttf/22.%20Evaluation%20of%20agricultural%20development%20investments%20under%20multiple%20risks%20using%20Bayesian%20Networks_Draft.docx?dl=0 (1) Data for evaluation of irrigation development interventions: https://doi.org/10.1016/j.scitotenv.2019.06.133 (2) Reservoir protection in Burkina Faso: https://doi.org/10.1016/j.envsoft.2019.01.016 (3) Forest restoration: Overlooked constraints. https://science.sciencemag.org/content/366/6463/315 |
| | | | | 2019 - Spectral-based soil information systems and Taking Agronomy to Scale Initiatives are scaled up to five additional African countries | Complete | (1) A soil spectroscopy network established through the Global Soil Laboratory Network (GLOSOLAN); (2) Innovative Solutions for Decisions in Agriculture (iSDA), a new social enterprise was launched to scale digital soil assessment solutions. | (1) The GLOSOLAN meeting minutes http://www.fao.org/3/ca7113en/ca7113en.pdf http://www.fao.org/global-soil-partnership/resources/events/detail/en/c/1177427/ and the WLE/ICRAF soil spectral technology (Full 2019 OICR https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3337&cycle=Reporting&year=2019) (2) https://www.isda-africa.com |

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| F2 | F2 Outcome: 2.1 Policy and practice informed by more effective agricultural land and water management solutions and investment options<br><br>[related WLE sub-IDO indicator: Number of countries in which AWLM solutions have been adopted into policy, practice and/or investment] | • Reduced smallholders production risk | Flagship 1 is collaborating with African and Asian countries to test and support implementation of innovative land and water policies and practices at scale. This includes mapping of, and public-private partnerships for scaling out and assessing the impact of, solar irrigation in Africa and Asia; mainstreaming solar power as a remunerative crop (SPaRC) in India; scaling out watershed innovations; mapping irrigation suitability in the Nile Basin; and demonstrating the potential of shallow groundwater for irrigation in Africa. | 2019 - Agriculture, land, water management (ALWM) investment options shared in 2018, are further refined with stakeholders during out scaling of these technologies in 2 countries (or states) | Complete | Continue to bring ALWM solutions piloted through demonstration projects in more than five countries to policy makers and practitioners, including (1) work on solar irrigation including development of solar suitability mapping tools (2) expansion of work on solar irrigation from India to new countries in South Asia; (3) outreach on solar technology. In addition, work to (4) investigate climate impacts on small scale irrigation, and groundwater availability and potential for irrigation expansion, and links to food security and nutrition were conducted in Ghana and Ethiopia, including (5) in Ethiopia how the potential for irrigated vegetable production could be increased and (6) how practices such as conservation agriculture can positively reinforce small scale irrigation efforts. Institutional aspects of AWLM were also investigated, through (7) work in Myanmar on water user associations and a strategic overview (8) of what it will take to expand small scale farmer irrigation in Africa. | (1) Online tool for solar irrigation suitability mapping: http://waterdata.iwmi.org/applications/l_solar/ (2) Farmer-led solar irrigation in Mali https://cgspace.cgiar.org/handle/10568/101594 and blog: https://wle.cgiar.org/solar-irrigation-counter-climate-vulnerability-and-improve-food-security-mali (2) A new project on inclusive and sustainable scaling of solar Irrigation in South Asia https://www.iwmi.cgiar.org/2020/02/press-release-project-makes-water-from-the-sun-for-climate-smart-farming/ (3) Session on scaling solar irrigation at the global climate smart agriculture conference: (https://globalcsaconference.org/scaling-solar-based-irrigation-learning-from-public-and-private-sector-initiatives/) and a blog (https://wle.cgiar.org/thrive/2019/10/28/how-do-we-scale-solar-irrigation-here's-what-experts-think) picked up by ACIAR (https://reachout.aciar.gov.au/how-do-we-scale-solar-irrigation-heres-what-the-experts-think and a blog in Impakter https://impakter.com/india-double-farmers-incomes-tackle-climate-change-technology-answer/ Also results from IWMI-TATA and solar business models in Africa presented at UNFCCC In Bonn in June: Session V: https://unfccc.int/playground-20/level-2/level-3/tems-m-off-grid-and-decentralized-energy-solutions-for-smart-energy-and-water-use-in-the-agri-food and at the World Future Energy Summit https://abudhabisustainabilityweek.com/en/the-week/wfes-expo-and-forums; and the Groundwater Project Inception meeting in Kathmandu and Dhaka and the Solar Irrigation in Southern Africa Think Tank in Cape Town http://www.wrc.org.za/news/symposium-presentations/ and a blog: Why water is so essential for healthier diets and zero hunger https://news.trust.org/item/20191015154325-a8cr6 (4) The effects of climate change on irrigation in Ghana |

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| | | | | | | | https://www.sciencedirect.com/science/article/pii/S0168169918311426?via%3Dihub (4) Paper on impacts of small scale irrigation in northern Ghana: https://www.sciencedirect.com/science/article/pii/S2212428418300744?via%3Dihub (4) On predicting shallow groundwater in Ethiopia https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/ and on insights on groundwater recharge https://ngwa.onlinelibrary.wiley.com/doi/full/10.1111/gwat.12801 (5) Constraints to vegetable production in Upper Blue Nile Basin, Ethiopia https://cgspace.cgiar.org/handle/10568/106352 (6) Conservation agriculture saves irrigation water in Ethiopia https://www.mdpi.com/2073-4441/11/10/2103 (7) Blog on Myanmar water user associations https://www.myanmarwaterportal.com/news/1506-local-inclusive-community-started-managing-water-for-their-farms-equally-in-pywat-ywar-village.html (8) Sustainable and equitable growth in farmer-led irrigation in Africa: https://cgspace.cgiar.org/handle/10568/100144 Policy brief on how to revolutionize smallholder irrigation in Africa: http://www.iwmi.cgiar.org/Publications/Success_Stories/PDF/2019/issue-24-revolutionizing-smallholder-irrigation-in-africa.pdf Relationship between household decision-making and income in small-scale irrigation in Africa: https://www.sciencedirect.com/science/article/pii/S0378377418305481 |
| | | | | 2019 - Evidence of what works for: AWLM, watersheds and marginalized groups, soil and water management, reservoirs, communal irrigation, translated into policy | Complete | Results of land management strategies and practices and land use mapping were published and presented, several of these were piloted in Ethiopia including (1) water spreading weirs (2) soil and water conservation measures (3) exclosures and other work (4) developed a better understanding | (1) Water spreading weirs in Ethiopia https://wle.cgiar.org/flooding-events-turned-farming-opportunities-innovation-transforms-livelihoods-pastoralists-ethiopia and summary poster https://wle.cgiar.org/harnessed-flood-water-re-greens-degraded-pastoral-lands-ethiopia (1) Papers on water-spreading weirs: https://www.cambridge.org/core/journals/renewable-agriculture-and-food-systems/article/water- |

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| | | | | recommendations and practitioner guidance and shared with national stakeholders. | | of sustainable land management. In India, the focus was on (5) demonstrating how to deliver livelihoods equitably and sustainably through watershed management approaches and (6) introduction of game methods to help farmers identify their own rules for management of water infrastructure. Other relevant initiatives included (7) mapping of cropland extent in India and changes in Malawi using new techniques for monitoring food supply and policy; (8) land restoration in Uzbekistan. | spreading-weirs-altering-flood-nutrient-distribution-and-crop-productivity-in-upstreamdownstream-settings-in-dry-lowlands-of-afar-ethiopia/9F891AFAD7197C649FC13DFDCE617CC3; and on flood-based land restoration and livelihoods: https://www.cambridge.org/core/journals/renewable-agriculture-and-food-systems/article/facilitating-livelihoods-diversification-through-floodbased-land-restoration-in-pastoral-systems-of-afar-ethiopia/A757DE59818450EF180A5D06B99D749E; and poster: https://www.cambridge.org/core/journals/renewable-agriculture-and-food-systems/article/facilitating-livelihoods-diversification-through-floodbased-land-restoration-in-pastoral-systems-of-afar-ethiopia/A757DE59818450EF180A5D06B99D749E (2) Assessing the impacts of soil and water conservation interventions on runoff and sediment yield Ethiopia: https://www.cambridge.org/core/journals/renewable-agriculture-and-food-systems/article/assessing-the-impacts-of-different-land-uses-and-soil-and-water-conservation-interventions-on-runoff-and-sediment-yield-at-different-scales-in-the-central-highlands-of-ethiopia/4F63E376EE1DAEB257043E7197E5B060 (3) Potential of exclosure-based conservation in Ethiopia: https://www.cambridge.org/core/journals/renewable-agriculture-and-food-systems/article/multicriteria-decisionsupport-system-to-assess-the-potential-of-exclosurebased-conservation-in-ethiopia/503FFF1F6BFB3F8140E97071961D2302 (4) Experiences in landscape management in the Ethiopian highlands https://cgspace.cgiar.org/handle/10568/107075 and a systematic assessment of land restoration performance https://www.slideshare.net/africa-rising/ar-landscapes and evaluating land restoration initiatives on ecosystem services in Ethiopia https://onlinelibrary.wiley.com/doi/full/10.1002/ldr.3424 (5) Full 2019 OICR https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3348&cycle=Reporting&year=2019 and |

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| | | | | | | | article https://elibrary.asabe.org/abstract.asp?aid=51078&t=2&redir=&redirType= (6) Experimental games for common water infrastructure in India https://www.sciencedirect.com/science/article/abs/pii/S0378377418312708?via%3Dihub (7) Mapping Cropland in South Asia using Landsat data https://cgiarcsi.community/2019/12/11/mapping-cropland-in-south-asia-using-landsat-data-on-google-earth-engine/ and mapping Crop Changes in Malawi https://cgiarcsi.community/2019/06/24/mapping-crop-type-changes-in-malawi-using-modis/ (8)short OICR https://cgiar.sharepoint.com/:w:/s/WLE/EcXCMZC7QR1Ng9WMy6QU3hgBIidK13dlZRV21Uu2NABLkQ?e=fbu0C8 on WLE influence around the Strategy on Agriculture Development of Uzbekistan for 2020-2030 (in Russian): https://lex.uz/ru/docs/4567337#4568274; which provides information on restoring land sustainably through improved use of irrigation for pistachio, almond and walnut trees. Website: http://centralasia.bioversityinternational.org/en/ |
| | F2 Outcome: 2.2. Improved management of new and revitalised medium to large scale irrigation schemes<br><br>[related WLE sub-IDO indicator: Number of medium and large irrigation | Agricultural systems diversified and intensified in ways that protect soils and water | Demonstrating through Agriculture Innovation Platforms, smart water management tools, water users' associations (WUA) and on-line irrigation benchmarking systems (OIBS) and asset management system (SAMS) the possibilities for revitalizing irrigation schemes at scale. These pilots are where government is engaged and convinced to invest in impactful interventions. For example, in Zimbabwe work in 13 schemes with 1698 farmers on 757 ha is being scaled to 30 more with Government involvement and continued donor support. | 2019 - Consolidate transferring knowledge from tested WLE solutions on farm level tools and management into demonstration in irrigated systems in two countries | Extended | This milestone has been extended into 2020, to enable time for national governments in at least 3 countries to combine on-farm and scheme performance tools to improve irrigation management. Other work included delivering insights on (1) how to achieve more productive uses of water in irrigation for climate smart objectives; getting a (2) prototype Systematic Asset Management System for assessing irrigation schemes tested and online, and including gender indicators into the Online Irrigation Benchmarking System; assessing (3) canal | (1) Prioritizing land and water interventions for climate-smart villageshttps://onlinelibrary.wiley.com/doi/full/10.1002/ird.2366 (2) The Systematic asset management system (register to access) and OIBS gender indicators http://oibsv3.iwmi.org/ (3) Canal irrigation performance and impacts https://cgspace.cgiar.org/handle/10568/101230 (4) ACIAR funded an extension in Zimbabwe to scale use of tools and innovation platforms https://www.aciar.gov.au/project/LWR-2016-137 and Full 2019 OICR demonstrating smart water management tools in small-scale irrigation schemes in Zimbabwe https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3362&cycle=Reporting&year=2019 |

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| | systems revitalized for increased sustainability and productivity] | | | | | irrigation performance in India; and(4) using smart water management tools in Zimbabwe to improve water productivity in small scale irrigation schemes. | |
| | | | | 2019 - National policymakers, academics and key stakeholders gain accesses to improved evidence base on small-scale irrigation through the publication of Special Issue of International Journal of Water Resources Development. | Extended | Printed issue (International Journal of Water Resources Development) planned for launch during XVII World Water Congress in Daegu, Korea, May 2020. | ACIAR confirmation letter funding open access https://cgiar.sharepoint.com/:u:/s/WLE/EUV-_5BN9TRHlrJLqFBDqtMB-zQjUuh1kheSDSq4jpLU4g?e=jtmIzb Outcome Impact Case Report on Zimbabwe https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3362&cycle=Reporting&year=2019 |
| | | | | 2019 - Tools and institutional recommendations for improved irrigation scheme management disseminated through engagement in key platforms and partnerships with national policy makers and other stakeholders (1 African, 2 Asian countries) | Complete | Tools for better irrigation scheme management are being further developed, and engagement in key platforms and partnerships is continuing to support outcomes. Sessions were held (1) with Alliance for a Green Revolution in Africa, Feed the Future Innovation Lab for Small Scale Irrigation, and the World Bank Group at Stockholm World Water Week, and with donors and development banks at the Water4Food conference. The irrigation benchmarking tools were discussed (2) with governments in India and Uzbekistan; and (3) the recommendations on how to set up Water User Associations for more sustainable and equitable irrigation scheme management was published as a handbook. Work in (4) Jordan looked to how to deliver | (1) Several sessions at Stockholm World Water Week (https://www.worldwaterweek.org/news/siwi-world-water-week) with (1) Water 4 Food conference https://waterforfood.nebraska.edu/-/media/projects/dwfi/documents/resources/2019-conference-proceedings.pdf?la=en (https://waterforfood.nebraska.edu/news-and-events/news/2019/08/proceedings-from-the-2019-water-for-food-global-conference, pp 20 and 80) and the WASAG 1st Forum Water For Food Conference http://www.fao.org/land-water/events/ws-forum/en/ (2) Workshop on Irrigation Benchmarking using OIBS/SAMS tool https://cgiar.sharepoint.com/:b:/s/WLE/EY11D_3CU39HhVLeWqP776kBZJ3Tq4NED-IHDVYZY0vxLw?e=qVPTFS and https://cgiar.sharepoint.com/:f:/s/WLE/EgLKvPxxvLRNudIbtztUs78BgRYrdM3MBCCtJf0-PUdo9w?e=w12K3T and workshop on fixed assets operational efficiency in water management (SAMS & OIBS tools), Tashkent https://cgiar.sharepoint.com/:b:/s/WLE/EXgorQwV2lFJtmEZfwIED2wBlhTvD6GqvxyJ4OM8iV3N_g?e=PQB6H |

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| | | | | | | behaviour changes in farmers in Jordan to facilitate more productive water use in irrigation. | O and https://cgiar.sharepoint.com/:f:/s/WLE/EmFMB6tflJVOtlKNLKiv31IBs2CO5mWnXlRjqnVBXDCCyQ?e=lePKht (3) Myanmar Water User Associations handbook (https://wle.cgiar.org/solutions/water-user-associations-pump-based-irrigation-schemes) and a brief on participatory management in Myanmar https://www.iwmi.cgiar.org/2019/04/people-power/ link (4) Need for behavior change for drought management in Jordan and the MENA region. https://www.iwmi.cgiar.org/2019/12/change-in-behaviour-needed-for-improved-drought-management-in-jordan-and-the-mena-region/ |

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| 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.<br><br>[related WLE sub-IDO indicator: Number of cities with increased capacity and evidence for stakeholders and policy makers to implement urban and peri-urban agriculture related policies, strategies and/or farming system innovations] | • Conducive agricultural policy environment | The RUAF Global Partnership collaborates with FAO and selected cities to better understand and strengthen City Region Food Systems for urban climate resilience.In addition, with the same partners a set of gender-sensitive indicators was developed for MUFPP cities, and the Framework was field tested in three cities, to date. | 2019 - Field tested methodology to assess and increase climate resilience in at least three city-region food systems. | Extended | The assessment methodology was field-tested in five pilot cities (1) (Quito, still ongoing) with outreach to MUFPP (200 cities) and CityFood (30 cities). The reports on the Dynamics and Planning of the City Region Food System of Quito were finalized and the review of existing approaches on climate resilience and city region food systems was also finalized and a two-day workshop held in Rome. Draft reports are available from the field tests in Tamale and Colombo (2) 6 draft training modules on city region food systems were developed. | (1) Synthesis report Quito https://cgiar.sharepoint.com/:b:/s/WLE/EbrzU7MKkGhKoJ_WEnG3tsUB8XDtRLdXJVRI3Npy_znBig?e=69Eqqc and the Quito Sustainability Plan https://cgiar.sharepoint.com/:b:/s/WLE/EZmJ7w-p8kJEufnooyUIbLsBM78-Lr4B5futTfm92ZhIiA?e=eWnduq -Quito Food Strategylink https://cgiar.sharepoint.com/:b:/s/WLE/EdkKJV33wedBuhiDIQT2_SoBDPbg2qOofKvoobAbSM9qsA?e=GVArjQ and rapid scans for Tamale and Colombo <p xmlns="http://www.w3.org/1999/xhtml">https://cgiar.sharepoint.com/:f:/s/WLE/EkgbVwG5i2tGvfrlvqleOwQB_SoQONUEZeC0Hge7lp2IvQ?e=nCAPnG and the (2) 6 (draft) training modules https://cgiar.sharepoint.com/:b:/s/WLE/EYRJlc8IuvpJmmWn6J3-RRoBj2tb6S-P1lNCFgrBB-rgDQ?e=TqGkGP |
| | | | | 2019 - Adoption of gender indicator recommendations into the Milan Urban Food Policy Pact (MUFPP) framework in four cities. | Extended | The Gender Indicator Framework (1) for assessing city region food systems for the Milan Urban Food Policy Pact (2) was field tested in (3) Nairobi, Quito, Antananarivo. These cities adapted/proposed new indicators, as applying gender lens is not easy, and the framework provides some clear guidance. Applying these gender indicators will be pursued further with cities. (4) These challenges will be described in a paper for UA magazine. (5) Framework indicators, and gender issues were included in training materials, Wageningen (CDI FSUS course, 30 participants) and at a Milan Urban Food Policy Pact meeting. A special issue on gender and urban | (1) MUFPP Gender Indicator Report https://cgiar.sharepoint.com/:b:/s/WLE/ETpI3_aPtEBAlP3H8ABY2PUBbh1Q8PcjfOW0bX_AzLwHvA?e=u6mcqq (2) MUFPP Monitoring Framework https://cgiar.sharepoint.com/:b:/s/WLE/Ea5nJgEPGH9LqfgIxGO565MBoloIQMp-eWxrzXp25gZJ0Q?e=eqHStv (3) Nairobi Report on MUFPP indicators https://cgiar.sharepoint.com/:b:/s/WLE/ESsxXcjSu-5Bhr91Hl229DEBMK5raTkuDZbaHc7wWZEn8A?e=v3ZPbF (5) FSUS CDI Training ppt and overview summary https://cgiar.sharepoint.com/:b:/s/WLE/EX7R0iqMa7BPvTiUkWfqx6YBDJnDpxeY4bxF-y-K1IWTCg?e=lDcYR4 |

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| | | | | | | agriculture is now in process for publication in 2020. | |
| | F3 Outcome: 3.2 Increased business capacities in nutrient, water and energy recovery from domestic and agro-industrial waste for intensified food crop production<br><br>[related WLE sub-IDO indicators: Increased number of business schools, training courses and start-up trainees with RRR business capacity] | • Increased capacity for innovation in partner development organizations and in poor and vulnerable communities | To increase recognition of waste as a business opportunity, curricula and an online course were designed for universities and schools. Pilot training program and direct engagements with universities generated keen interest to adopt the curriculum into their programs or incorporate selected modules in courses. Advisory services for key sanitation/RRR investors (World Bank and BMGF) in South Asia helped strengthen business capacities. Our support of waste-based standards in Sri Lanka is helping establish an enabling environment for RRR. The need to establish standards was an important lesson for scaling up waste-based fertilizer recommendations, resulting in milestone change. | 2019 - Six (plus) universities and business schools are using RRR teaching materials developed by WLE | Complete | Seven universities and business schools using the materials including: 1. Birla Institute of Technology & Science, India (M.E Sanitation Science Technology and Management program). 2. IHE Delft (Module – Sanitation Financing) 3. CEWAS school: in water entrepreneurship courses 4. RRR entrepreneurship training, TH Köln (run by CEWAS) 5. M.Sc. programs, AIT-Bangkok; 6. MSc, Makerere University, Uganda; 7. MSc at Ghent University. | Letters from the universities and schools https://cgiar.sharepoint.com/:b:/s/WLE/ETZQwp8_JxJKtCktOQ0snzgBo7BG-RZdBJRGjhazYQRrqw?e=67DPVz |
| | | | | 2019 - Completion of analysis of gender dynamics in resource recovery and reuse and inclusive business models | Extended | Completed the review of literature. The report will be completed by the second quarter of 2020. | |

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| 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) | We have continued with the development and trialing of innovative approaches for managing and mitigating the impacts of water variability. This includes updating of systems to maximize benefits from contemporary technologies (e.g. cloud-based systems), as well as continued focus on nature-based solutions and risk transfer mechanisms. We have continued with the development and trialing of innovative approaches for managing and mitigating the risks associated with floods and droughts, with a focus on gender equality and inclusion. | 2019 - Innovative approaches for mitigating flood and drought risk and exploiting potential flood benefits tested in four countries (India, Vietnam, Myanmar and Sri Lanka) with associated recommendations and plans for upscaling developed. | Complete | Progress on novel approaches to water risk management (1) Managed Aquifer Recharge for sustaining groundwater supplies for smallholder coffee production in Vietnam; (2) through hydrological characterization of different rice environments in flood based farming systems in the Ayeyarwady Delta in Myanmar. (3) Flood and drought monitoring for mitigating drought and flood risk has been achieved in all four countries and is documented, including locations with high impact identified, (4) insurance trials completed, information sent to government and other agencies, capacity building and (5) solutions integrated into national programs. | (1) Managed aquifer recharge https://hdl.handle.net/10568/106705 and linkages between irrigation practices and groundwater availability https://hdl.handle.net/10568/107078 Corresponding Short 2019 OICR: https://cgiar.sharepoint.com/:w:/s/WLE/EffW0egILjFPvXw6UCAohNMBAEXTDVUvSqgGVo6TXedUYA?e=pmpJHT (2) Hydrology and rice in Myanmar https://cgspace.cgiar.org/handle/10568/106828 (3) Drought Bulletin https://www.iwmi.cgiar.org/resources/drought-monitoring-system/drought-bulletin/ (4) Solutions for those managing risk in climate disasters https://www.iwmi.cgiar.org/2019/09/solutions-for-those-managing-risk-in-climate-disasters/ (5) Smallholder Agribusiness and Resilience Project Project Design Report (IFAD) https://www.ifad.org/en/document-detail/asset/41409009 |
| | | | | 2019 - WLE diagnostic and planning tools (particularly software) developed for flood and drought mitigation across Asia (Sri Lanka, Myanmar, Vietnam, India) are used and supported by national/state governments and UN-SPIDER. | Extended | This milestone was extended to enable recent (1) technological advances and new approaches (e.g. bundling) to be incorporated and to continue the work on Bundled Index Insurance implemented, in Bihar, India. The (2) satellite-based flood insurance was also tested as means for compensating Bangladeshi farmers for flooded crops. Partnering took place with (3) the South Asia Association for Regional Cooperation Disaster Management Centre of UN-SPIDER on emergency response. As a result of this work, there will be an extension to Afghanistan adoption of a Drought Early Warning System and the South Asia Drought | (1) Lessons of experiences the Index Based Flood Insurance in Bihar, India https://cgspace.cgiar.org/bitstream/handle/10568/107292/Pilot%20evaluation%20of%20IBFI%20in%20Bihar%20India_October%202019.pdf?sequence=1&isAllowed=y (1) Bundled Solutions of Index Insurance with Climate Information and Seed Systems https://hdl.handle.net/10568/103394 (2) High-tech insurance compensating Bangladesh's farmers https://wle.cgiar.org/high-tech-insurance-compensating-bangladesh%E2%80%99s-farmers-flooded-crops (1) and (2) New guidance for policymakers on satellite-based crop insurance https://wle.cgiar.org/new-guidance-policymakers-supporting-farmers-through-satellite-based-crop-insurance (3) UN-SPIDER conducts Institutional Strengthening Mission to Laos http://www.un-spider.org/news-and-events/news/un-spider-ism-lao-pdr-2019 |

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| | | | | | | Monitoring System platform customized in Google Earth Engine, which will roll-out 2020. | |
| | | | | 2019 - Guidance on what mechanisms enable disadvantaged groups to benefit from insurance vehicles delivered and disseminated to relevant government agencies, insurance companies and NGOs in India and Bangladesh | Complete | Two policy briefs published on (1) reducing vulnerability among smallholder farmers through index-based flood insurance in India and (2) Making Index-Based Weather Insurance in Bangladesh socially inclusive: challenges and options. | (1) Index-based flood insurance in India: https://wle.cgiar.org/reducing-vulnerability-among-smallholder-farmers-through-index-based-flood-insurance-india-equity (2) Socially inclusive index-based flood insurance in Bangladesh https://cgspace.cgiar.org/handle/10568/106032 and a paper: Unpacking Barriers to Socially Inclusive Weather Index Insurance https://www.mdpi.com/2073-4441/11/11/2235 |
| | 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 | In 2019 VCR moved from tools development to implementation of water-energy-environment-food nexus tools in various river basins and countries of Asia and Africa. To ensure wider uptake of WLE tools, researchers presented results at professional, university and policy settings; trained next users and participated in regional and other networks. | 2019 - Decision support tools that facilitate greater understanding of inter-sector trade-offs associated with different water management options developed and applied in at least one major basin in Africa and one in Asia. | Complete | Several analyses delivered including (1) Economic analyses (linked to environmental flows) to explore synergies and trade-offs between built and natural infrastructure in the Tana River Basin, Kenya; (2) Nexus analysis of three tributaries (Sekong, Sesan and Srepok) to the Mekong River; and (3) Applying hydrological models from the Koshi, Karnali and the Mahakali river basins contributed to Nepal Irrigation Master Plan. | (1) Quantifying the services of natural and built infrastructure in the context of climate change, Kenya https://www.iwmi.cgiar.org/2019/04/quantifying-the-services-of-natural-and-built-infrastructure-in-the-context-of-climate-change-the-case-of-the-tana-river-basin-kenya/ (2) Measuring, understanding and adapting to nexus trade-offs in Mekong transboundary river basins https://cgspace.cgiar.org/handle/10568/106357 (3) Full 2019 OICR - Nepal https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3360&cycle=Reporting&year=2019 and further details on the application of the model to Nepali river basin management https://www.iwmi.cgiar.org/2019/03/you-cant-manage-what-you-dont-measure/ |
| | | | | 2019 - Cohort of technical staff in relevant national and regional governments, as well as local partners, have new/improved knowledge, skills and | Complete | Several training activities took place: (1) Trained over 105 officials in technical skills, Nepal, Myanmar. (2) Also trained 25 officials, & 5 MSc students hydrometeorological monitoring of springsheds, Nepal. A workshop "Towards Inclusive Vision for Sustainable Water Futures in | (1) Myanmar workshop report: https://cgiar.sharepoint.com/:w:/s/WLE/EW3g3mv-7IdLtzL7RqFpxRgBrCsaz5AwHI__XYPznN-R-A?e=KfdcTJ Myanmar training manual: https://cgiar.sharepoint.com/:f:/s/WLE/EkIdse99se5Ei_QJyeLaDv0BgYd8zxBEP__Dz4pJu0LCbg?e=J2pNYx (2) NepalDigo Jal Bikas project annual report http://djb.iwmi.org/wp- |

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| | | | | confidence to employ nature-based solutions for improved surface and groundwater management. | | Western Nepal", attracted 100 participants (41 women and 60 men). (no link available) 4 African young professionals gained experience in conjunctive water management. (no link available) | content/uploads/sites/6/2020/03/Year3_AnnualPerformance_Report.pdf (P. 25) |
| | | | | 2019 - Completion of analysis of Africa wide potential and trade-offs for solar-irrigation assessed across water-energy-food dimensions. | Complete | Presentation (1) of draft results at various venues and presentation of final results at AGU. Paper: "Solar or diesel: a cost comparison for groundwater-fed irrigation in Sub-Saharan Africa under two energy solutions" under review in Environmental Research Letters | (1) Irrigation-energy planning framework presentation https://www.ifpri.org/sites/default/files/presentation_posteragu_2019.pdf, also on Powering the rural transformation https://www.slideshare.net/ifpri/powering-the-rural-transformation Water-energy-food nexus https://wefnexus.org/2019/09/claudia-ringler-snip-seminar/ |

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| F5 | 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 | WLE contributed to enhancing the capacity of key institutions for integrated landscape management through:1) WLE established the Commission on Sustainable Intensification, recruiting 20 commissioners from the Global South2) WLE developed and made available a cross-CGIAR knowledge-brokering framework for facilitating integrated landscape management3) WLE reviewed management interventions and tools, contributing to landscape decision-support frameworks.4) WLE systems approaches contributed to milestones reports of partners including EAT-Lancet, FOLU FABLE, IPBES | 2019 - Sustainable Agricultural Intensification Commission established to explore policy approaches to manage trade-offs in smallholder agricultural landscapes between environmental sustainability, healthy diets and livelihoods. | Complete | (1) Technical contributions made to IPBES and EAT-Lancet Commission and (2) Secretariat of the Sustainable Agricultural Intensification Commission (CoSAI) established, (3) Chair and commissioners on board. | (1) Full 2019 OICR Report on EAT https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3339&cycle=Reporting&year=2019 Executive Summary of the EAT Lancet Commission https://eatforum.org/content/uploads/2019/07/EAT-Lancet_Commission_Summary_Report.pdf IPBES regional assessments launched, highlighting risks to ecosystems https://wle.cgiar.org/ipbes-regional-assessments-launched-highlighting-risks-ecosystems Full 2019 OICR Report https://marlo.cgiar.org/projects/WLE/studySummary.do?studyID=3338&cycle=Reporting&year=2019 (2) Act now to feed 10 billion, global experts tell WLE Commission at EAT Forum https://wle.cgiar.org/act-now-feed-10-billion-global-experts-tell-wle-commission-eat-forum (3) CoSAI Commissioners List https://cgiar.sharepoint.com/:x:/s/WLE/EQ30lvpYINFDg4MlMWzGPG0BI4s2CCQz9Z3humfyriwNiw?e=KDEiKU |
| | | | | 2019 - Decision support products and approaches from WLE projects assessed for different types of decision dilemmas, and screened for inclusion in decision support frameworks. | Complete | (1) Working paper on Developing a Decision Support Framework for assessing WLE management interventions, through review of proposed management interventions and existing WLE tools, and a (2) series of WLE decision-support tools for trade-offs | (1) Developing a DSS Framework for WLE management interventions https://drive.google.com/open?id=11SxXoqrdJa7NP9AsaWsfM8mBVqW5jq7i (2) Development goals should enable decision-making. https://wle.cgiar.org/development-goals-should-enable-decision-makin Exploring solutions for nutrition-sensitive agriculture in Kenya and Vietnam.https://www.sciencedirect.com/science/article/pii/S0308521X19306687?via%3Dihub A model to examine farm household trade-offs and synergies in Vietnam. https://www.sciencedirect.com/science/article/pii/S0308521X18307340?via%3Dihub Farm-household livelihood and nutrition indicators to guide nutrition-sensitive agriculture interventions. https://link.springer.com/article/10.1007/s12571-019-00985-0 g Asian water futures - multi scenarios, models and criteria assessment [Abstract only]. https://cgspace.cgiar.org/handle/10568/82734 |

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| | | | | 2019 - Publication of two reports on knowledge brokering approaches and policy interventions for NRM at the landscape scale are used for co-learning dialogue with key research partners (e.g. Food and Land Use Coalition) | Complete | Two reports were published: (1) a paper on the knowledge brokering framework for Integrated Landscape Management and (2) a report on Food and Land Use was submitted to the Food and Land Use Coalition with contributions from WLE scientists | (1) Knowledge Brokering Framework https://www.frontiersin.org/articles/10.3389/fsufs.2020.00013/full (2) Pathways to Sustainable Land-Use and Food Systems (Fable) https://www.foodandlandusecoalition.org/wp-content/uploads/2019/09/Fable-interim-report_complete-high.pdf |
| | F5 Outcome: 5.2. Natural and agricultural resource interventions are more cost-effective by minimizing negative trade-offs that degrade landscapes | • Increased capacity for innovations in partner research organizations<br>• Enhanced individual capacity in partner research organizations through training and exchange | 1) WLE designed and piloted a survey with decision-makers on what works in decision-support for landscape management and will expand this in 2020.2) WLE tools contributed to the co-development with stakeholders of agricultural – NRM programs in at least four pilot landscapes, in Burkina Faso, Ethiopia, Uganda, and India | 2019 - Completion of large-scale survey targeting key policymakers (e.g., in NGOs, national governments, development banks, etc.) to identify gaps in capacity to use evidence, and to determine demand for decision support tools | Extended | The survey to investigate on how to better support decisions for more sustainable agriculture and natural resource management has been designed, piloted and expanded and will be rolled out at a large scale in 2020. | Survey https://ee.kobotoolbox.org/x/#sxTyFD2n |
| | | | | 2019 - Pilot landscapes established and co-developed with stakeholders in three countries. | Complete | Workshop reports and blogs of at least three program workshops in three countries that use WLE tools for decision-support and program design, with (1) WeForest program in Ethiopia, (2) STEP-UP project in Uganda, and (3) ICAR in India. | (1) Fixing forests: decision analysis is in East Africa https://wle.cgiar.org/thrive/2019/03/23/fixing-forests-how-decision-analysis-working-ground-east-africa (2) Agriculture in the Anthropocene: can India's Godavari Basin show us the way? https://wle.cgiar.org/thrive/2019/12/02/agriculture-anthropocene-can-india%E2%80%99s-godavari-basin-show-us-way (3) For West African farmers, reservoirs hold much more than water https://wle.cgiar.org/thrive/2019/11/04/west-african-farmers-reservoirs-hold-much-more-just-water |

**Table 6: Numbers of peer-reviewed publications from current reporting period (Sphere of control)**

| | Number | Percent |
|---|---|---|
| Peer-Reviewed publications | 115 | 100% |
| Open Access | 70 | 60.87% |
| ISI | 106 | 92.17% |

**Table 7: Participants in Capacity Development Activities**

| Number of trainees | Female | Male |
|---|---|---|
| In short-term programs facilitated by CRP/PTF | 3342 | 6046 |
| In long-term programs facilitated by CRP/PTF | 77 | 167 |
| PhDs | 6 | 7 |

## Table 8: Key external partnerships

| Lead FP | Brief description of partnership aims (30 words) | List of key partners in partnership. Do not use acronyms. | Main area of partnership (may choose multiple) |
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| F1 | CIAT-led "Business models to address deforestation in Amazonian landscapes in Peru" is developing bankable projects in cacao and oil palm value chains that contribute to land restoration and forest conservation. | • ClimateFocus - Climate Focus<br>• Ministerio del Ambiente / Ministry of Environment (Peru)<br>• Grupo Bancolombia | • Policy<br>• Research |
| F1 | A flagship restoration project in Makueni County (Kenya) that focused on developing a viable business model to restore productive lands in this district | • Government of Makueni County (Kenya) | • Research<br>• Policy |
| F1 | Policy recommendation on soil carbon management and monitoring accepted by 197 country parties (16/COP14) | • UNCCD - United Nations Convention to Combat Desertification | • Policy |
| F1 | Soil spectroscopy working group of the Global Soil Laboratory Network of the Global Soil Partnership (hosted by FAO) | • ISRIC - International Soil Reference and Information Centre<br>• USDA - U.S. Department of Agriculture<br>• WGRC - Woods Hole Research Center<br>• UNL - University of Nebraska<br>• The University of Sydney<br>• FAO - Food and Agriculture Organization of the United Nations | • Research<br>• Capacity Development |
| F1 | New Ethiopian Ministry of Agriculture Data Sharing Policy Supported by WLE/CIAT and GIZ will enhance Agricultural Transformation | • GIZ - Deutsche Gesellschaft für Internationale Zusammenarbeit / German Society for International Cooperation<br>• ILRI - International Livestock Research Institute<br>• USAID - U.S. Agency for International Development | • Delivery |

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| | | • EIAR - Ethiopian Institute of Agricultural Research<br>• EARCS - Ethiopian Agricultural Research Council Secretariat<br>• MoANR - Ministry of Agriculture and Natural Resources (Ethiopia)<br>• CABI - Centre for Agriculture and Biosciences International<br>• BMGF - Bill & Melinda Gates Foundation | |
| F1 | Under the Catholic Relief Services (CRS) and Buffet Foundation's Agricultural Landscape Restoration Initiative program, WLE/CIAT is implementing water-smart agriculture programming at landscape scale in El Salvador. | • CRS - Catholic Relief Services<br>• HGBF - The Howard G. Buffett Foundation | • Research<br>• Capacity Development |
| F2 | Scaling partnerships for small scale irrigation technologies, especially solar irrigation for smallholders in Africa. (This partnership involves national distributors in Ghana and Ethiopia, in addition to those listed). | • SunCulture<br>• Futurepump<br>• GIZ - Deutsche Gesellschaft für Internationale Zusammenarbeit / German Society for International Cooperation | • Research<br>• Policy<br>• Capacity Development |
| F2 | Collaboration to develop the baseline survey of the solar pump piloting project | • ATA - Agricultural Transformation Agency (Ethiopia) | • Delivery<br>• Policy |
| F2 | Scale out a successful watershed management model out to over 35,000 ha in Central India. (This partnership includes seven local NGOs, in addition to the partners listed.) | • BAIF - BAIF Development Research Foundation<br>• ICAR-IGFRI - Indian Grassland and Fodder Research Institute<br>• ICAR-CAFRI - Indian Council of Agricultural Research - Central Agroforestry Research Institute<br>• Government of Uttar Pradesh (India)<br>• BUAT - Banda University of Agriculture and Technology | • Delivery |
| F2 | Agricultural innovation Platforms and water smart management tools in two Zimbabwe communal irrigation schemes, improved water, land productivity and household incomes. The model is being extended to 30 more schemes | • Ministry of Environment, Water and Climate (Zimbabwe)<br>• Government of Zimbabwe<br>• ACIAR - Australian Center for International | • Delivery<br>• Policy |

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| | | Agricultural Research<br>• ANU - Australian National University<br>• UNISA - University of South Australia<br>• CSIRO - Commonwealth Scientific and Industrial Research Organisation | |
| F3 | WLE/RUL is a recognized member of the BMGF supported Advisory consortium for Fecal Sludge Management in South Asia (TA-HUB SOUTH ASIA) | • DevCon - DevConsultants Limited<br>• ENPHO - Environment & Public Health Organization | • Delivery |
| F3 | WLE/CIAT facilitated development and approval of the first Municipal food security policy for Cali, supporting an integrated action plan. With the Academic platform on food and nutritional safety (12 institutions). | • Government of Colombia / Gobierno de Colombia<br>• WFP - World Food Programme<br>• ALIMENTOS DE VIDA - CORPORACIÓN RED DE MERCADOS AGROECOLÓGICOS CAMPESINOS DEL VALLE DEL CAUCA<br>• WWF - World Wildlife Fund<br>• VallenPaz<br>• Univalle - Universidad del Valle<br>• CEDECUR - Centro de Educación e Investigación para el Desarrollo Comunitario Urbano y Rural<br>• UNAL - Universidad Nacional de Colombia<br>• Corporación Biotec<br>• UAO - Universidad Autónoma de Occidente<br>• HarvestPlus<br>• CIAT - Centro Internacional de Agricultura Tropical | • Delivery |
| F3 | To support the revision of two normative FAO guidelines on water quality and agriculture | • WUR - Wageningen University and Research Centre<br>• CEBAS-CSIC - Centro de Edafología y Biología Aplicada del Segura<br>• FAO - Food and Agriculture Organization of the United Nations<br>• IWMI - International Water Management Institute | • Delivery |
| F3 | CGIAR joins forces with international humanitarian, nonprofit organizations in piloting and scaling-up socially inclusive and gender-responsive RRR | • IWMI - International Water Management Institute<br>• ICRAF - World Agroforestry Centre | • Capacity Development |

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| | interventions in refugees and host communities for soil rehabilitation and energy recovery. | • CIAT - Centro Internacional de Agricultura Tropical<br>• UN-Habitat - United Nations Human Settlements Programme<br>• UNHCR - United Nations High Commissioner for Refugees<br>• DRC - Danish Refugee Council | |
| F3 | Research, innovations uptake in City Region Food Systems, urban agriculture and resilience, ensuring gender incorporated in Milan Urban Food Policy Pact indicators (with MUFPP secretariat, Urban Governance for Nutrition Programme) | • ICLEI - Local Governments for Sustainability<br>• FAO - Food and Agriculture Organization of the United Nations<br>• UNEP / UN Enviroment - The United Nations Environment Programme<br>• IFPRI - International Food Policy Research Institute<br>• GAIN - Global Alliance for Improved Nutrition<br>• Rikolto | • Delivery |
| F3 | Work with the Veolia Institute Foresight Committee, to influence private sector perceptions and knowledge on urban farming and climate change. | • Veolia Institute | • Capacity Development |
| F3 | RUL invited into WHO-FAO expert groups to develop guidelines, policy advice on food- and vector borne diseases in Asia and Africa (WHO-FAO meetings on foodborne Antimicrobial Resistance, water safety) | • FAO - Food and Agriculture Organization of the United Nations<br>• WHO - World Health Organization | • Policy |
| F4 | WLE/IWMI provides strategic inputs to the Helvetas-led Gulf of Mottama project (Myanmar), to ensure the root causes of exclusion, vulnerability of marginalized women and men are better understood and addressed. | • IUCN - International Union for Conservation of Nature<br>• NCRMC - National Coastal Resource Management Committee<br>• Helvetas | • Capacity Development<br>• Research |
| F4 | Participation in the Water-Energy-Food Nexus Network Africa (https://wefnexus.org/) | • Penn State - Pennsylvania State University<br>• UNU - United Nations University<br>• University of Ibadan<br>• IITA - International Institute of Tropical Agriculture<br>• 2ie - Institut International d'Ingénierie de l'Eau et | • Research<br>• Capacity Development |

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| | | de l'Environnement / International Institute for Water and Environmental Engineering | |
| F4 | Scaling out ground and surface water governance in India using experiential games as a tool (Note: Andhra Pradesh Drought Mitigation Program represented in partner list by Government of Andhra Pradesh) | • FES - Foundation for Ecological Security<br>• BMZ - Bundesministerium für wirtschaftliche Zusammen-arbeit und Entwicklung / Federal Ministry of Economic Cooperation and Development (Germany)<br>• MANAGE - National Institute of Agricultural Extension Management<br>• Government of Andhra Pradesh (India)<br>• ASU - Arizona State University | • Other<br>• Research |
| F4 | Promotion of knowledge products for contribution to Sri Lankan – Climate and Food Security Monitoring Bulletin https://hdl.handle.net/10568/103228 | • WFP - World Food Programme | • Delivery |
| F4 | Research on the use of groundwater for agriculture, influenced water policies and implementation programs in Lao PDR. | • ACIAR - Australian Center for International Agricultural Research<br>• Ministry of Natural Resources and Environment (Lao PDR)<br>• MAF - Ministry of Agriculture and Forestry (Lao PDR)<br>• NUOL - National University of Laos<br>• IGES - Institute for Global Environmental Strategies<br>• KKU - Khon Kaen University | • Delivery<br>• Policy |
| F4 | Based on trials conducted by WLE, managed aquifer recharge adopted by the Government of Vietnam as a new tool to enhance climate resilience | • HRNS - Hanns R. Neumann Stiftung<br>• Nestle<br>• Ministry of Natural Resources and Environment (Vietnam)<br>• MARD - Ministry of Agriculture and Rural Development (Vietnam)<br>• SDC - Swiss Development Cooperation | • Policy<br>• Delivery |
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| F5 | Use and expansion of ESA frameworks and tools for biodiversity – food – agriculture integration, with IPBES | • IPBES - Intergovernmental Science-Policy Platform on biodiversity and Ecosystem Services | • Research<br>• Policy |
| F5 | Use and expansion of ESA frameworks and tools for land use management and enhanced capacity building of key partner institutions, with partners of the Food and Land Use Coalition (FOLU) | • FOLU - The Food and Land Use Coalition | • Policy<br>• Capacity Development |
| F5 | Use and expansion of ESA framework and tools for integrated landscape management with the Indian Council for Agricultural Research (ICAR) | • ICAR - Indian Council of Agricultural Research | • Delivery<br>• Research |
| F5 | Use and expansion of ESA tools for anticipating and understanding trade-offs and enhanced capacity building of key partner institutions, with WUR | • WUR - Wageningen University and Research Centre | • Research<br>• Capacity Development |
| F5 | Flagship 5 developed and made available a cross-CGIAR knowledge-brokering framework for facilitating integrated landscape management, published in a joint, cross-center paper: https://www.frontiersin.org/articles/10.3389/fsufs.2020013/full | • ICRAF - World Agroforestry Centre<br>• IWMI - International Water Management Institute<br>• University of Bonn<br>• DEFRA - Department for Environment Food and Rural Affairs (United Kingdom)<br>• BIOVERSITY - Bioversity International<br>• CIAT - Centro Internacional de Agricultura Tropical | • Research<br>• Policy |
| F5 | Bridge Collaborative, with key outreach events focused on cross-sectoral impacts, such as the Bigger Change Faster Policy Seminar (https://www.ifpri.org/event/bigger-change-faster-integrated-development-health-and-environment-actions-sustainable-future) | • TNC - The Nature Conservancy<br>• PATH<br>• Duke University | • Delivery |
| F5 | Use of ESA tools for integrated landscape management and enhanced capacity building of key partner institutions | • WeForest | • Delivery<br>• Capacity Development |
| F5 | Use and expansion of ESA frameworks and tools for food - health – environment integration, with EAT-Lancet Commission | • EAT - EAT Foundation | • Research<br>• Policy |

## Table 9: Internal Cross-CGIAR Collaborations

| Brief description of the collaboration | Name(s) of collaborating CRP(s), Platform(s) or Center(s) | Value added, in a few words |
|---|---|---|
| WLE assisted CIMMYT with training in soil spectroscopy in India | CIMMYT, WLE | Disseminating WLE tools |
| WLE and CCAFS collaborated in the development of a proof of concept to assess the mitigation benefits from expansion of trees on Colombian rangeland | CCAFS, WLE | Promoting scientific collaboration |
| A joint session was co-convened by WLE, FTA and PIM during The 8th World Conference on Ecological Restoration, to discuss the relevance of gender and social inclusion in landscape restoration initiatives and interventions. | FTA, PIM, WLE | Sharing scientific knowledge |
| A mobile application to support facilitation of learning games on water management in India (JAL SUTRA) was jointly supported by WLE and PIM | WLE, PIM | The support of both WLE and PIM allowed this development to be supported over a number of years. |
| The Real-time East Africa live groundwater use database proposal was among the four winners of the CGIAR Inspire Challenge ($100,000 award). | BigData, IWMI | Methodological innovation for improved natural resource management |
| Side session titled "Scaling solar based irrigation: Learning from public and private sector initiatives "at the 5th Global Science Conference on Climate Smart Agriculture in Bali, Indonesia | CCAFS, WLE | Disseminating research results for scaling out |
| Further collaboration between WLE, RICE and FISH CRPs within the Myanmar landscapes transformation project, which seeks to understand how fish, rice and water management innovations developed by WLE, FISH and RICE can be scaled and contribute to food systems that are healthier for people and environmentally more sustainable. In 2019, the three CRPS collaborated in the development of the Mega Delta Grand Challenge of the Two Degree Initiative. | Fish, WLE, Rice | To achieve synergies among the three CRPs' mandates |

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| Bundling of climate risk crop insurance products with other resilience building initiatives by inking insurance products with drought tolerant wheat and flood tolerant rice (Bihar India) | WLE, CCAFS, CIMMYT, IRRI | Enhancing sustainability and value of satellite-based crop insurance products |
| Improving governance of groundwater in India using experimental games | WLE, IFPRI, ICRISAT, PIM | Scaling out governance innovations |
| Established Commission on Sustainable Agricultural Intensification, across CGIAR centers and external partners https://wle.cgiar.org/act-now-feed-10-billion-global-experts-tell-wle-commission-eat-forum . This inititiave will involve all CGIAR centers | Fish, ICARDA, ICRAF, ICRISAT, IFPRI, IITA, ILRI, IRRI, IWMI, WLE, AfricaRice, BIOVERSITY, CIAT, CIFOR, CIMMYT, CIP | Identify promising investment opportunities for scaling out CGIAR innovations |

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

| Studies/learning exercises planned for this year (from POWB) | Status | Type of study or activity | Description of activity / study | Links to MELIA publications |
|---|---|---|---|---|
| S2810 - Assessment of the impact of Fadama package of intervention on resilience of participants versus non-participants under civil strife and conflict in northern Nigeria | Completed | EPIA: Ex-post Impact Assessment | Mixed methods evaluation involving qualitative data collection with key informants combined with a large scale quantitative survey of 1,787 randomly selected households. | https://www.ifpri.org/publication/humanitarian-assistance-and-resilience-building-impact-fadama-iii-af-ii-food-security |
| S2812 - Outcome story planning and development | Completed | Other MELIA activity | Outcome stories were prioritized and appropriate evidence collected. Link to final OICRs selected and developed. https://cgiar.sharepoint.com/:w:/s/WLE/Efyn2-5l2dtCm8VeRkpWMR0Bz58eDBOeicm76EZfHZ805A?e=QgpLeI | |
| S2816 - Flagship Theory of Change Workshops | Extended | Other MELIA activity | ToC reflection was conducted as part of the WLE Annual Meeting, but individual flagship workshops were canceled due to budget constraints. | |
| S2818 - Learning Review of GYI outputs: ensuring gender and youth equity and inclusion | Extended | Other MELIA activity | The CRP hired a gender and inclusion specialist in late 2018 and will extend this task into 2020. | |
| S2819 - MEL Tools Assessment and Learning workshop for Integrating CRPs | Extended | Other MELIA activity | In partnership with the other integrated CRPs, WLE will co-facilitate a learning workshop, now planned for 2020. | |
| S2825 - Evaluation of Soil and Water Management Work Carried out in Ethiopia | Completed | Program/ project evaluation/ review | Outcome evaluation with recommendations | https://cgspace.cgiar.org/handle/10568/107102 |

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| S2826 - Outcome Evaluation of Climate-Smart Research on Solar-Powered Irrigation in India | On Going | Program/ project evaluation /review | The evaluation was started in 2019 and will focus on the outcomes (Dhundi pilot) and the emerging and potential impacts of WLE funded research (scaling out as part of Suryashaki Kisan (SKY)). The evaluation is co-funded by CCAFS and the SMO. | |
| S3227 - Outcome Evaluation Of Research For Development Work Conducted In Ghana And Sri Lanka Under The Resource, Recovery And Reuse (RRR) Subprogram Of The CGIAR Research Program On Water, Land And Ecosystems (WLE). | Completed | Program/ project evaluation/ review | Outcome evaluation with recommendations | https://cgspace.cgiar.org/handle/10568/107242 |
| S3234 - Results Framework Review | Completed | Other MELIA activity | WLE-wide review of outcomes and milestones reviewed and updated to better reflect project portfolio. | |

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

| Name of the evaluation | Recommendation number (from evaluation) | Text of recommendation (can be shortened) | Status of response to this recommendation | Concrete actions taken for this recommendation. | By whom (per action) | When (per action) | Link to evidence |
|---|---|---|---|---|---|---|---|
| Outcome Evaluation Of Research For Development Work Conducted In Ghana And Sri Lanka Under The Resource, Recovery And Reuse (RRR) Subprogram Of The CGIAR Research Program On Water, Land And Ecosystems (WLE) | Recommendation #1 on gender and youth | RRR program should work more closely with a social analyst with strong gender analysis credentials | Complete | Accepted in full. This recommendation is already in process. A dedicated WLE gender specialist was hired in 2018 and is tasked with strengthening gender research across all of the flagships. In 2019 the specialist prioritized the RRR subprogram. | PMU | 2019 | NA |
| Outcome Evaluation Of Research For Development Work Conducted In Ghana And Sri Lanka Under The Resource, Recovery And Reuse (RRR) Subprogram Of The CGIAR Research Program On Water, Land And Ecosystems (WLE) | Recommendation #3 on focusing of Flagships on a limited number of best-bet innovations | WLE adopt a set of criteria to rank the various activities underway in LWS, RDL and VCR as to their potential to achieve significant innovative science-based outcomes with a potential for major impacts, and focus most of its human and financial resources on implementing these activities. | On Going | Partially agree. The nature of scientific research is that some research will fail to produce significant outcomes, while other research will lead to development results, but often in unanticipated ways. WLE has adopted PBM management criteria that require all projects to be aligned with the CRP ToC and results. These criteria were adopted in 2019 and will be applied to the end of phase II. | PMU | 2019 | NA |
| Outcome Evaluation Of Research For Development Work | Recommendation #5 on use of ToCs and impact pathways | WLE take further steps to strengthen its impact pathways and make more effective use of | On Going | Accepted in full. The CRP will require all projects that are in the 'transition to scale' phase to have a | PMU | 2019 | NA |

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| Conducted In Ghana And Sri Lanka Under The Resource, Recovery And Reuse (RRR) Subprogram Of The CGIAR Research Program On Water, Land And Ecosystems (WLE) | | them. These steps could include: 1) providing effective training to researchers in the concept of ToCs and the use of impact pathways in designing and managing programs and projects; 2) use professional facilitators in a workshop or brainstorming context to develop programmatic impact pathways and impact pathways for major projects, and 3) include the major partners in the process of developing the impact pathway and overall program/ project at the beginning of the program and/ or project. | | ToC that is aligned with the CRP ToC. Furthermore, the CRP will make available the MEL Specialist to any project that requires assistance in developing their ToC. The CRP will also ensure that all future ToC development is participatory, ensuring that a ToC is both a 'processes' and an output. | | | |
| Outcome Evaluation of the work of the CGIAR Research Program on Land, Water and Ecosystems (WLE) on soil and water management in Ethiopia | Recommendation #1 WLE-Ethiopia to keep doing much of what it is already doing | Specifically, WLE should conduct regular After-Action Reviews (AAR) for all Outcome Trajectories (OT) based on developing and revisiting timelines.AARs should be conducted as part of a participatory workshop. Also, WLE should become better at acknowledging the contribution of others, including the contribution of WLE. Specifically, the ET suggests developing a 'code of conduct' for acknowledging each other's contributions. | On Going | Accepted in full. WLE will conduct AARs as needed for all OTs and will also develop a code of conduct to acknowledge the contributions of other research and development partners. | PMU | 2020 | NA |
| Outcome Evaluation of the work of the CGIAR Research Program on Land, | Recommendation #2 WLE-Ethiopia to build on the concept of 'impact tracking' | The emergent WLE-Ethiopia approach of 'impact tracking' described by key staff during the evaluation should be systematized | On Going | Accepted in full. WLE will commission a communications product to publicize our approach to 'impact tracking'. The ultimate | PMU | 2020 | NA |

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| Water and Ecosystems (WLE) on soil and water management in Ethiopia | with support from WLE-Global | and promoted as an international public good, applicable to other programs seeking to trigger major change with relatively little funding. | | goal will be to publish the approach to a high-impact, scholarly journal. | | | |
| Outcome Evaluation of the work of the CGIAR Research Program on Land, Water and Ecosystems (WLE) on soil and water management in Ethiopia | Recommendation #3 WLE leadership to improve collaboration between WLE CGIAR Centers working in Ethiopia | WLE identifies and selects to work on one or two synergies believed by the staff to have the greatest potential. For example, WLE could choose to support CIAT and ICRISAT to develop a common WLE-branded landscape/watershed approach. | On Going | Accepted in full. The CRP will identify strategic workstream in which significant synergies are likely to occur and will actively develop a common WLE-branded landscape/watershed approach. | PMU | 2020 | NA |

## Table 12: Examples of W1/2 Use in this reporting period (2019)

| Please give specific examples, one per row (including through set aside strategic research funds or partner funds) | Select broad area of use of W1/2 from the categories below - (drop down) Select only one category. |
|---|---|
| Flagship 1 - Scaling: Innovative Solutions for Decision Agriculture (iSDA) – a new social enterprise launched to scale digital solutions for sustainable smallholder agriculture through private sector partnerships. | Delivery |
| Flagship 1 - Tailoring knowledge for delivery: finalization of the GMCC (Green Manure Cover Crops) Cropping System Assessment Tool; compilation of a database of crop non-responsiveness to fertilizers in Sub Saharan Africa, so as to inform fertilizer non-responsiveness recommendations. | Research |
| Flagship 1 - Tailoring knowledge for delivery: Development of the Global Soil Data Manager application | Capacity development |
| Flagship 1 - Tailoring knowledge for delivery: a Diversity Assessment Tool to build agrobiodiversity for resilience that will integrate crop, livestock and aquatic resources diversity into agricultural development decision making. | Capacity development |
| Flagship 1 - Tailoring knowledge for delivery: methodology for monitoring agrobiodiversity in farms and identifying portfolio of crops and varieties more suitable to restoration and food security needs (Uzbekistan and Bolivia). | Research |
| Flagship 1 - Discovery: business models for land restoration: within silvopastoral systems in Colombia and with Makueni District County Government. | Delivery |
| Flagship 1 - Discovery: analysis of micronutrient deficiencies in African soils and the human nutritional nexus: opportunities with staple crops. | Research |
| Flagship 1 - Tailoring knowledge for delivery: development of an open-source near handheld infrared spectrometer for soil material quality analysis along the agricultural value chain. | Delivery |

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| Flagship 1 - Tailoring knowledge for delivery: a map of hotspots for achievable soil carbon sequestration and soil fertility Improvement in Africa. | Research |
| Flagship 1 - Tailoring knowledge for delivery: conceptual framework on gender and soil organic carbon developed for guiding the identification of gendered opportunities for improving soil health. | Other: Gender |
| Flagship 1 - Policy engagement: participation in the Science-Policy Interface of UNCCD through which recommendations for soil carbon assessment were built and provided, and adopted by COP14. | Policy |
| Flagship 1 - Discovery: deeper exploration of strategies and tools to support gender integration and inclusion in restoration research and practice, through multi-country studies, review of innovation platforms, and establishment of new initiatives. | Other: Gender |
| Flagship 1 - Scaling: supporting two initiatives (Kenya and India) to build up more effective tools and techniques monitoring and evaluation of land restoration and degradation risks. | Research |
| Flagship 2- Influencing and stimulating dialogue: e.g. FAO WASAG, Stockholm World Water Week, Africa's Farmer-led Irrigation Revolution; Global Climate Smart Agriculture Conference (Solar Irrigation); ICID (launching Systematic Asset Management System and Irrigation Benchmarking; Young Professionals training); translation of Gender in Irrigation Learning and Improvement Tool into French and Portuguese. | Other: Outreach |
| Flagship 2 - Influencing and stimulating dialogue: moving towards 'gender transformative approaches' and collating deep dive gender studies e.g. examining gender norms and relations in planning and implementation of agricultural watershed development in India; qualitative surveys to understand how public investment programs are streamlining gender in small and micro scale irrigation. | Other: Gender |
| Flagship 2 - Tailoring knowledge for delivery: Developing a geospatial database of public sector driven SSI scaling initiatives in Ethiopia and Ghana | Research |
| Flagship 2 - Scaling: Expansion of the work to develop an online solar suitability mapping tool and framework for installation of solar photovoltaic pumps for smallholder farmers in Mali and Ghana. | Research |
| Flagship 2 - Discovery: explored business model scenarios and suitability for exclosures in Ethiopia. | Research |

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| Flagship 2 - Discovery: development and testing of the Strategic Asset Management System (SAMS) to support management of irrigation schemes and their performance. | Research |
| Flagship 2 - Scaling: addressing the water-food-energy nexus through design of investment and business models and supporting outreach activities of solar-powered irrigation (IWMI TATA, India). | Research |
| Flagship 3 - Tailoring knowledge for delivery: collaboration with development partners for resource recovery and reuse uptake in South Asia (advisory services co-funding), e.g. as knowledge partner to World Bank sanitation improvement program in Sri Lanka to support development of a new USD 130 million program for 2020 – 2025. | Partnerships |
| Flagship 3 - Training: Testing a new teaching curriculum on resource recovery and reuse concepts with several universities. | Capacity development |
| Flagship 3 - Training: Internship program at IWMI for BSc, MSc and PhD students working on rural urban linkages and resource recovery and reuse. | Capacity development |
| Flagship 3 - Influencing and stimulating dialogue: forums on resource, reuse and recovery tools, approaches including World Circular Economy, World Water and Development Congress, IWA Resource Recovery Conference, Fecal Sludge Management Conference, Sustainable Sanitation Solutions Conference, Asia Water Forum, West Africa Clean Energy and Environment Conference, ICLEI-CityFood Resilient Cities, MUFPP | Other: Outreach |
| Flagship 3 - Tailoring knowledge for delivery: continued production of the Resource Recovery and Reuse report series. | Capacity development |
| Flagship 3 - Policy engagement: Facilitation of a Charter on City Region Food (CRFS) Policy and Resilience by the municipality of Quito, and the adoption of gender sensitive Milan Urban Food Policy Pact (MUFPP) indicators in Nairobi. | Policy |
| Flagship 3 - Policy engagement: Policy advice with FAO and RUAF on increasing urban food resilience in view of climate change (Colombo and Tamale) including options for minimizing unproductive food waste. | Policy |
| Flagship 3 - Policy engagement: Collaboration with FAO to develop a new FAO Guideline on Water Quality and Agriculture | Partnerships |
| Flagship 3 - Influencing and stimulating dialogue: Urban Agriculture Magazine on Food Policy Councils developed and distributed, UA Magazine on Gender Transformative Approaches under development | Delivery |

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| Flagship 3- Policy engagement: Participation in WHO/FAO expert meetings to deepen our knowledge, collaborate and provide policy advice on (a) the fight against Vector Borne Diseases in Asia and Africa, (b) Antimicrobial resistance (AMR) and Water Quality, and (c) Safety and Quality of Water Used in Fresh Fruits and Vegetables. | Policy |
| Flagship 4 - Influencing and stimulating dialogue: support to paper and outreach on management of resilience of socio-ecological systems. | Research |
| Flagship 4 - Tailoring knowledge for delivery: advancing understanding on how to improve monitoring of vital ecosystem services within global seagrass and mangrove ecosystem https://eos.org/science-updates/integrating-global-seagrass-and-mangrove-ecosystem-observations | Policy |
| Flagship 4 - Tailoring knowledge for delivery: expanding understanding of how Index Based Flood Insurance impacts the poor, landless and women https://www.mdpi.com/2073-4441/11/11/2235 through an evaluation, including delivering advice on how to address inclusion. | Other: Gender |
| Flagship 4 - Tailoring knowledge for delivery: strengthened linkages on uptake of water-energy-food nexus analysis in African decision-making, including engaging with AGRA on the need to bring renewable energy into agricultural transformation and also guiding a new World Economic Forum Africa group on nexus issues. | Delivery |
| Flagship 4 - Tailoring knowledge for delivery: new research on the benefits of energy development for rural development (Egypt and Ethiopia) | Research |
| Flagship 4 - Discovery: Successful application of a tool developed for water-energy-food nexus analysis to regional migration questions to start in 2020 | Pre-start up |
| Flagship 4 - Tailoring knowledge for delivery: through an assessment of solar versus diesel groundwater irrigation development in Sub-Saharan Africa. | Research |
| Flagship 4 - Influencing and stimulating dialogue: support to book on Water for Food Security, Social Justice and Nutrition that brings in a social inclusion and social justice focus into the water-food-nutrition nexus. | Other: Gender |
| Flagship 4 - Influencing and stimulating dialogue: though strengthening integration between irrigation and fisheries and a research article | Research |

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| Flagship 4 - Influencing and stimulating dialogue: by coordinating a contribution to global call to tackle groundwater (Nature letter) and associated op-eds. | Policy |
| Flagship 4 - Influencing and stimulating dialogue: climate-water-food modeling results shared at international conferences: Nebraska Water for Food, Denver Water, including participation in consultations on Denver's new water institute; online talk for FAO for World Food Day, Commission on Sustainable Intensification of Agriculture (CoSAI) pitch at the Climate Summit. | Other: Outreach |
| Flagship 4 - Influencing and stimulating dialogue: supporting a request by the African Group of Climate Change Negotiators for a paper on macroeconomic factors, climate change and food security in Africa | Other cross-cutting issues |
| Flagship 5 - Influencing and stimulating dialogue: establishment and set up of the Commission on Sustainable Intensification of Agriculture (CoSAI). | Pre-start up |
| Flagship 5 - Tailoring knowledge for delivery: developed and made available a cross-CGIAR knowledge-brokering framework for facilitating integrated landscape management, published in a joint, cross-center paper, following a review of management interventions and tools, contributing to landscape decision-support frameworks. | Research |
| Flagship 5 - Tailoring knowledge for delivery: contributed to the co-development with stakeholders of agricultural/ natural resources management programs in pilot landscapes, in Ethiopia, Uganda, and India, including for example contributing to a stakeholder workshop with STEP-UP, Uganda, to support analysis of social and environmental trade-offs. | Partnerships |
| PMU ME - Tailoring knowledge for delivery: Outcome evaluations completed: (1) work conducted In Ghana And Sri Lanka under the Resource, Recovery And Reuse program; (2) of the water management work carried out in Ethiopia. A third joint WLE-CCAFS-SMO evaluation of solar powered irrigation in India was initiated. | Other Monitoring, learning, evaluation and impact assessment (MELIA) |
| PMU Communications - Policy engagement and influencing and stimulating dialogue through portfolio level knowledge management and communications activities including content production (publications, briefs, blogs etc.), events management, outreach through op-eds and social media, and support to junior researchers through a small grant facility. | Other: Outreach |
| PMU Gender - Transitioning sections of the WLE portfolio towards gender transformative approaches which acknowledge and aim to address the deep rooted causes of gender and other inequalities. New research has been supported, and the WLE portfolio is under review to pinpoint areas that hold good prospects for making such a transition. | Other: Gender |

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| PMU Management: Support to Management and Synthesis Functions of all Flagships. Extensive program support including Strategic Management and Partnerships; Coordination and Administration; Communications, Knowledge Management; Monitoring, Evaluation and Learning; and Gender Youth and Inclusivity. | Delivery |

## Table 13: CRP Financial Report (US$)

| | Planned Budget 2019* | | | Actual expenditure* | | | Difference* | | | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | W1/W2 | W3/Bilateral | Total | W1/W2 | W3/Bilateral | Total | W1/W2 | W3/Bilateral | Total | |
| F1 - Restoring Degraded Landscapes (RDL) | 1,762,000 | 9,543,000 | 1,305,000 | 1,682,000 | 7,981,217 | 9,663,217 | 80,000 | 1,561,783 | 1,641,783 | |
| F2 - Land and Water Solutions for Sustainable Intensification (LWS) | 1,580,000 | 8,206,000 | 9,786,000 | 1,512,874 | 9,779,700 | 11,292,574 | 67,126 | -1,573,700 | 1,506,574 | |
| F3 - Sustaining Rural-Urban Linkages (RUL) | 951,000 | 2,933,000 | 3,884,000 | 1,052,261 | 2,122,675 | 3,174,936 | 101,261 | 810,325 | 709,064 | |
| F4 - Managing Resource Variability, Risks and Competing Uses for Increased Resilience (VCR) | 1,395,000 | 1,916,000 | 3,311,000 | 1,452,647 | 3,097,193 | 4,549,840 | -57,647 | -1,181,193 | -1,238,840 | |
| F5 - Enhancing Sustainability Across Agricultural Systems (ESA) | 800,000 | 363,000 | 1,163,000 | 830,899 | 1,040,939 | 1,871,838 | -30,899 | -677,939 | -708,838 | |
| Strategic Competitive Research grant | 470,000 | | 470,000 | | | | 70,000 | | 470,000 | The strategic grants were programmed in 2019, with the majority of work planned to take place in 2020 and 2021. To be reported under Flagships. |
| CRP Management & Support Cost | 1,242,000 | | 1,242,000 | 1,252,558 | | 1,252,558 | -10,558 | | -10,558 | |
| CRP Total | **8,200,000** | **22,961,000** | **31,161,000** | **7,783,239** | **24,021,724** | **31,804,963** | **416,761** | **-1,060,724** | **-643,963** | |