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2017 Plan of Work and Budget (POWB): CGIAR Research Program on Water Land and Ecosystems (WLE)

Led by IWMI

in partnership with Bioversity International, CIAT, FAO, ICARDA, ICRAF, ICRISAT, IFPRI, RUAF Foundation

together with CIFOR, CIP, ILRI, and WorldFish

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Acronyms

4p1000	4 per 1000 Initiative
A4NH	CGIAR Research Program on Agriculture for Nutrition and Health
ADB	Asian Development Bank
AFS	Agri-Food system
ALWM	Agricultural Land and Water Management
BMGF	Bill & Melinda Gates Foundation
CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CCC	CGIAR Country Coordination
CD	Capacity Development
CGIAR	A Global Agricultural Research Partnership
CIAT	International Center for Tropical Agriculture
CIFOR	Center for International Forestry Research
CIP	International Potato Center
CoA	Cluster of Activities
CoP	Conference of Parties
CRFS	City-Region Food Systems
CRP	CGIAR Research Program
DGIS	Directoraat Generaal Internationale Samenwerking
ESA	Enhancing Sustainability Across Agricultural Systems
FAO	Food and Agriculture Organization of the United Nations
FP	Flagship
FTA	CGIAR Research Program on Forests, Trees and Agro-Forestry
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GLDC	CGIAR Research Program on Grain Legumes & Dryland Cereals
GLF	Global Landscape Forum
GRIPP	Groundwater Solutions Initiative for Policy and Practice
GYI	Gender, Youth and Inclusive
ICARDA	International Center for Agricultural Research in the Dry Areas
ICRAF	World Agroforestry Centre
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDO	Intermediate Development Outcome
IFI	International Finance Institution
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
ILSSI	International Lab for Small Scale Irrigation
IPBES	Intergovernmental Platform on Biodiversity and Ecosystem Services
ISPC	CGIAR Independent Science and Partnership Council
IUCN	International Union for Conservation of Nature
IWMI	International Water Management Institute
JAXA	Japan Aerospace Exploration Agency
KAP	Knowledge Attitude Practice
LDN	Land Degradation Network
LSIS	Large and Medium Scale Irrigation Schemes
LWS	Land and Water Solutions for Sustainable Intensification (WLE Flagship Program)
MARIS	Migration, Agriculture and Resilience Initiative for Sustainability
MARLO	Managing Agricultural Research for Learning and Outcomes
MC	Management Committee
MDB	Multilateral Development Bank
MEL	Monitoring, Evaluation and Learning
MIRS	Mid-infrared spectroscopy
MOOC	Massive Open Online Course
NBI	Nile Basin Initiative
PIM	CGIAR Research Program on Policy Institutions and Markets
PMU	Program Management Unit
POWB	Plan of Work and Budget
PPP	Public-Private Partnerships
RCT	Randomized Control Trial

RDL	Regenerating Degraded Landscapes (WLE Flagship Program)
RRR	Resource recovery and reuse
RTB	CGIAR Research Program on Roots Tubers and Bananas
RUL	Sustaining Rural-Urban Linkages (WLE Flagship Program)
SDG	Sustainable Development Goal
SIA	Sustainable Intensification of Agricultural Systems
SLMP	Sustainable Land Management Practices
SMB	System Management Board
SMO	System Management Office
TEEB	The Economics of Ecosystems & Biodiversity
ToC	Theories of Change
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention for Climate Change
UPA	Urban and Peri-urban Agriculture
USAID	United States Agency for International Development
UTFI	Underground Taming of Floods for Irrigation
VCR	Managing Resource Variability, Risks and Competing Uses for Increased Resilience (WLE Flagship Program)
WLE	CGIAR Research Program on Water Land and Ecosystems

A. CRP LEVEL

A1. Delivery

A1.1 Adjustments/ changes to your Theories of Change

WLE's approach to delivering results – the research and results frameworks, the individual flagship impact pathways and overarching program level theory of change (ToC) – remain largely unchanged from the Phase 2 proposal. The exception is Flagship 5 (FP5) on Enhancing Sustainability across Agricultural Systems (ESA) that did not receive W1-2 funding for 2017, and will, therefore, be revised and updated in 2017. Bilateral funding for FP5 remains intact, hence, the key contributory elements, pathways, partners and assumptions in the ToC hold true for 2017, even though scaled down. WLE will review the whole program's ToC as part of its annual review and report process, as well as during the FP 5 revision process, which will deliver a revised results framework for FP5.

A1.2 Highlight expected Outcomes and Outputs

In 2017, the WLE portfolio will build on past work as well as support some new areas of investigation. Some of the expected highlights will include:

Flagship 1

- A series of gender sensitive and equitable land restoration case studies, to be used to influence policies or programs to incorporate land restoration practices in at least two countries.
- An assessment of the soil organic carbon sequestration potential in Kenya and Ethiopia, working alongside major soil and land management initiatives of GIZ (Kenya, Ethiopia) and the Ethiopian Sustainable Land Management Program. This work builds on Phase 1 research on soil degradation status and soil health (infrared spectroscopy). It will allow us to provide quality information to major global initiatives (e.g. 4p1000) on soil carbon sequestration for climate change mitigation.
- Consolidate and market Phase 1 work on soil and land health diagnosis into a new low cost tool for diagnosing soil nutrient constraints to crop production, using soil and plant dry spectral analysis that will help farmers more easily pinpoint areas of risk.

Flagship 2

- Formulation of business models and investment cases for scaling up of agricultural land and water management technologies in irrigated and rainfed systems, building on work done on these technologies during Phase 1 and responding to demands from government partners in Ethiopia and India.
- A report on performance benchmarking for irrigation systems, which brings together research findings conducted in Phase 1. The aim is to start to apply the benchmarking approaches to improve irrigation schemes in Zimbabwe, Tanzania and Myanmar.

Flagship 3:

- Work on resource recovery from fecal sludge from on-site sanitation systems will be incorporated into the Sri Lankan Sanitation Policy, which is likely to be launched in 2017, demonstrating how Phase 1 work around capacity development for evidence based urban and peri-urban agricultural related policies, can be used to deliver impact through Phase 2.
- An important reference source book: “Resource Recovery from Waste: Business Models for Energy, Nutrient and Water Reuse” will be published by Earthscan in 2017. This builds on Phase 1 work around business options for nutrient, water and energy recovery and reuse.
- A new global assessment of (direct and indirect) wastewater irrigation will be distributed and discussed in global fora on wastewater, and is a product of key work with UN agencies on wastewater in Phase 1.

Flagship 4

- An institutional framework and tools for flood insurance, building on Phase 1 collaboration with CCAFS, incorporating equitable risk sharing for women in Phase 2. This product will be delivered to government partners in South Asia, as well as insurance companies.
- Implementation guidelines for SDG 6 (Water) including a methodology for assessing key targets under this SDG, a key client of this work is the Ramsar Convention.
- A water-energy-food nexus analysis for the Nile Basin Initiative to assist in identification of alternative development strategies for the basin.
- Strengthened outreach, especially in groundwater ‘hotspots’, on more sustainable groundwater management through the GRIPP Groundwater Solutions Initiative for Policy and Practice.

Flagship 5

- A jointly designed approach to delivering sustainability across agri-food systems in selected regions. Initial engagement is expected across five countries.

In 2017, WLE will also finalize its cross flagship synthesis, which brings together results from the Phase 1 WLE portfolio. This synthesis will elaborate on approaches to sustainable intensification of agricultural systems (SIA) developed in Phase 1, and form an important source of integrated knowledge for Phase 2.

A.1.3 Use of Different Funding Sources

W1-2 will finance catalytic activities (e.g., piloting, scaling, synthesizing, capacity development) that leverage further bilateral investments, and enhance the value and impact of research evidence derived from across the portfolio. W1-2 funds are essential for WLE to develop synergies with other CRPs, participate effectively in CGIAR country coordination and build on the results generated in WLE Phase 1. W1-2 resources will also be invested in outreach, through which WLE aims to build awareness of, and capacity for, credible solutions, which can attract development financing. W1-2 funds the Gender, Youth and Inclusive (GYI) Development theme, which will support the flagships to ensure GYI issues are fully integrated, where relevant, while also conducting global outreach to develop new research in this area, including the development of new consortia and networks. An example is a new research network, MARIS (Migration,

Agriculture and Resilience Initiative for Sustainability) which will be linked to WLE, to further the research agenda on the impact of youth out-migration on land and water management.

W1-2 funds maintain the Program Management Unit's (PMU). The PMU works to enhance program coherence, value for money and the impact of flagship research through four main elements: Management; Engagement and Communications; GYI and Monitoring, Evaluation and Learning (MEL). WLE is developing a MEL system to ensure that WLE's research meets its performance targets and that the benefits of integration across individual outcomes are brought together for wider impact.

Based on the expected research portfolio for the year ahead, up to 76% of WLE's research agenda in 2017 could be supported by W3-bilateral funding. See Section B for examples of specific activities.

TABLE 1: WLE PLANNED BUDGET BY FLAGSHIP FOR 2017 (IN USD 000S)

Flagship Name	Planned Budget 2017		
	W1/W2	W3/bilateral	Total
FP1: RDL	2,045	6,089	8,134
FP2: LWS	1,834	9,508	11,343
FP3: RUL	1,103	3,522	4,625
FP4: VCR	1,619	2,852	4,471
FP5: ESA	0	3,440	3,440
WLE Management & Support	1,331	0	1,331
Total	7,933	25,411	33,343

A1.4 Planned Revisions to Program of Work

Some milestones and targets have been updated, since the versions in the proposal, but across Flagships 1 – 4, all changes are relatively minor. The most significant change has resulted from the ESA Flagship 5 not receiving 2017 W1-2 funding. WLE will now review FP5's objectives and activities, consulting with other relevant CRPs (see A2.2), and external partners, to refine the approach for delivering sustainability in agri-food systems at landscape scale. The revised proposal for FP5 will respond to ISPC and donor comments, and will include a more focused and targeted approach that better responds to needs and demands of the development community. It will be submitted to the SMO later this year.

The concomitant reduction of W1-2 funds has necessitated a scaling down of the PMU budget and planned activities for ESA to act as an interface between WLE's thematic flagships and other CRPs. Seed funding for relevant initiatives will not be available as originally planned.

A2. Collaboration and Integration

A2.1 Contribution to and from Platforms

In 2017, WLE will explore working with the **Big Data Platform** to develop concepts and possible fund raising initiatives in areas including:

- Soil-plant dry spectral analytical methods, in which CGIAR Centers are increasingly investing. Engagement with the Platform would aim to promote the use of standardized CGIAR measurement protocols, spectral and reference databases, and calibration libraries.
- A collaboration through Flagship 1 (RDL) to mainstream the diagnosis of soil nutrient constraints to crop production and improving the targeting of landscape and soil restoration efforts through advanced statistics that combine and explore relationships between (global) biophysical, socio-economic data sets, meteorological data and climate change projections.
- New probabilistic approaches to analysing the costs, benefits, and risks associated with agricultural interventions and decisions. This would involve exploring the development of a probability management system, which will be a database of probability distributions for commonly re-occurring variables in different geographies, and tools for creating, managing and using probability distributions.
- A collaboration through Flagship 4 (VCR) for linking its global climate, water, groundwater and water pollution databases with the Big Data platform.

WLE's GYI theme will engage closely with **Gender Platform**. The platform will firstly be a forum through which cutting-edge research and learnings on gender, youth and inclusion under WLE, can be showcased across CGIAR Centers. Secondly, it is anticipated that the platform can bring together insights from across the CRPs to identify core themes relating to gender, youth and inclusion against the context of global challenges (e.g. climate change, land degradation, population growth, out-migration and economic change) to agrarian livelihoods. Linking the Gender Platform to the GYI-hosted MARIS network, which promotes global collaboration and dialogue on migration and agriculture research, can also help expand the scope and membership of the network and participation in MARIS events. .

WLE will collaborate with other CRPs to contribute to the Gender Platform, including the planned annual CGIAR social science conference. WLE envisages that the gender platform could play a very valuable role in developing consortiums for funding bids on some of the cross-CRP themes.

A2.2 Cross-CRP interactions

WLE will focus strongly on cross CRP collaboration in 2017, starting by consulting with the AFS CRPs (**MAIZE, RICE, WHEAT, LIVESTOCK, FISH, FTA, RTB**) to identify areas for joint working on new and existing research, to be delivered through the revised FP 5. WLE collaboration with other CRP Flagships, which were not approved for 2017, and the portfolio of research under GLDC, will be reassessed by WLE on a case-by-case basis. WLE already works closely with **FTA** on the Global Landscapes Forum initiative and in 2017 has a small activity on assessing risks and opportunities around upscaling of selected **MAIZE** technologies in the Eastern Gangetic Plains.

WLE will collaborate with the integrative CRPs on a number of initiatives. For **PIM**, there are three main areas:

- Joint development of diagnostic tools to assess gender issues in water management to support project design, MEL and the development of research questions.
- Jointly furthering the youth research agenda, considering a) active participation and/or exclusion of young people in land and water management, and b) youth aspirations/unemployment and the transition of many young people from agricultural to non-farm livelihoods, with implications for agricultural knowledge, rural institutions and long-term sustainability.
- Joint research on agricultural collectives in Nepal, building on existing WLE research to Improve Dry Season Irrigation for Marginal and Tenant Farmers, focusing on options for upscaling, and analyses of other initiatives in the region

CCAFS and WLE will continue the strong link built in Phase 1 on flood insurance in South Asia, investigating through Phase 2, how to ensure equitable provision to men and women. Further collaboration will be around soil carbon sequestration and the 4 per 1000 initiative, as well as integrating climate services information developed through CCAFS regional programs into WLE watershed and irrigation development initiatives in India, Myanmar and Ethiopia.

A4NH – Flagship 3 (RUL) will explore avenues for collaboration in 2017 including on wastewater and irrigation and links to health.

A2.3 Expected Efforts on Country Coordination

WLE, as per the proposal commitments, will align with the recommendations emerging from the SMB Working Group on CCC. The first stage will be to define how to engage in CCC in Ghana and Nepal, where WLE/IWMI plays a lead role, and in WLE target countries including Burkina Faso, Nigeria, Ethiopia, Uganda, Tanzania, Bangladesh, India, Nepal and Vietnam. WLE funding for CCC is limited, as this was originally to be supported by FP5. However, CCC in WLE will be coordinated via the PMU in 2017, with Flagships engaging in country coordination in their target countries. CCC target countries will be included in the process of redesigning FP 5.

A3. Management, Governance and Monitoring, Evaluation, Learning

A3.1 Relevant Changes in Management and Governance

Arrangements remain largely as described in the proposal, with IWMI, IFPRI, ICRAF, ICRISAT, CIAT and Bioversity represented on the Management Committee (MC) as well as the Program Director, MEL Manager and GYI Coordinator. TORs for WLE management structures have been updated. A new Program Director is now fully on board (since October 2016).

The Independent Steering Committee now includes two new representatives from CGIAR partner Center Boards, and has its first Phase 2 meeting in March 2017. New members of WLE include Fraser Sugden as the GYI Coordinator, Rolf Sommer as co-leader of FP1 RDL and Matthew McCartney as co-leader of FP4 VCR. The PMU is smaller: FTE inputs have been reduced quite substantially in 2017 in proportion with reduced budgets. The PMU will now lead the redevelopment of the ESA Flagship in 2017.

A3.2 Monitoring, Evaluation, Impact Assessment and Learning Plans

The 2017 [work plan for monitoring, evaluation and learning](#) will operationalize the [results-based management strategy](#) outlined in the Phase 2 proposal. There are six areas of focus. First, finalizing the results framework, indicators and targets for the program as the basis for planning (POWB) and reporting (AR) and internal management. Second, the establishment of baseline data for key outcomes, with an initial focus on behavioral changes – recognized to be at the core of CGIAR outcomes. WLE is pioneering the adaptation of KAP-type survey protocols¹ for this purpose. Third, with five other CRPs, WLE will launch the integrated online planning and reporting system (MARLO). Further refinements will take place, followed by pre-setting, data entry and launching by May 2017. This will ease and align planning and reporting requirements. Fourth, WLE will prepare evidence ‘gap maps’ for each flagship to identify evidence thin areas, as the basis for refreshing the evaluation strategy for phase II. The implication is that evaluations will focus on areas that are both of value to WLE, to the CG and of wider public goods interest. Fifth, as per the [evaluation plan](#) for 2017, evaluations of small-scale irrigation interventions in Ethiopia and Tanzania under the ILSSI / USAID Feed the Future Program will take place; an RCT impact evaluation of irrigation on agricultural productivity, nutrition and health and women's empowerment will be carried out in Ghana. The evaluation gap-map process will provide the framework for evaluations over the 2018-22 period. Finally, WLE will outline a plan for utilizing evidence from monitoring and evaluation better, building on existing information sharing fora and improving access to data.

¹ KAP – Knowledge, Attitude, Practice – surveys originated in the health sector, focusing on downstream behavioral changes amongst target individuals and groups based on health education campaigns. They are an established practice in this field.

B. FLAGSHIP LEVEL

B.1 Flagship 1: Restoring Degraded Landscapes (RDL)

B.1.1 Expected Annual Milestones towards Outcomes 2022

In 2017, FP1 will support landscape restoration pilots in Kenya, Ghana, Ethiopia and Colombia, and work with stakeholder platforms in Ghana and Tanzania on conservation and restoration planning, as part of its aim to incorporate land restoration into policy and practice (outcome 1.1). There will be extensive engagement with the Kenyan government and other partners, including a case study on soil and water conservation in the Upper Tana Basin, monitoring ecosystems services improvements from upstream restoration pilots, and engaging with the private sector to develop a land restoration investment portfolio. WLE researchers will work with the World Bank on soil fertility assessment in the Living Standards Measurement Study, and One Acre Fund and government partners in Kenya, Tanzania and Ghana through the Africa Soil Information Service (AfSIS). Evidence of annual milestones' delivery will be publications, guidelines on land restoration, two business case studies, a synthesis report and database on land and water restoration efforts, reports from platforms (e.g. GLF), capacity development interventions, conference proceedings and design of indicators and questionnaires. This outcome will contribute to the sub-IDO on increased resilience of agro-ecosystems and communities, especially those involving smallholders.

Under the Outcome 1.2, on integrating soil fertility and soil carbon into climate investments and programs, the flagship will operate in close partnership with the GIZ *Soil Protection and Rehabilitation for Food Security Program* in Kenya and Ethiopia, as well as with the Ethiopian Sustainable Land Management (SLM) Program. Scientists will develop a soil organic carbon guide and promote its adoption by county governments in Western Kenya. Through advancing (rapid) assessment methods for assessing soil organic carbon dynamics, support will be provided to two African UNCCD LDN (Land Degradation Neutrality) participating countries. WLE will promote integration of these methods into monitoring activities on LDN progress. Results will be presented at FAO *Global Symposium on Soil Organic Carbon*, the *6th International Symposium on Soil Organic Matter*, and the UNCCD COP 13. This outcome will contribute to the sub-IDO on reduced net greenhouse gas emissions from agriculture, forests and other forms of land use.

Under Outcome 1.3 on helping partners to improve the management of land restoration and the risks of land degradation, RDL will develop a new analytical approach for planning and performance management of land restoration initiatives, tested together with IUCN and Technoserve. Agronomic trials demonstrating soil and plant spectral technologies for predicting crop nutrient constraints will take place in Kenya and Tanzania. Outputs will include a risk-based framework for planning and management of land restoration, and improved capacity of national scientists in soil-plant spectral methods (Ethiopia, Ghana, Kenya, Malawi, Nigeria, Tanzania). WLE will generate and publish baseline datasets on land health in Cameroon, Chad, and Kenya and on paired soil-plant analysis on multi-location maize trials in Ethiopia, Kenya and Tanzania; a report on piloting soil fertility evaluation in Uganda and Ethiopia; and new calibrations for total element analysis in soils, plants and fertilizers using portable x-ray fluorescence spectroscopy. This outcome contributes to the sub-IDO on increased capacity of partner organizations, evidenced by the rate of investments in agricultural research.

B.1.2 Output towards Outcomes 2022

Gender relevant outputs are planned under the land restoration outcome (1.1) including: syntheses of successes and failures and recommendations for investment in socially equitable land restoration and an analysis of the impacts of land restoration and conservation on women, as well as the implications of out-migration and changing youth aspirations in sites undergoing land restoration in Ethiopia and Kenya. Frameworks, databases and tools for planning, monitoring, implementation and performance evaluation of land restoration will be developed in Kenya, Ethiopia and Ghana, with a partnership platform to be launched in Tanzania with pilots trialing innovative approaches to sustainable landscape interventions. WLE will jointly produce, with national partners, a business case summarizing an ex-ante assessment/ scenario analysis on economically viable and socially acceptable land restoration interventions, to attract potential land restoration investors.

Under Outcome 1.2, researchers will develop a guide to estimating and measuring soil carbon at various scales, thus evaluating the benefits of soil ecosystem services as well as the viability of payments for such services. RDL scientists will produce two review papers: one, in collaboration with CCAFS, summarizing the quantitative evidence that avoidance of soil organic carbon losses at global scale delivers climate mitigation benefits, and a second one on gender, social and economic barriers and drivers of adoption of soil conserving management practices. A review of promising new mechanistic models to simulate soil organic carbon dynamics will be produced, and an empirical model that uses mid-infrared spectroscopy to determine soil degradation status will be developed, to be presented at UNCCD COP 13.

Within Outcome 1.3, a new risk-based framework for planning and performance management of land restoration interventions will be developed and tested with partners. The framework, (to be published as a paper) will quantify costs, benefits and risks associated with proposed interventions and identify important variables for monitoring restoration performance. In addition, new approaches for targeting of soil fertility recommendations based on low cost soil and plant spectral analytical techniques will be tested in a large number of agronomic trials in Kenya and Tanzania. This will result in the first database of its kind and capacity development for governments, restoration agencies, and local partners.

RDL will place emphasis on ensuring that knowledge generated feeds relevant policy processes (e.g. monitoring of SDG 15, UNFCCC soil carbon discussions, etc.), through products such as policy briefs, blogs and videos on new approaches to evaluating land restoration options.

B.1.3 Contribution of W1-2 Funds

Initial projections suggest that RDL could secure up to \$6.1M of W3-Bilateral funding for 2017, which would be 75% of the 2017 RDL budget. The \$2M W1-2 funding will support strategic elements along the RDL impact pathway, building on previous research and results (e.g. evaluating silvopastoral systems as a restoration option and social indicators to determine effects of land restoration in the Amazon), and integrating (ex-ante) decision analysis into a consolidated framework for evaluating land restoration options. These funds will help improve coherence through effective flagship engagement and add value to the activities supported by bilateral funds (e.g. conceptualize a common RDL Implementation and Management Framework, synthesize

successes and failures in land restoration, catalyze global partnerships, promote bottom-up land restoration efforts through formation of a stakeholder & partnership platform in Tanzania). W1-2 will support strategic research, e.g. acquire, assess and use spatial soil and plant data, using infrared and x-ray dry spectroscopy to assess soil degradation and crop nutritional constraints, examine linkages between soil biology and ecosystem services in Western Kenya and synthesize interactions between agronomic performance, soil health, and SOC dynamics. RDL will further develop, test and develop capacity for application of decision analysis in land restoration projects. It will also support the integration of gender issues in the flagship, e.g. by studying barriers and drivers of adoption in Africa of soil carbon conserving management practices, with emphasis on women.

B.2 Flagship 2: Land and Water Solutions for Sustainable Intensification (LWS)

B.2.1 Expected Annual Milestones towards Outcomes 2022

By 2022, agricultural land and water management (ALWM) solutions and investment options for greater productivity and resilience will inform policy and practice (Outcome 2.1). By building on the research, methodologies and business models undertaken in Phase 1, LWS will investigate how to take ALWM to scale in India and Ethiopia in 2017. LWS is also promoting investment solutions at global and national levels. For example, the Ethiopian Ministry of Water, Irrigation and Electricity and Agricultural Transformation Agency have requested support around smallholder irrigation development, using solar PV technologies in groundwater extraction, and the Ministry of Agriculture in India, has requested support in developing better approaches to watershed management. Elsewhere, IFIs (e.g. IFAD, Sida, JICA) have requested guidance from LWS partners on how to improve productivity through ALWM. In the MENA region (Egypt, Jordan, Iraq), and West Africa (Mali, Ghana, Niger,) LWS is working closely with ministries and national researchers to build understanding of productivity gains through ALWM, rainfed technologies, e.g. conservation agriculture, mechanized raised beds, biophysical soil and water conservation/ rainwater harvesting measures). Products include LWS scientific publications, policy briefs, new data and maps. This work will contribute to the sub-IDO on reduced production risk.

Under Outcome 2.2, LWS will deliver management improvements to medium and large-scale irrigation schemes. Using participative approaches, researchers will identify how incomes and efficiencies (water and nutrient) can be improved through benchmarking tools, PPP arrangements, market connections and capacity development in the private and public sectors. Evidence will be delivered through high quality journal publications, and shared through various national, international and global events. There is some potential for influencing the development of several large and medium scale irrigation schemes (LSIS) with ALWM practice in Zimbabwe, Nigeria and Myanmar, in 2017 and onwards, in partnership with IFIs, e.g., UNOPS-LIFT, CILSSS for WB –Sahel, etc. This outcome contributes to the sub-IDO on ‘agricultural systems diversified and intensified in ways that protect soils and water’

B.2.2 Output towards Outcomes 2022

In 2017, outputs such as investment business models for scaling up ALWM approaches will contribute towards outcome 2.1, as LWS builds new knowledge and consultations on findings with boundary partners in Ethiopia, Ghana, Tanzania, Mali and Indian states (Gujarat and Karnataka). In addition, ALWM adoption developed under WLE Phase 1 will be demonstrated at scale in Ethiopia, Ghana and India, with a view to contributing towards social (gender and youth) inclusion and environmental sustainability in the long term. Capacity development will be an important intervention of the ALWM work, with tertiary and vocational training at institutional and individual level. In 2017, support to the curriculum of Arba Minch, Addis Ababa and Jimma universities, as well as capacity development on small-scale irrigation will continue, and support to MSc and PhD scholarships. The Gender in Irrigation Learning and Improvement Tool (GILIT) will be released in 2017 after being tested by two countries under Phase I.

Under Outcome 2.2, the flagship will promote new technologies and management approaches to improve productivity and income generation in Zimbabwe, Nigeria and Myanmar; develop improved baseline/benchmark indicator systems that enhance irrigation performance, support the

incorporation of gender, equity and ecosystem services in African irrigation investments, and develop benchmarking tools, PPP arrangements and support capacity development in the irrigation sector. In 2017, IWMI expects to lead the upcoming Nepal Irrigation Department institutional capacity development effort supported by ADB. IWMI is also assisting the ADB to develop the '2016 Asia Leadership program on Sustainable Development and Climate Change' by contributing specific e-learning modules on selected natural resource management topics.

B.2.3 Contribution of W1-2 Funds

WLE projections indicate that LWS could leverage up to \$9.5M of W3-Bilateral funding for 2017 to support its outcomes, which would constitute 84% of the annual LWS budget. The \$1.8M W1-2 funding will support essential and innovative research, targeting new regions or demonstrating successes at scale, to build a case for government investments, and/or develop added value deliverables. Building on previous research, LWS will develop business and investment models (e.g. on solar fodder value chains and service provision in irrigation), promote market led approaches to increasing income and productivity (e.g. through PPPs in irrigation), and develop metrics and approaches for sustainable intensification at landscape scale (e.g. benchmarking irrigation reports, global data on soil moisture management). W1-2 funds catalyze the bilateral contributions around scaling and innovative research, by supporting engagements and communication with boundary partners, enabling advancement along impact pathways.

A small proportion of LWS W1-2 is to be invested into the review of returns from Research for Development investments in ALWM, which will inform the development of the LWS baseline in 2017, and to explore the links with the CGIAR Big Data Platform, to propose indicators for metrics towards impact. W1-2 will be used to explore links with the FAO Land and Water Division, around common interests in solar irrigation development in MENA region, and more broadly, how LWS can contribute into the FAO Strategic Initiative on Sustainable Food and Agriculture. W1-2 will help to ensure coherence of LWS through effective flagship engagement (e.g. LWS partnership meetings to develop a common Flagship vision and plan to realise the ambition over 6 years). Three LWS specific outreach events are planned: Stockholm World Water Week; the ICID 24th Congress; and tentatively the 3rd Global Food Security Conference.

B.3 Flagship 3: Sustaining Rural-Urban Linkages (RUL)

B.3.1 Expected Annual Milestones towards Outcomes 2022

The first outcome (3.1) aims to improve the capacity of policy makers and key stakeholders to implement evidence-based urban and peri-urban agricultural related policies and strategies and farming systems innovations in eight cities in five countries by 2022. To achieve this, RUL will work at city region level, linking stakeholders across administrative boundaries; and at international level, supporting dissemination of RUL research findings into regional and global dialogues with and through its uptake partners, such as the RUAF Foundation, FAO and others. In 2017, RUL will support agencies to analyse their food value chains and farming systems to strengthen capacity and policy advice in this area. The flagship will support four of these cities to adopt a monitoring system for urban and peri-urban agriculture/city region food systems (UPA/CRFS) innovations and the development of food related indicators, policies and/or actions. Evidence to be generated in support of these milestones in 2017 include articles on Energy, Waste and Urban Agriculture; Policy briefs on Use of Waste for Energy and Fertilisers, reports on CityFood Tools, a fact sheet on the role of private sector in CRFS and a revised policy vision on CRFS in context FAO RUAF CRFS programme. This outcome will contribute to the sub-IDO on the creation of a conducive agricultural policy environment.

The work on increasing business capacities for nutrient, water and energy recovery and reuse (Outcome 3.2) will be conducted through practitioner training and partnering with business schools, IFIs (ADB, World Bank, etc.) and investment catalyzers (e.g. BMGF). In 2017, RUL will focus on the assessment of the value of fertilizer from waste derived products and research into RRR financial models, public-private partnership models, the investment climate for RRR in East Africa and South Asia and gender sensitive feasibility studies. Results will feed into the development and subsequent implementation of 18 Business Models for resource recovery from fecal sludge in Asia, Latin America and Africa. These will be promoted via MOOC design and start up support in two states of India. Evidence of delivery of the 2017 milestones includes RRR curricula (MOOCs), RRR/RUL publication series, RRR tool box, global databases (with FAO), proceedings relating to RUL participation at major conferences, capacity development manuals and marketing strategies, as well as research reports on field trials for waste based fertilizer and the potential for waste use in agriculture. This outcome will contribute to the sub-IDO on increasing capacity for innovation in partner development organizations and poor communities.

RUL will undertake work in 2017 to support the outcome on integrated urban-rural management of fecal matter and wastewater (3.3), exclusively using bilateral funding. Its impact pathway builds on collaboration with UN partners to contribute to the monitoring frameworks for SDG indicators (6.2.1 and 6.3.1), and assists in the development of safety standards for sanitation and water reuse. In 2017, research from WLE Phase 1 will be adapted into advice for investors in integrated urban water management and sanitation in Nepal and India and support the formulation of national guidelines on safe fecal sludge management in India. Evidence of milestone delivery will be through project reports and draft guidelines.

3.2 Output towards Outcomes 2022

Under CoA 3.1 new research papers from West Africa on the role of urban and peri-urban vegetable production for men and women and youth employment are expected, supported by a

review on rural-urban migration, and a two-city study on the spatial dynamic of urban farming and its capacity for youth employment. Outputs will include at least one policy brief.

Under CoA 3.2, two new publications on social perspectives and gender roles in resource recovery and reuse (RRR) are expected, along with several national investment climate studies, and the publication of about 60 RRR case studies. These incorporate gender as a cross cutting issue, and will serve business schools as teaching material. A MOOC on a set of fecal sludge based business models will be developed.

Under the CoA 3.3 subprogram, a multi-city project will start with stakeholder processes. Aligned with the UN Water theme for 2017 (wastewater), the related World Water Development Report will be strongly supported by WLE, supplemented by a new global assessment of wastewater irrigation, training courses and a training guide on safe wastewater use for African farmers.

B.3.3 Contribution of W1-2 Funds

Budget projections by RUL partners indicate that RUL could secure up to \$3.5M of W3-Bilateral funding for 2017 to support its outcomes, which would constitute 76% of the total RUL budget for 2017. The \$1.1M of W1-2 funding will support the nexus between individual projects funded by bilateral donors and strategic gaps along the impact pathway, including innovative and interdisciplinary research (e.g. innovative research on crop and soil responses to recovered nutrient resources). A key priority will be the facilitation of outreach and partnerships (e.g. RUAF Foundation into different urban fora through stakeholder dialogues and cross-site analysis; collaboration with development banks and collaboration with FAO, by feeding new data into the FAO data depository Aquastat; special seminars on RUL research at the Stockholm Water Week). W1-2 funding will also support cross-project and location analysis including flagship engagement and the development of linkages with AFS CRPs; and gender analysis and follow up, as well as the design of materials for a RRR curriculum and the RRR publication series.

B.4 Flagship 4: Managing Resource Variability, Risks and Competing Uses for Increased Resilience (VCR)

B.4.1 Expected Annual Milestones towards Outcomes 2022

Under Outcome 4.1, evidence-based solutions to minimize adverse impacts and maximize opportunities associated with water variability extremes (i.e. floods and droughts) will be developed. In 2017, VCR will develop an institutional framework and tools for flood insurance, in collaboration with CCAFS, incorporating a more equitable system of risk sharing between women and men. In 2017, VCR will establish a drought-monitoring framework for FAO (Southern Africa Resilience Hub) in Southern Africa, and develop a workplan for science-policy exchange and learning alliances around water variability challenges and opportunities with AFS CRPs. The flagship will work with a wide range of partners: in Sri Lanka, with the Ministry of Disaster Management (MoDM), the Department of Irrigation, the Department of Meteorology, the South Asia Global Water Partnership. In India, the Ministry of Agriculture and the Indian Centre for Agricultural Research (ICAR); and in Bangladesh, the Institute of Water Modeling, Ministry of Disaster Management and the Center for Environmental and Geographic Information Systems (CEGIS). Evidence of delivery of these milestones will be through the establishment of a database on flood related crop losses, business cases developed for index based flood insurance, tools developed and implemented for drought monitoring, and a workplan for collaboration with AFS CRPs.

VCR also aims to provide policy advice to governments and stakeholders (e.g. in Kenya and Ghana) on improved water resource infrastructure planning and management for enhanced ecosystem service benefits and increased resilience (outcome 4.2). In 2017, the focus will be on capacity development in the Volta and Tana Basin agencies (e.g. government, Tana and Athi River Development Authorities) on management of balanced portfolios of green and grey infrastructure for improved resilience, the roll-out of SDG indicator 6 in South Africa, and the development of a methodology for assessing wetland extent (SDG 6.6.1). The flagship will work with UNEP, IUCN, University of Manchester, Basque Centre for Climate Change, Overseas Development Institute, to achieve the milestones towards this outcome. Evidence of achievement of these milestones will be through take-up of recommendations in the Volta and Tana basins, a report on roll out of SDG 6 (including interactions with government), and a journal article on method development.

Outcomes 4.1 and 4.2 will contribute to the sub-IDOs on “Enhanced adaptive capacity to climate risks,” “Reduced production risks” and “Increased resilience of agro-ecosystems and communities, especially those including smallholders”.

Outcome 4.3 aims for increased public investments into, and adoption of WLE policy advice, on aligned water-energy-food nexus measures and strategies at various scales. Addressing nexus issues in groundwater is a core component. This will include work with global mechanisms (e.g. Ramsar Convention), uptake partners, and other change agents (e.g. German and Indian governments and the Nile Basin Initiative), and the private sector to reach impact. In 2017, VCR will strengthen the partnerships of the Groundwater Solutions Initiative for Policy and Practice (GRIPP) Initiative. It will support the government of India, amongst others, to apply information on risks and opportunities related to groundwater use. VCR will support multilateral development

institutions, such as the ADB and World Bank, to test water-energy food nexus checklists focused on resource conservation on irrigated agricultural projects and provide technical inputs into water-energy-food nexus initiatives for the Eastern Nile and Southeast Asian countries, respectively. Evidence of achievement of these milestones will be through a Nile Basin Initiative organized conference and a publication by the ADB on irrigation-energy linkages.

Outcome 4.3 contributes to the sub-IDs on “More productive and equitable management of natural resources” and on “Land, water and forest degradation minimized and reversed”, and on “Reduced production risks.”

4.2 Output towards Outcomes 2022

In 2017, VCR will deliver a database for India of crop loss values based on different flood scenarios and a report/working paper on the role of index based flood insurance as a post-flood management response, including insights on gendered aspects. A report on mapping of surface water extent, drought severity index and prediction of drought stress will be developed for target countries in Southern Africa. VCR will also develop joint work plans with selected AFS CRPs focusing on water variability and competing water uses and will do an initial assessment of how to upscale selected AFS CRP technologies under risks and resilience in the Eastern Gangetic Plains with attention to gender.

In 2017, VCR will advance research on quantifying ecosystem services in water resource planning models and comparing outcomes from natural and built infrastructure in the Tana and Volta River basins. Research will continue on the implementation of SDG 6 (the water indicator), including how it is best applied in South Africa and on the development of guidelines for the use of Earth Observation data for SDG 6.6.1 (wetland extent) based on global datasets.

In 2017, VCR will continue to enhance the WLE groundwater Solutions Initiatives for Policy and Practice (GRIPP). It will enhance the coordination and implementation of high-quality action research among GRIPP partners and support the development and dissemination of most recent approaches and experiences in groundwater management in hot-spot areas of emerging and heavily groundwater-dependent economies around the world. Research in India and elsewhere will focus on risks and opportunities of groundwater use including institutional arrangements and incentive systems for engagement of women and youth. Finally, VCR will co-develop scenario analyses for decision makers on integrated water-energy development and will provide policy advice on trade-offs and synergies across water, land and energy resources, targeted at selected basin, national, regional, AFSs and global levels. Capacity development will be a key area of work, alongside policy dialogues and producing knowledge products to inform policy and investment.

B.4.3 Contribution of W1-2 Funds

Initial projections suggest that VCR could leverage up to \$2.9M of W3-Bilateral funding for 2017 to support its outcomes; which would be 64% of the total VCR budget expected for 2017. The \$1.6M of W1-2 funding will support strategic gaps along the impact pathway, such as maintaining continuity and adding value by building on previous high impact research and results (e.g. tools and approaches for mitigating the negative impacts of floods and droughts on livelihoods, such

as index based flood insurance and drought preparedness primarily in South Asia). W1-W2 will be used to support an analysis of social and gender equity issues associated with crop insurance in general and index based flood insurance specifically. W1-2 funds will help to ensure coherence of the portfolio through effective flagship engagement and adding value to the activities supported by bilateral funds to generate VCR outcomes (e.g. to incorporate findings into water trade-off assessments, through conventions and international forums (IPBES, Ramsar, JAXA) and provide added value to the Flagship's sustainable groundwater initiative through building and maintaining partnerships. W1-2 will support strategic and transformational research, such as: the piloting of the Underground Taming of Floods (UTFI) approach in Vietnam, examining options for application at the global scale; the development of a regional energy model to support the Nile Basin Authority to assess energy-related water and food implications for the Eastern Nile; assessing the benefits associated with the natural variability of flood pulsing, and research on trade-offs between upstream hydropower or irrigation infrastructure, and downstream losses to flood based farming/fishing. W1-2 will also support capacity development for incorporating malaria control into planning and management of water infrastructure in Africa, the roll-out of SDG assessment and monitoring for sustainable water (via a case study in South Africa) and development of metrics/indicators for evaluating progress toward SDG targets, and the development of synergies with other CRPs.

B.5 Flagship 5: Enhancing Sustainability across Agricultural Landscapes (ESA)

B.5.1 Expected Annual Milestones towards Outcomes 2022

As this Flagship will not receive W1-2 funding in 2017, the priorities for 2017 include strengthening and revising the approach for the Flagship in line with ISPC and donor commentaries, and proceeding with some planned activities using bilateral funding sources. The System Council commissioned donor review of September 2016 recognized that “FP5 has high potential for impact”; “FP5 is considered of high strategic importance”; “Partnerships are strong” and that the flagship demonstrates significant comparative advantage for the CGIAR. The ISPC noted, “The thinking that is articulated in ESA is important and should be mainstreamed through the CGIAR”². These will be key anchor points in the process of revising the Flagship, including sharpening the focus and specificity of what FP5 can deliver, refining the flagship’s ambitions, responding to latest thinking and developments in this area, and reviewing the roles that each partner will play in delivery.

The current structure of FP5 is around two outcomes for 2022. Outcome 5.1 (Evidence-based approaches to agricultural system diversification and intensification in ways that protect soil and water (‘sustainable intensification’) implemented at landscape scale by key partners) contributes to the sub-IDO on “Agricultural systems diversified and intensified in ways that protect soil and water”. Milestones will include delivery of a revised proposal, through consultations with AFS CRPs and external partners to better understand knowledge needs and deliver a more effective approach to improving application of sustainability within agri-food systems in selected regions and at scale. At the same time, evidence on environmentally sustainable approaches, will be generated through ongoing projects, to be fed into the updated FP5 sustainability methodology. Some adjustments to the outcomes may occur as part of the redesign process.

Outcome 5.2 (Application of new tools to enhance the impact and value for money of WLE and partner interventions) will support the sub-IDO on “More productive and equitable management of natural resources”. Activities under this outcome will be delivered solely through bilateral funding in 2017, leading to the milestone on the application of innovative decision-support tools and impact pathway analysis applied across a sample of programs. The further development and application of decision analytic methods proposed under this flagship will support evaluation of options for restoring degraded landscapes in the RDL flagship.

B.5.2 Output towards Outcomes 2022

The ambitions of this flagship have been scaled back for 2017, with the focus on submitting a revised proposal for the flagship on enhancing sustainability across agricultural systems, to CGIAR for approval. Through bilateral funding, ESA partners will be able to progress on initiatives to provide decision makers with options to build resilience and produce datasets and tools for water and land accounting and agro-biodiversity monitoring. The component of ESA on decision

² ISPC review of pre-proposals, April 2016

analysis will continue, developing approaches for participatory decision modeling, spatial intervention targeting, and ex-ante impact models for decisions.

Capacity Development, Gender and Youth will be addressed in the revised flagship proposal.

Bilaterally funded activities will also facilitate progress in 2017 on a number of cross cutting components. The impact pathways modelling work in Kenya has an explicit gender component, distinguishing between the nutritional requirements of men and women, including pregnant and lactating women. Greater Mekong research addresses a number of gender related questions, including how benefits and costs from water and land development are distributed; the role of women in the management of river health and the relevance of gender for water and associated land governance. The Flagship also supports research on identifying gender sensitive market opportunities; modalities to enable poor rural women and men to benefit from agricultural heritage systems; facilitating the creation of women's groups for income generation activities; and inclusion of women in decision-making processes

B.5.3 Contribution of W1-2 Funds

FP 5 will not receive W1-2 funds in 2017. A small working group comprised of members of the PMU and MC and researchers from other partner Centers will take forward the process of revising the Flagship proposal for submission to the System Council.

The future intended use of W1-2 funds for this flagship will be to carry out strategic and innovative research that pools knowledge from across the CGIAR and key external partners on how to more effectively deliver sustainability across agricultural systems. Whilst there is a good amount of emerging knowledge on sustainability across CG partner Centers, it remains fragmented or disconnected, and has not been pulled together comprehensively. W1-2 will help to pool and synthesize this knowledge to deliver pragmatic advice for policy and programming on how to integrate sustainability in agricultural and food systems. This will also involve building on multiple bilateral activities across the System in this area.

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Flagship Tables

TABLE 2. SUB-INTERMEDIATE DEVELOPMENT OUTCOME INDICATORS AND 2017 TARGETS

FP No.	Mapped and contributing to Sub-IDO	Relevant CRP sub-IDO indicators	2017 Target
FP1	3.3.1 Increased resilience of agro-ecosystems and communities, especially those involving smallholders	Number of countries in which governments, agencies and local stakeholders invest in research based strategies and programs targeting adoption of restorative and preventative practices against land degradation	2 countries by end of 2017
	3.3.3 Reduced net greenhouse gas emissions from agriculture, forests and other forms of land use	Number of countries where climate financing, national strategies and programs invest in research based practices to build soil fertility and soil carbon, providing food security, adaptation and mitigation benefits	1 country in 2017 adopting WLE initiated CO2 offset measures by 2017
	CC3.1.2 Increased capacity of partner organizations, as evidenced by rate of investments in agricultural research	Number of countries that adopt and have trained staff in land restoration surveillance, planning and verification frameworks	Initiation of preparation of planning and verification frameworks in two countries
FP2	1.1.2 Reduced production risk	Number of countries in which agricultural water and land management (ALWM) solutions have been adopted into policy, practice and/or investment	Two countries in 2017 (Ethiopia and India)
	3.2.2 Agricultural systems diversified and intensified in ways that protect soils and water	Number of medium and large irrigation systems revitalized for increased sustainability and productivity	Three schemes across three countries informed and improved by LWS knowledge and capacity development products and activities by end of 2017 (A total of 15 medium and large scale irrigation schemes across 4 countries by 2022)
FP3	CC3.1.3 Conducive agricultural policy environment	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	8 cities in 5 countries (2017) 25 additional towns and cities have implemented urban food related policies, strategies or action plans by 2022
	CC4.1.3 Increased capacity for innovation in partner development organizations and in poor and vulnerable communities	Increased number of business schools, training courses and start-up trainees with RRR business capacity.	One business and/or start-up school working on RRR course material in 2017
FP4	3.2.1 More productive and equitable management of natural resources	Number of countries in which stakeholders and policy makers implement approaches that	Initial results from pilot testing of innovative water management approaches in one country (2017)

		increase water supply for agricultural production under conditions of water variability	
	3.3.2 Enhanced capacity to deal with climate risks and extremes	Number of countries with demonstrable investment by donors, MDBs and Governments in landscape-based solutions to manage increased water variability	Increased capacity for better management of natural and built infrastructure portfolios in two basin agencies in the 3 countries (2017)
	3.2.1 More productive and equitable management of natural resources	Level of public investment into policies that reduce groundwater depletion and promote its sustainable use with associated increase in agricultural incomes	Information on risks and opportunities of groundwater use applied by key Government partners in India via Groundwater Solutions for Policy and Practice Initiative (2017)
FP5	3.2.2 Agricultural systems diversified and intensified in ways that protect soil and water	Number of countries in which WLE-research based sustainable agro-ecosystems management practices are integrated into policies and programs	Initiated engagement with key partners in 5 countries on enhancing sustainability in agri-food systems

TABLE 3: EXPECTED ANNUAL MILESTONES (PROGRESS MARKERS) TOWARDS OUTCOMES 2022

FP No.	FP Outcome 2022	Milestone 2017 Max. of 3 milestones per FP outcome 2022	Mapped budget request for 2017	
			W1-2 USD	W3/ bilateral USD
FP1	Outcome 1.1: Restorative and preventative practices (that also enhance ecosystem services) incorporated in regional and national policies, strategies and/or programs	Knowledge products used by national governments or regional stakeholder platforms supporting implementation of innovative restoration pilots as well as national conservation and restoration planning in Kenya and Ghana;	815	3,423
		Private sector companies or foundations active in land restoration (such as CommonLand) request WLE support for developing an investment-ready business portfolio		
		Further investments made in land restoration pilots as a result of demonstrated improvements in ecosystems services provision		
	Outcome 1.2: National and regional climate strategies and programs investing in practices that build soil fertility and soil carbon, also providing adaptation, mitigation and food security benefits	Kenyan county governments of Kakamega, Siaya and Bungoma consider including this guide into their soil and landscape restoration planning and monitoring.	429	911
		Two UNCCD LDN participating countries of the humid tropics request support for further advanced methods (such as mid-infrared spectroscopy -MIRS) for determining soil degradation status into their list of LDN progress monitoring indicators		
		Increased visibility, reach and influence of WLE-RDL at the level of national and international platforms (AFR100, 20x20), UNCCD and UNFCCC COPs, GLF, 4p1000 etc.		
	Outcome 1.3: National and regional partners better equipped to manage land degradation risks and implement effective land restoration practices	Framework paper presenting a new analytical approach for planning and performance management of land restoration initiatives integrating feedback from testing with development partners	802	1,754
		Partnership with government and development agencies in in Kenya and Tanzania produce data sets from multi-location agronomic trials demonstrating a soil-plant ionomics approach using dry spectral technology for predicting crop nutrient constraints		

FP2	Outcome 2.1: Solutions and investment options informing policy, practice and investments in agricultural land and water management benefiting smallholder farmers leading to greater productivity and resilience	Phase 1 business models reviewed (and as appropriate adapted/adopted) public/private sector agencies in 6 countries	1,587	6,520
		Phase 1 recommendations on ALWM interventions evident in policy, investment and/or development programs in 3 countries : Ethiopia, Ghana and India		
	Outcome 2.2: Management improvements of new and revitalised medium and large scale irrigation schemes enhancing the productivity of water and the sustainability of food supply	Farmers, scheme managers, investors and policy makers in medium and large scale irrigation systems , request LWS- influenced new technologies and management approaches to improve productivity and income generation (targeting Zimbabwe, Nigeria and Myanmar)	248	2,988
		improved baseline/ benchmark indicator systems that enhance irrigation performance, gender equity and ecosystem services in 2 African irrigation investments efforts by IFAs and/or national public sector investment partners by end of 2018		
		Identify how problematic large and medium scale irrigation schemes(LSIS)in 3 countries (India, Ethiopia, Egypt) can be improved by benchmarking tools, PPP arrangements and supporting capacity building needs in private and public irrigation sector		
FP3	Outcome 3.1: Increased capacity and evidence for male and female stakeholders and policy makers to implement urban and peri-urban agriculture (UPA) related policies and farming system innovations	Led by its agencies 8 cities have implemented in-depth analysis on their food value chains and farming system for capacity development and policy advice. (2017)	230	665
		4 cities have (gone a step further and) adopted a monitoring system for UPA/CRFS related innovations and development of food related indicators, policies and/or actions. (2017)		
	Outcome 3.2: Increased business capacities in nutrient, water and energy recovery from domestic and agro-industrial waste for intensified food crop production	Field trials for waste-based soil rehabilitation established for major plantation crops in Sri Lanka targeting recommendations for private sector investments on e.g. 180,000 ha under tea. (2017)	460	2,349
		Business models (n=18) for resource recovery from fecal sludge promoted through the design of a free Massive Open Online Courses (MOOC) for entrepreneurs of both gender across Africa, Asia and Latin America, and support of start-ups on fecal sludge mgt. in India (2017).		

	Outcome 3.3: Increased public sector adoption of policy advice on safe fecal matter and wastewater management and environmental protection	Advisory services to ADB and World Bank in Nepal and India for adoption and replication of resource oriented solid and liquid waste management in small towns with potential to impact about 300,000 people. (2017)	413	508
		Guidelines developed for the Indian Ministry of Urban Development on safety handling of fecal sludge and wastewater to be applied in ca. 8000 towns with potential to impact several million people (2017)		
FP4	Outcome 4.1: Strong evidence underpinning implementation of solutions that increase water supply for agricultural production, livelihoods and ecosystems, and that decrease losses from water variability extremes	Flood insurance theoretical and institutional framework and tools (with insights for more equitable risk sharing for women) delivered to government partners and insurance companies (co-developed with CCAFS)	571	538
		Preliminary drought monitoring framework established and available to FAO and partners in Southern Africa.		
		Workplan with selected AFS CRPs to support ex-ante analyses of water variability developed.		
	Outcome 4.2: Policy advice on improved water resource infrastructure planning and management adopted, leading to enhanced ecosystem services and increased resilience	Increased capacity in basin agencies for better management of combined portfolios of natural (green) and built (grey) infrastructure in the Volta and Tana basins to build greater resilience and enhanced ecosystem services.	613	293
		Methodology for the assessment of key targets under SDG 6 [water] and interlinkages developed.		
	Outcome 4.3: Increased public investments into, and adoption of WLE policy advice on aligned water-energy-food nexus strategies at various scales, including for groundwater challenges	Establishment of operational partnerships in the WLE Groundwater Solutions Initiative for Policy and Practice (GRIPP) Initiative	434	2,021
		Information on risks and opportunities associated with groundwater use applied and taken up with key Government partners in India and elsewhere.		
		At least 2 water-energy-food nexus initiatives and national strategies are informed by WLE technology, policy and institutional insights		

FP5	Outcome 5.1: Evidence-based approaches to agricultural system diversification and intensification in ways that protect soil and water implemented at landscape scale	Redesigned Flagship submitted for approval taking into consideration reviewer comments	0	2,959
		Results from bilateral projects incorporated into the redesign of Flagship 5		
		Evidence on specific ecosystem based approaches, such as agrobiodiversity conservation, generated		
	Outcome 5.2: Application of new tools to enhance the impact and value for money of WLE and partner interventions ³	Application of innovative decision-support tools applied across a sample of programs	0	481

Disclaimer (from Guidance): Budget amounts build on investment and outputs from Phase 1

³ Flagship 5 outcomes likely to be adjusted during Flagship 5 redesign

TABLE 4: EXPECTED KEY OUTPUT 2017 TOWARDS OUTCOMES 2022

FP No.	FP Outcome 2022	CoA Output	Tagging of expected outputs 2017		
			G	Y	CD
FP1	Outcome 1.1: Restorative and preventative practices (that also enhance ecosystem services) incorporated in regional and national policies, strategies and/or programs	Research papers and knowledge products that synthesize land restoration successes, failures and impacts on women, as well as provide recommendations of scenarios and value propositions for investments in socially equitable land restoration (2017, 2018)	2	1	1
		Monitoring frameworks, databases and tools for planning, monitoring, implementation and performance evaluation of land restoration initiatives for three focus countries published (2017-2018)	1	1	0
		Land restoration pilots implemented or initiated in three target countries trialling innovative approaches and enabling conditions for sustainable landscape interventions, including land restoration partnership platform in Tanzania . (2017-2020)	1	1	1
		'Business case document' summarizing an ex-ante case study / evidence-based scenario on land restoration carried out together with national partners in one country, demonstrating potential impact and catalysing investment.	1	1	1
		Knowledge products (e.g. videos, briefs, blogs for the WLE Solutions Platform and wider dialogue through WLE Thrive Blog)feeding into international and regional restoration initiatives, e.g. assessment of progress towards SDG 15 (2017-2020)	1	1	2
	Outcome 1.2: National and regional climate strategies and programs investing in practices that build soil fertility and soil carbon, also providing adaptation, mitigation and food security benefits	Methodological guide published on estimating and measuring soil carbon at various scales, for evaluating the benefits of soil ecosystem services as well as payments for such environmental services (2017-2019)	1	0	1
		Review paper of current and promising new mechanistic models to simulate soil organic carbon dynamics completed; first version of an empirical model that uses mid-infrared spectroscopy (MIRS) to determine soil degradation finalized and results presented at UNCCD COP 13.	0	0	2
		Review paper of the gender, social and economic barriers and drivers of adoption of soil conserving management practices and insights from two case study countries (2017, 2018).	2	1	1
		Videos, briefs, blogs for the WLE Solutions Platform and wider dialogue through the Thrive Blog, e.g. on the impact of different land use and management practices on soil carbon dynamics and soil fertility, benefits on ecosystem services and climate change mitigation, gender, social and economic barriers to adoption, and relevance of soil carbon at global scale (2017-2020).	1	1	2

			Tagging of expected outputs 2017		
FP No.	FP Outcome 2022	CoA Output	G	Y	CD
	Outcome 1.3: National and regional partners better equipped to manage land degradation risks and implement effective land restoration practices	New risk-based conceptual frameworks and models for screening land restoration options using existing knowledge and low cost measurements to judge the probability of success or level of economic return (2017-2018).	1	1	2
		Monitoring framework, reporting guidelines and training modules on and for land restoration surveillance, risk assessment and land health surveillance approaches relevant to governments, restoration agencies, and local partners for cost-effective tracking of land restoration (2017-2020).	1	1	2
		Knowledge products on land restoration planning and performance management for presentation at national platforms and UNCCD COP, peer reviewed scientific papers, briefs, and blogs for the WLE Solutions Platform and wider dialogue through the Thrive Blog (2017-2022).	1	1	2
FP2	Outcome 2.1: Solutions and investment options informing policy, practice and investments in agricultural land and water management benefiting smallholder farmers leading to greater productivity and resilience	Policy and development investment-relevant business models (including investment cases) for outscaling productive and equitable Agricultural Water and Land Management (ALWM) in the rainfed- irrigated continuum prepared	1	1	1
		Diagnostic and analytical tools developed to assess levels of adoption and the environmental and social benefits of ALWM.	1	1	0
		Peer-reviewed scientific publications and presentations on ALWM's contribution to resilient livelihood and food systems across rainfed smallholder irrigated landscapes (ongoing 2017-2022).	1	0	0
		Capacity building through tertiary and vocational training at institutional and individual level	1	2	2
	Outcome 2.2: Management improvements of new and revitalized medium and large scale irrigation schemes enhancing the productivity of water and the sustainability of food supply	Report informed by Phase I findings on improved baseline and benchmark indicator systems to improve irrigation performance, for sustainable productivity improvements.	1	0	0
		High quality publications on benchmarking and improved irrigation management delivered and disseminated in relevant fora	1	0	0
		Recommendations for reforms and improved institutional arrangements to improve water productivity through improved delivery of targeted irrigation services	1	1	0

FP3	Outcome 3.1: Increased capacity and evidence for male and female stakeholders and policy makers to implement urban and peri-urban agriculture (UPA) related policies and farming system innovations	Data and papers on the role of urban, peri-urban and rural agriculture for urban vegetable supply, gender roles and youth employment.	2	1	1
		Policy brief on private sector engagement in urban food supply	0	1	0
	Outcome 3.2: Increased business capacities in nutrient, water and energy recovery from domestic and agro-industrial waste for intensified food crop production	Scientific papers on social perspectives and gender roles in waste and wastewater management	2	1	0
		Scientific papers, books and book chapters on resource recovery and resue business models referencing public-private partnerships and corporate social responsibility	1	1	1
		Several national resource recovery and resue investment climate analyses	0	0	1
	Outcome 3.3: Increased public sector adoption of policy advise on safe fecal matter and wastewater management and environmental protection	Scientific analysis of rural-urban water allocation from a business model perspective	0	0	1
		Extended FAO farmer field school training manuals on health risk reduction in wastewater irrigation	1	1	2
		New global assessment of wastewater irrigation distributed and discussed in global fora on wastewater	0	0	1
FP4	Outcome 4.1: Strong evidence underpinning implementation of solutions that increase water supply for agricultural production, livelihoods and ecosystems, and that decrease losses from water variability extremes	Database for regions of India of crop loss values derived from different flood scenarios based on flood hazard model and remote sensing- based flood parameters.	1	0	1
		Reports/ working papers and capacity development materials on post-flood management response, index based flood insurance and fiscal coping mechanism, with insights on gendered impacts.	1	1	1
		Historical to current mapping of surface water extent and drought severity index and prediction of drought stress using multisource remote sensing data for target countries in Southern Africa;	1	0	2
		Methodology for the assessment of risks and resilience in the upscaling of agri-food system strategies in the Eastern Gangetic Plains (India, Bangladesh and Nepal) in collaboration with the Maize AFS CRP and workplans with other AFS CRPs developed (G-1, Y-0, CD-1)	0	0	1

	Outcome 4.2: Policy advice on improved water resource infrastructure planning and management adopted, leading to enhanced ecosystem services and increased resilience	Quantification of water-related ecosystem services in water resource planning (optimization) models in the Tana and Volta basins.	0	0	2
		Report on "domestication" of SDG Goal 6 indicators in national and basin case studies (target setting, development of country level indicators, recommendations for policy change, formatting for SDG reporting, monitoring programmes, data management).	0	0	1
		Report/paper on implementation guidelines for the use of Earth Observation data for SDG 6.6.1 (wetland extent) based on the analysis of available global datasets.	0	0	0
	Outcome 4.3: Increased public investments into, and adoption of WLE policy advice on aligned water-energy-food nexus strategies at various scales, including for groundwater challenges	Provision of policy advice on trade-offs and synergies across water, land and energy resources, targeted at selected basin, national, regional, AFSs and global levels to national and basin stakeholders	1	0	1
		Recommendations for investments in sustainable and equitable groundwater development and management, including institutional arrangements and incentive systems for engagement of women and youth to national governments and global forums.	2	2	0
		Scenario analyses prepared for decision-makers in sector ministries on integrated water-energy development in specific locations.	1	1	1
WP5	Outcome 5.1: Evidence-based approaches to agricultural system diversification and intensification in ways that protect soil and water implemented at landscape scale by key partners	Revised proposal for Flagship on enhancing sustainability across agricultural systems, submitted to CGIAR for approval	1	0	1
		Innovative knowledge products provide decision makers with a suite of options to build resilience (ongoing 2017-2022)	1	0	2
	Outcome 5.2: Application of new tools to enhance the impact and value for money of WLE and partner interventions	Approaches for participatory decision modeling, including decision makers and stakeholders, spatial intervention targeting, and <i>ex-ante</i> impact models for decisions related to the thematic mandates of WLE and CGIAR (2017-2022)	2	1	2
		Datasets, tools and platforms for water and land accounting and agro-biodiversity monitoring (2017)	0	0	1

Notes from Guidance

G = Gender, Y = Youth, CD = Capacity Development; Markers: 0 = not targeted, 1 = significant, 2 = principal

CoA (Cluster of Activity) Outputs or Key Outputs reported in the POWB are expected to be key products, new knowledge and services produced through a variable number of deliverables reported at the project level (and not necessarily at the program level).