



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

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Acronyms

CIAT	International Center for Tropical Agriculture
CRP	CGIAR Research Program
DAI	Decision Analysis and Information Systems
ESR	Ecosystem Services and Resilience
ESRF	Ecosystem Services and Resilience Framework
Eoi	Expressions of Interest
FS	Flagship
FC	Fund Council
GPI	Gender, Poverty, and Institutions
GS	Google Scholar
IAE	Independent Evaluation Arrangement
ICRAF	World Agroforestry Centre
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDOs	Intermediate Development Outcomes
IF	Impact Factor
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
IES	Integrating Ecosystem Solutions into Policy and Investments (FS1)
IP	Impact Pathways
ISPC	Independent Science and Partnership Council
ITP	IWMI – TATA Water Policy Research Program
ITWPP	IWMI-Tata Water Policy Programme
IWRM	Integrated Water Resources Management
KA	Knowledge Aggregation
LWP	Sustainably Increasing Land and Water Productivity (FS2)
IA	Impact Assessments
IWMI	International Water Management Institute
KMC	Knowledge Management and Communications
MC	Management Committee
M&E	Monitoring and Evaluation
MRV	Managing Water Resource Variability and Competing Use (FS5)
NBI	Nile Basin Initiative
NRM	Natural Resource Management
OT	Operations Team
PIM	Policies, Institutions and Markets
PMEC	Program Management, Engagement and Coordination
R4D	Research for Development
RBO	River Basin Organizations
RDE	Regenerating Degraded Agricultural Ecosystems (FS3)
RRR	Recovering and Reusing Resources in Urbanized Ecosystems (F4)
SADC	Southern African Development Community
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SC	Steering Committee
SDG	Sustainable Development Goals
SLOs	System Level Outcomes
SPaRC	Solar Power as a Remunerative Crop
SRF	Strategy and Results Framework
SRP	Strategic Research Portfolio

ToC	Theory of Change
ToR	Terms of Reference
QofS	Quality of Science
UP	Uptake Pathways
VBA	Volta Basin Authority
WEF	Water, Energy and Food
WLE	Water, Land and Ecosystems

Executive Summary

Background and context

Global agriculture is one of humanity's great success stories. Never has the world produced so much food. Yet arguably, agriculture has degraded ecosystems substantially, which in turn has negatively impacted the provisioning, regulating and supporting services provided by ecosystems that underpin agricultural productivity, human livelihoods and equity. It is notable also that agriculture is both a cause and a victim of water scarcity that can arise in all catchments where intensification decreases water supply.

The CGIAR Research Program (CRP) Water, Land and Ecosystems (WLE) is led by the International Water Management Institute (IWMI) and is implemented in collaboration with 11 CGIAR Centers and FAO. According to its founding proposal in 2011, the objective of WLE is “to learn how to intensify farming activities, expand agricultural areas and restore degraded lands, while using natural resources wisely and minimizing harmful impacts on supporting ecosystems.” WLE has inherited some of the work that started under the previous CGIAR Challenge Program on Water and Food (CPWF), including selected focal regions of WLE research; an emphasis on context-specific, development impact from scientific research (“participatory action research”); some of its research governance arrangements; and many boundary partners.

WLE was based on a five-year workplan and began to operate in 2012 with an approved budget for three years. In 2014 an extension phase for 2015-2016 was approved. Originally, WLE was made up of five strategic research portfolios (SRPs), but the program was restructured in 2014 around five flagships and three cross-cutting core themes. In early 2014, WLE developed a comprehensive Gender Strategy, to integrate gender considerations into program planning and management and into the project portfolio. This was followed in late 2014 by an Ecosystem Services and Resilience framework document. The latter was adopted as a new unifying approach that would bring ecosystem concerns to the forefront of both WLE's research program and WLE's theory of change (ToC) to achieve Intermediate Development Outcomes (IDOs).

Purpose, scope and objectives of the Evaluation

The primary purpose of this Evaluation is to enhance the contribution that WLE is likely to make toward CGIAR goals relating to the productivity and sustainability of water and land resources in agro-ecosystems, as well as the livelihoods of poor producers and consumers in developing countries. As with all CRP evaluations, the purpose is to provide essential, evaluative information for decision-making by CRP Management, funders, partners and other stakeholders. The Evaluation aims to provide accountability and learning by including both summative and formative aspects. The summative part encompasses an assessment of research outcomes including those that resulted from CPWF's pre-CRP research and R4D activities. The formative aspects focus on current research and evolution of WLE over the past four years from the perspective of program design and governance and management arrangements. Furthermore, the Evaluation looks at the extent to which current research has been influenced by feedback from impacts derived from pre-CRP research.

The Evaluation Team developed its questions at two levels: overarching questions and questions in connection with the key evaluation criteria of relevance, quality of science, efficiency, effectiveness and impact. The following set of strategic questions were used by the team:

- Are the conceptual framework and key hypotheses of WLE coherent, effectively communicated and appropriate for the wide range of issues and diversity of locations included in the program?
- Are the impact pathways identified by the program ones that are likely to achieve the desired development outcomes and are they consistently developed across the different components of the program?
- Is the quality of science in the program of an appropriate standard, does it reflect the CGIAR's comparative advantage in science and is it engaged with and reflective of international developments in the different fields included in the program?
- Are the partnership strategy and range of partnerships being developed in the program consistent with the program's overall goals and the development of impact pathways within the program?
- Are the management procedures and governance structure of the program appropriate, efficient and consistently applied and is there clarity on the roles and operational procedures of different components of the management structure?
- Is the research for development character of the program coherently developed, with an appropriate balance between high level research and responsiveness to real world issues as identified by key stakeholders in the different areas where the programme is working? ¹

Approach and methodology

The approach used by the Evaluation was designed to address the challenges posed by WLE's complexity, scale, widespread geographical distribution and wide range of activities, distributed across five flagships and three core research themes. The team used to the extent possible methods that aim to generate evidence and findings that are "representative" of WLE.

The methodology used a variety of primary and secondary data collection methods. Some of these, such as portfolio analysis and social surveys, looked across the WLE's research portfolio to identify overall characteristics and trends. Others, such as case studies and field missions considered specific issues or sets of activities and explored them in depth. The two approaches (across portfolio and in-depth) were inter-related and mutually supportive. Portfolio-wide trends signalled issues that were explored through in depth approaches. Methodologies used during data collection and analysis included:

- portfolio analysis of data and documentation available within the program, e.g. data from WLE's M&E system, records of expenditure, funding sources, etc.;
- document review and analysis, e.g. strategy and policy documents, project documents and reports;
- synthesis of earlier, completed evaluations;
- semi-structured interviews;
- group discussions and mini-workshops;
- missions to the four WLE focal regions and river basins, including field visits;
- surveys and questionnaires;
- key informant interviews, e.g. face to face, by skype, etc.;
- case studies;

¹ Note that the sixth question was amended after publication of the Evaluation team's inception report. This was to better reflect issues that emerged during the evaluation.

- bibliometric analysis and H-index analysis;
- in-depth review of a sample of project proposals and publications, blogs, capacity building materials, etc.

Analysis also involved compiling, comparing and cross-checking (triangulating) the findings from the different lines of inquiry to address the review questions. Those findings regarded as verified, substantive and important to the evaluation were analysed within the cause and effect chains contained in different levels of theory of change (e.g. CGIAR, WLE, Regional and Project level theories), enabling the team to arrive at conclusions and recommendations. An additional triangulation approach compared the evidence provided by partners and stakeholders. In this case, the purpose of triangulation was not to move towards one verified set of evidence, but rather to explore perceptual variation, which may have fundamental effects on implementation and on the interpretation of results.

One important limitation encountered by the Evaluation Team was the lack of continuity in CGIAR and WLE's overall direction, and in CRP structure, objectives, approach and staffing. The team examined the extent to which these have provided sufficient consistency to enable substantive research on complex issues to be designed and implemented. This limitation spans both formative and summative evaluation, since it was necessary to examine the effects to date of the numerous changes, and whether the systems now in place will provide an adequate enabling environment for effective research for development and for measurable research outputs to desired development outcomes at scale. Sufficient time and continuity are also needed to identify and quantify potential negative trade-offs or externalities that might become apparent as interventions or activities are intensified or up-scaled.

Main Findings and conclusions

Overall

Overall, WLE has made good progress. While there are areas that need improvement, discussed below, the Evaluation Team thinks that WLE is making good progress under difficult circumstances. Various components of the program are on track to produce interesting and innovative results that have the potential to move towards achieving the program's IDOs. Some of WLE's activities and outputs can be considered to be of the highest international standard. Additionally, the high standard of many of the personnel involved in the program is noted. Flagships and regions are managed by staff who are experienced, dedicated and respected in their areas of competence and responsibility.

Relevance

WLE's focus on water, land and ecosystems has high strategic relevance. The program differentiates itself from crop- and systems-based CRPs by addressing challenges related to restoring and maintaining ecosystem services from the local or field scales up to the regional or basin scales. Additionally, WLE seeks to identify and quantify potential trade-offs or externalities that may be the unintended consequence of intensification of rainfed and or irrigated agriculture or, in some cases, the result of programs aimed at improving the efficiency of water use.

WLE's Ecosystem Services and Resilience Framework (ESRF) sets out an approach that is seen as the means to achieve the program's vision of a world in which agriculture thrives alongside vibrant ecosystems. However, the ESRF has generated tensions within WLE that were apparent during interviews and group discussions conducted during the Evaluation. Some considered the ESRF to be important in providing insights and strategic direction to their research while others stated that it does

not differ radically from other ecosystem services approaches. Still others were critical, saying that they found the ESRF too abstract, conceptually prescriptive and/or too general to be useful.

WLE's comparative advantage lies in part in its character as a research for development program directly linked to goals associated with development outcomes, as inherited from the CPWF program. The scope of issues examined, combining water, land and ecosystems in a global R4D program, is unique in many respects, as is the scope and strength of the partnerships and the geographical and agro-climatic range of field sites. However, a more active adoption of action research approaches, different types of stakeholder-led learning approaches, and analysis of the relationship between research and development are needed if this advantage is to be fully realized. Particular attention should also be given to the challenges associated with moving from research outputs to development outcomes and the potential value or merit of taking problem-driven approaches that are iterative and adaptive in nature.

Quality of science

The WLE's Quality of Science (QoS) is overall of a good standard and was found by the Evaluation Team to be relevant to the scientific target audiences. At the project level, the conceptual frameworks, the selection of methods and the analytical techniques used were frequently found to be of a high standard. The number of publications being generated is high and the research outputs examined were similarly overall of a good to very good standard with some examples of excellent, world-class research published in high impact journals. Among WLE staff there are a number of outstanding researchers who are recognized internationally as leaders in their fields.

However, the Evaluation Team is concerned that the good quality results at project and, to some extent, cluster level are not enhanced by effective mechanisms for the aggregation and synthesis of results to produce overall analyses and conclusions at the regional, global CRP and inter-CRP levels. Overall, there is a sense that the whole of WLE is not greater than the sum of the parts, or that the many interesting individual findings are not adding up to something larger. This means that the cumulative findings that are found in groups of similar projects in a number of thematic areas are not being integrated to give valuable insights on key program themes. It is notable also that mechanisms and processes for vertical and horizontal integration and synthesis of findings were better developed and given more priority in some focal regions than others.

The Evaluation Team believes that this finding is not merely a reflection of the program being at an early stage, with few results to aggregate. Like all CRPs, WLE was initially created by mapping a large number of existing projects into one program. Many started long before WLE was created and were completed in the first years of WLE. There is also a concern that processes to relate results to meta-hypotheses and program IDOs are under-resourced and not adequately used. As a consequence, it is difficult to understand how or why individual project outputs and outcomes contribute to overall program objectives. This conclusion is tied to the limitations of the overall conceptual framework and a deficit of strategic management and direction in the program.

Effectiveness and impacts

Overall, WLE has been successful in producing a significant number of relevant outputs across a large portfolio of projects, which mostly have been delivered according to plan, and in a timely manner. This has been achieved despite the diversity and geographical spread of the portfolio and the challenging context in which it has been implemented. Some constraints to effectiveness were imposed by a lack of methodologies to measure progress and by the limited extent to which project-level outputs and outcomes are being aggregated and synthesized to be converted into knowledge goods. The Evaluation

Team detected a tendency to follow a ‘knowledge deficit model’ based on the assumption that change to agricultural systems can be accomplished simply by changes in policies, which respond in a rational and linear manner to the provision of evidence on the efficacy of alternative options. Such an approach may limit the effectiveness of delivery of important results from WLE research.

WLE is producing outcomes at the regional and global levels that contribute effectively to the sustainable management of land, water, and ecosystems. Some relevant achievements have occurred in the Mekong region, where a community of practice of sustainable hydropower development has been established encompassing five countries. The advances through the IWMI-Tata program in water policy in the Ganges river basin in India is another outstanding example of successful conversion of research outputs into outcomes, and where new concepts of using groundwater storage for flood control are being introduced. The uptake of business models for wastewater treatment and waste recycling in rural areas of Ghana and other countries clearly shows the positive impact of well-focused research. The use of the water, food and energy nexus has been useful for positive dialogue at several scales including the global level, and, finally, the use of soil spectroscopy methods in many African countries has created a promising network on which outreach efforts on soil fertility and plant nutrition could be based.

It is too early to expect impacts at IDO level related directly to WLE work, but examination of evidence for impacts produced by programs that preceded WLE indicates that there is an urgent need to undertake impact assessment studies. These should be focused on the most relevant programs for WLE, including the IWMI-Tata water policy program and the AgWater Solutions project on smallholder irrigation management.

Partnerships and capacity development

The program has thought about its partnership strategy and identified the specific types of partners that are required to achieve its objectives and goals. It has a large number of partnerships, some dating back to the CPWF and earlier programs. WLE has been very successful in attracting private sector partners and has had policy influence in different regions. One concern expressed by a number of stakeholders is that uncertainties over the future of the program and budget cuts have had a negative influence on the consolidation of partnership processes. Successful partnerships require continuity and trust, which demands time and consistent efforts. It is essential that existing commitments are honored and that partnerships continue to be developed as a central part of the program.

WLE’s approach to capacity development is intended to be flexible and rooted in project-level experiences, especially through learning from shared experiences in multi-stakeholder dialogues and partnership processes. The program has an online categorization of activities (including capacity development activities) and in 2015, WLE formed a small working group to review its strategy for capacity building. However at the time of the Evaluation, the program did not yet have an overall capacity development strategy that included all activities taking place at the project level.

Gender, Poverty and Institutions

WLE has done a good job in mainstreaming gender but the program’s approaches to the analysis of poverty, including poverty targeting, and to institutional analysis and change, have emerged as important issues in the evaluation. Poverty and institutions are part of one of WLE’s cross-cutting core themes but to date the implementation has concentrated almost exclusively on gender, where a systematic and coherent approach has been developed across the program. The program recognizes this deficiency and WLE Phase II will make more explicit its poverty reduction focus and incorporate institutional drivers and barriers to change as part of its impact pathways.

It must be asked whether a uniform approach to institutional change can be created in a global programme like WLE, which works in societies with a range of levels of development, legal and political systems, culture and history. This means that institutional systems are extremely diverse and could limit the transferability of policies and approaches. Uptake pathways need to reflect these diversities, and WLE should find a balance between ensuring a level of consistency in the attention paid to institutional issues while avoiding the imposition of an overall framework that may not be appropriate in all contexts. Additionally, WLE should make use of social sciences approaches, including political economy analysis in its institutional work.

Knowledge management and communication

WLE is to be commended for the number and range of KMC products (e.g. books, reports journal papers, blogs etc.). However, some aspects of the program's KMC activities could benefit from further consideration. In particular the website is designed principally for the promotion of WLE development options. This reflects a conscious decision to use the website for this purpose rather than for academic debate. The Evaluation Team is of the opinion that there is a need to temper this approach and to discuss some of the uncertainties and limiting factors that surround these issues, especially with respect to case studies and the promotion of development options. In parallel with the need to develop testable hypotheses under the ESRF indicated above, it is important that the website reflects more adequately the diversity of options and the multitude of factors that influence development outcomes.

Governance and management

The Operational Management of WLE is very good despite the challenging context within which the program has been implemented. The Program Management has ensured that the day-to-day operation of WLE is efficient and the impacts of challenges associated with restructuring and budget cuts have not compromised the overall implementation of the program. Strategic management is more of a concern, with insufficient internal discussion and leadership leading to a lack of clear guidance on key issues such: i) translating the abstract core concepts of WLE into testable hypotheses that are reflected in strategic program decisions; ii) the aggregation of results to produce novel and insightful syntheses on core research issues; and iii) consistent approaches to issues such as poverty analysis and targeting, institutional change, and other socio-economic dimensions of the program. The changes in WLE leadership (at the time of the evaluation, WLE was hiring its third director since the beginning of the program in 2012) may be one of the reasons for this limitation.

The Evaluation Team notes the excellence of many of the staff involved in the program, both existing personnel and new recruits. It is essential that the program creates an environment to retain and mentor key staff, and ensures that they are given the necessary space and incentives to contribute in an effective manner.

Tensions within the governance structure, although much diminished at the time of the evaluation, were observed and traced to perceptions that the Steering Committee (SC) was too directional and dogmatic in its strategic guidance of the Management Committee (MC). Much of this was about the character, content and presentation of the ESRF, as discussed above. Insufficient diversity of the composition of the SC and an apparent lack of encouragement for rigorous, holistic and ongoing debate regarding the ESRF were contributing factors.

Recommendations

The Evaluation Team has 12 recommendations, which are presented below.

Recommendation 1. The conceptual underpinning of WLE.

WLE should clarify and further develop the conceptual underpinning of the program, including but not limited to the ESRF. The ESRF should be seen as a 'living' document to be examined and continuously developed by the program. Specific actions should include the following:

- Define testable hypotheses for the overall approach and develop a structured program of research and knowledge aggregation activities to examine these hypotheses. This should include the use of models and modelling based on existing empirical data where this is available.
- Broaden the scope of the ESRF to include a more complete coverage of institutional, social, economic and livelihoods issues and the analysis of transformative change.
- Establish a closer relationship with the PIM CRP which has the mandate and expertise to address a number of the concerns over the scope and focus of the WLE approach, including in relation to institutional and policy analysis.
- Recognize and integrate a wide range of research traditions and methods and avoid prescriptive use of the ESRF in all activities and at all institutional levels.
- Develop the framework as a flexible set of concepts and principles that can be adapted to the specific context and key issues of different focal regions and flagships/clusters.
- Describe the key concepts of WLE in such a way as to make them more accessible to people who are not specialists in the field.
- Avoid using terminology that is indistinct and /or not well defined.

Recommendation 2. WLE's Theory of Change.

WLE's theory of change needs to be strengthened. It should relate directly to the analysis of change and clearly set out a usable and adaptable approach to examine change processes at all levels. This should be done in parallel with the actions described in Recommendation 1, reflecting the close association between the program's conceptual approach and the theory of change. Specific actions should include the following:

- Undertake an analysis of what the program is seeking to change: in essence to drive agriculture forward along a sustainable intensification pathway while restoring and/or maintaining ecosystem services.
- Undertake an analysis of the drivers of and barriers to change in agricultural systems at all scales and institutional levels: those factors that influence the speed and trajectory of change in different biophysical and societal contexts. This should also include specific attention to the challenges of adapting research recommendations to different biophysical and societal contexts and achieving development outcomes at scale.
- Develop a structured approach to the analysis of social and institutional aspects of the change processes. This should build on and expand the work on behavioural economics currently found in the DAI core theme. Ultimately it would lead to the development of an overall strategy on social and institutional change, ensuring that all parts of the program are able to access support on these issues where needed. This strategy should be developed in collaboration with the PIM CRP.
- Give explicit consideration to potential externalities at all spatial and temporal scales and along relevant value chains. Particular attention should be given to potential unintended consequences of intensification of agriculture on other water users and uses (in space and time).

Recommendation 3. Nurturing young scientists.

WLE should assign sufficient resources to maintain the positive feature of having a significant number of junior scientists as project leaders. Specific actions should include the following:

- Encourage collaboration between young scientists and senior scientists
- Encourage mentoring of young scientists by senior scientists to generate good publications and visibility

Recommendation 4. WLE publication policy.

WLE participating Centers should commit to fully following WLE publication policy. Specific actions should include the following:

- All publications should be internally peer-reviewed
- No WLE publications should appear in predatory journals.

Recommendation 5. Dedicated research facilities.

There is need, opportunity and capability for long-term research at dedicated field facilities strategically located in developing countries. WLE should play a role in maintaining and establishing such long-term research facilities because well-managed and well-instrumented field and catchment scale laboratories are needed to underpin the research of WLE and other CRPs. Such studies are also essential to provide much needed empirical data for calibrating and validating the extensive WLE's modelling efforts. Specific actions that are needed include:

- Develop strategic collaboration with institutes that have field and catchment scale laboratories or are willing to invest in them.
- Undertake multi-scalar research at spatial scales that range from the field to the river basin

Recommendation 6. Learning, knowledge synthesis and aggregation.

WLE should make a focussed effort to learn from its experience in different types of projects and within and across focal regions. Specific actions should include the following:

- Develop a strategy for knowledge synthesis and aggregation across the program. (Some efforts in this direction have already been made by WLE within the context of developing a novel "Solutions Database/Platform.")
- Allocate sufficient resources, and leadership from among the strongest researchers in WLE. For the program to reach its potential in the production of innovative global knowledge goods, some priorities will need to be established. To facilitate this process, WLE should establish a strategic group working directly under the Program Director to be responsible both for the development of the overall program strategy and the identification and management of key syntheses products. The Evaluation Team notes that this was a recommendation in 2011 from the ISPC to improve the original proposal for hypothesis driven research, and it was reiterated in the ISPC commentary on the 2015-16 extension proposal.
- Provide resources to flagship leaders to instigate and facilitate discussions on key themes in project clusters, with support from lead researchers in the field (both inside and outside WLE), to identify generic conclusions and areas where results are specific to the context of individual projects. Synthesis research integrating outputs from WLE projects and/or other CRP projects should be encouraged and prioritized where such work can bring significant added value. The approach developed in the RRR flagship provides an example of how this can be done.

- Where this has not happened, undertake global reviews of the ‘state of the art’ for the key themes, including a discussion of the state of knowledge and main methodological approaches and challenges. These reviews should be of high quality, adhere to systematic protocols, be quantitative where appropriate, and contribute novel insights.

Recommendation 7. Impact Assessment

The Evaluation Team recommends that WLE should make strategic investment in impact assessment taking into account available resources. Specific actions should include the following:

- Undertake new impact assessment studies, as previously recommended by Merrey (2015), starting with the Comprehensive Assessment of water management in agriculture of the CPWF and including the IWMI-TATA water policy program in India which is still ongoing in WLE. Also to be included in the priority list is the Ag-Water Solutions project which is one of the foundations of WLE’s on-going efforts in the area of smallholder irrigation in Africa.
- Define a plan of impact assessments, based on key criteria including scale of intervention, degree of innovation, strategic importance to the flagship or region, availability of baseline data, impact assessment capacity of key researchers and partners, and duration of commitment from partners.
- Include meta-syntheses that assess outcomes across projects to provide an understanding of the effectiveness (or otherwise) of different approaches to addressing key development themes within the program

Recommendation 8. Partnerships

WLE management should do a comprehensive stocktaking of existing partnerships across the program. Specific actions should include the following:

- Identify where the best potential exists for consolidating partnerships at cluster and regional levels.
- Initiate a dialogue with partners on actions to ensure continuity in partnerships to mitigate the impact of existing funding uncertainties over the future of the program.
- Recognise that different partnerships may be needed for different ToC steps or pathways (e.g. for moving from research outputs to development outcomes).

Recommendation 9 Gender.

WLE should employ a dual strategy in its gender work. Specific actions should include the following:

- Examine how gender integrates into WLE’s technical priorities (as is being done) but also identify a few separate gender priorities and develop research questions around them.
- Provide GPI with research resources to support some cutting edge transformative work specifically on gender, aimed at understanding how gender disparities and gender relations effect agricultural innovation, productivity and sustainability.
- Identify a few partners that have expertise in working with women and technology at the grassroots level.

Recommendation 10. Composition and role of the WLE Steering Committee.

The Steering Committee should reassess its composition. Specific actions should include the following:

- Include one or more members with training in social sciences research.
- Undertake a rigorous and holistic debate on the role of ESR in the sustainable intensification of production by closely engaging researchers from various disciplines, including scientists who can bring agriculturalists' perspectives.

Recommendation 11. Strategic management and Program Planning and Integration.

Specific actions should include the following:

- Develop a prioritization mechanism to deal with budget cuts, focused on WLE's own primary objectives as a CRP. This is preferable to using a proportional formula to allocate budget cuts across flagships.
- Ensure the new system is transparent and agreed upon by main players. The criteria for mapping bilateral projects into WLE should be documented and the responsibility for reviewing and approving of this mapping should be assigned to flagship leaders with the WLE director providing final approval.

Recommendation 12. The Continuing Imperative of WLE.

- The Evaluation Team strongly recommends that the CGIAR retains a program with WLE's focus on the interactions between ecosystems and agricultural production. It should serve as an integrative CRP at levels of organization beyond the plot or field which are the targets of many other CRPs (e.g. at the catchment, basin and regional scales) and it should take explicit account of externalities and trade-offs that can become apparent at these scales. The specific form of such a program and its relationship to other CRPs needs to be established but to not have such a program, whatever the details of its form and institutional focus, would risk the momentum that has been established by WLE in the CGIAR's long-term efforts and programs on natural resources management.

1. Introduction

1.1 Purpose and Audience

This report presents the findings of the evaluation of the CGIAR's research program (or CRP) on Water, Land and Ecosystems (WLE). WLE started in 2012 and was extended in 2014 until December 2016. The initial structure of WLE underwent a substantial revision at the time of the extension and many of the current WLE activities started only in 2014 or 2015. Initially, WLE consisted primarily of existing projects that were 'mapped' into it but that had had their origins under other frameworks. These have progressively finished and new activities developed directly within the WLE framework have been introduced (including all of the activities under Flagship 1 which started in 2014).

This evaluation was commissioned by the CGIAR's Independent Evaluation Arrangement (IEA) and is one of 10 CGIAR research program (CRP) evaluations that IEA conducted in the 2013-2016 period. In common with the other evaluations, the primary purpose of this evaluation is to increase the contribution that WLE is likely to make toward CGIAR goals, in particular enhancing the productivity and sustainability of water and land resources in agroecosystems as well as strengthening and promoting greater sustainability for the livelihoods of poor producers and consumers in developing countries.

The evaluation is intended to provide insights, supported by appropriate evidence, to both program managers and decision-makers in the CGIAR system, to increase the likelihood that WLE will meet its stated objectives. It is also intended to give the wider group of stakeholders involved with or interested in WLE an overall perspective on how the program is evolving and what challenges remain for the future. The primary audience of the evaluation is the WLE program and its core partners, its governing bodies, the Consortium and the Fund Council. The evaluation is also intended to be of interest and use to WLE research partners and those involved in development or delivery.

In November 2013, the Fund Council (FC) of the CGIAR agreed that all current CRPs should undergo some form of evaluation by the time preparation of the full proposals for the second call for CRPs began. The WLE evaluation has been completed in time to provide insights, supported by appropriate evidence, for WLE management and staff in their preparation of the WLE 2 full proposal and eventually for decisions on program selection. It is worth noting that the evaluation was carried out as WLE Management, staff and partners were preparing the pre-proposal for the second call, and although the full report was not ready before the submission of the pre-proposal, the Evaluation Team paid particular attention to providing inputs for the formulation of the pre-proposal and briefings to the ISPC and the Consortium. Events were organized to that effect.

The future WLE is likely to be different than the existing one: this evaluation of past activities is also intended to be a key input in decisions on what changes should be made and how WLE can best take advantage of emerging research and funding opportunities. Finally, the first round of evaluations, including that of WLE will also contribute to the next System-wide evaluation.

1.2 The CGIAR Context

During the course of this evaluation, the CGIAR approved extensions to all 15 CRPs for 2015-16 and adopted a new Strategy and Results Framework (SRF)² to replace the original 2010 version. The new SRF identifies CGIAR objectives at three levels: Intermediate Development Outcomes (IDOs), at sub-level for the CRPs and CRP portfolio, and System Level Outcomes (SLOs)³. The CRPs have developed impact pathways and theories of change (ToC) that link CRP activities and outputs to the IDOs that in turn, link to the SLOs that represent the CGIAR's high-level goals. The CRPs have also defined quantitative targets and measurable indicators for progress towards the IDOs and SLOs.

A new CRP cycle begins in 2017. In August 2015, WLE put forward a pre-proposal for a Water, Land and Ecosystems CRP (including soils). The pre-proposal was reviewed by the ISPC, which highlighted some issues that needed to be addressed. At the time of the finalization of this evaluation, the full proposal was being prepared for submission in March 2016.

The funding sources available to the CRPs are shown in Box 1-1. During the first phase of WLE, the Windows 1 (W1) and (W2) funding decreased relative to other forms of funding and declined in real terms. W1 and W2 funding provide the greatest flexibility for the CGIAR and CRP managers to strategically allocate funds to meet IDOs and SLOs.

Box 1-1: Major Sources of Funding in the CGIAR System

To maximize coordination and harmonization of funding, donors to CGIAR are strongly encouraged to channel their resources through the CGIAR Fund. Donors to the Fund may designate their contributions to one or more of three funding "windows":

- Contributions to W1 are the least restricted, leaving to the Fund Council how these funds are allocated to CRPs, used to pay system costs or otherwise applied to achieving the CGIAR mission.
- Contributions to W2 are designated by Fund donors to specific CRPs.
- Contributions to Window 3 (W3) are allocated by Fund donors to specific CGIAR Centers.

Participating Centers also mobilize financial resources for specific activities directly from donors and negotiate agreements with their respective donors for the use of these resources

Source: CGIAR website: <http://www.cgiar.org/who-we-are/cgiar-fund/>

1.3 Evaluation Questions

As with all IEA CRP evaluations, this evaluation covers criteria that relate to research performance (relevance, quality of science, effectiveness, impact and sustainability), cross-cutting areas of partnerships, capacity development and gender as well as organizational performance. In addition, the Evaluation Team set six overarching questions. The Inception Phase involved extensive discussions

² CGIAR Strategy and Results Framework for 2016-2025. May 2015. <https://library.cgiar.org/bitstream/handle/10947/3865/CGIAR%20Strategy%20and%20Results%20Framework.pdf?sequence=1>

³ The three SLOs in are: Reduced poverty; Improved food and nutrition security for health; and Improved natural resource systems and ecosystems services.

among Evaluation Team members and a broad range of WLE stakeholders. During these discussions, various perspectives emerged on the development and implementation of the WLE program.

These were assessed by the Team and structured to form the following key strategic questions that the evaluation needed to address. It should be noted that the sixth question was amended from that contained in the inception report. This reflects the importance of issues as they emerged during the evaluation. The other questions remain the same:

- Are the **conceptual framework** and **key hypotheses** of WLE coherent, effectively communicated and appropriate for the wide range of issues and diversity of locations included in the program?

This question relates most directly to the relevance and quality of science evaluation criteria but also has implications for impact and sustainability.

- Are the **impact pathways** identified by the program ones that are likely to achieve the desired development outcomes and are they consistently developed across the different components of the program?

This question relates most directly to the effectiveness, impact and sustainability evaluation criteria.

- Is the **quality of science** in the program of an appropriate standard, does it reflect the CGIAR's comparative advantage in science, and is it engaged with and reflective of international developments in the different fields included in the program?

This question relates most directly to the quality of science evaluation criterion but also has significance for relevance and effectiveness.

- Are the **partnership strategy** and range of partnerships being developed in the program consistent with the program's overall goals and the development of impact pathways within the program?

This question relates most directly to the relevance, effectiveness, sustainability and quality of science evaluation criteria.

- Are the **management procedures** and **governance structure** of the program appropriate, efficient, and consistently applied and is there clarity on the roles and operational procedures of different components of the management structure?

This question relates most directly to the efficiency and effectiveness evaluation criteria.

- Is the **research for development** character of the program coherently developed, with an appropriate balance between high level research and responsiveness to real world issues as identified by key stakeholders in the different areas where the program is working?

This relates most directly to impacts and has implications for quality of science, relevance, effectiveness evaluation criteria.

These questions have guided the collection and analysis of evidence throughout the evaluation. The conclusions related to each of the questions are presented in chapter 8.

1.4 Evaluation Methodology

The evaluation has used a range of methods to collect evidence and undertake the analysis upon which this report is based. The overall methodology included a combination of primary and secondary data collection and both summative and formative approaches, assessing progress to date (including completed projects that pre-date WLE and were 'mapped' into the program when it started) as well as the prospects for achieving positive results for those activities that are still being implemented. The findings on progress are in part assessed against WLE's theory of change (discussed in detail in chapter 3) and are also assessed in relation to IEA's standard evaluation criteria: relevance, quality of science, effectiveness, efficiency, impact and sustainability and to the key evaluation questions set out above. The methodology described here is a summary of a much more complete description that can be found in the evaluation inception report (available on the IEA website http://iea.cgiar.org/sites/default/files/WLE%20Evaluation%20Inception%20report_Final.comp_.pdf).

WLE is a very large program, containing more than 150 current activities (some of them extremely large research projects) distributed across five flagships and three core themes. Coverage is global, with research activities throughout the developing world, but there is significant concentration on the four WLE focal regions: the Mekong, the Volta/Niger basin, the Ganges basin and the Nile/East Africa. There are hundreds of outputs, including books, journal articles, reports and policy briefs, assorted other publications, methods and data bases, electronic media such as videos and others.

Because WLE has such large numbers of activities and outputs, the Evaluation Team chose to sample a few projects in depth. The sample projects were chosen based on a set of criteria, as discussed below. They are considered sufficiently representative to lead to conclusions on WLE as a whole, however, the overall conclusions will not necessarily apply to individual activities or outputs.

Information was collected from the following sources:

- **Document review:** documents included CGIAR strategy and other documents, WLE programming, strategic planning and conceptual documents (including key documents such as the ecosystem services and resilience framework, the gender strategy, the partnership strategy, documents associated with the open call for research proposals and others), WLE financial reporting, selected project proposals, selected project reporting, publications and thematic, program and project reviews and evaluations. These documents were used for both overall program assessment and as part of in-depth analysis on particular themes or clusters of activities.
- **Interviews and group discussions:** more than 200 people were directly consulted including people involved directly in the program, stakeholders such as 'uptake partners' from government agencies and other organizations, and numerous international experts knowledgeable in the key fields of WLE but not directly involved in the program. The persons consulted included staff from most of the 11 CGIAR Centers involved in the program as well as FAO, which is also a consortium partner for WLE. In the consultations held, the Evaluation Team believes it has obtained a balance in perspectives between men and women, natural and social scientists, as well as researchers and practitioners. A complete list of persons interviewed and organizations visited can be found in Annex C. Face-to-face or electronic briefings were also held with the WLE SC and MC and the evaluation Reference Group.
- **Center and project site visits:** members of the Evaluation Team visited the headquarters of four participating CGIAR Centers (Bioversity, IWMI, ICRISAT and ICRAF) as well as regional offices of others, for example IWMI in several countries, WorldFish in Cambodia, ILRI in Addis Ababa and CIAT in Nairobi. Missions were undertaken to eight countries in the four focal regions to visit projects and meet a diverse range of stakeholders. These missions provided the Evaluation Team

with hard evidence and important contextual insights to understand the full picture of WLE at the time that the evaluation was conducted. The direct contact with both research and uptake partners was of particular value in helping the team to understand the relationship between WLE's concepts and approaches, on the ground realities, and the needs and interests of different stakeholders. The team also interacted with the WLE SC and MC in March 2015 in Rome, and with a variety of WLE staff during visits to IWMI headquarters in Colombo in December 2014 and May 2015. Finally, the Evaluation Team met with the SC and with a range of stakeholders at the WLE Mekong Forum in October 2015.

- **Staff survey:** The staff survey was administered in June 2015 to all researchers from CGIAR participating Centers who had at least five percent of their salary allocated to WLE whether financed by W1-2 funds or W3/bilateral funds. Only 33 percent responded, which was not very high, but sufficiently representative for the results to be used when combined with other sources of information. The survey was administered at a time when all CRP researchers were busy drafting the pre-proposal for the second call of CRPs which probably explained partly the low response rate. The complete survey results are presented in Annex A of this evaluation.

The main tools used during the evaluation are summarized below:

- **Assessment of quality of science:** A protocol was developed by the Evaluation Team, based on the IEA framework for assessing quality of science. It used quantitative (bibliometrics) and qualitative methods. It examined internal science management procedures, research design through a review of research proposals and other project documents, the project teams and team leaders, review of methodologies and of data management and knowledge aggregation methods as well as the quality of outputs, essentially publications. The publications assessment was based on an in-depth evaluation of a sample of publications from each flagship and, where appropriate, core theme.
- **Case studies:** A number of case studies were undertaken and are presented throughout this report. These case studies, which were selected on the basis of documentary analysis and through discussions with WLE management and staff, are used to illustrate particular evaluation issues such as quality of science, policy influence or the development of partnership processes.
- **Sample project review:** For in-depth qualitative understanding, 55 sample projects were selected and studied in detail, representing around 35 percent of the total portfolio. The analysis of these sample projects included interviews and, in some cases, field visits, by members of the Evaluation Team with relevant thematic expertise. Selection of the sample projects was guided by the following factors: i) thematic balance, representing the different themes/clusters within each flagship as well as their coverage in relation to the overall themes of WLE, ii) representation of the largest projects, iii) representation of projects identified by WLE management as being innovative, iv) a balanced representation of the lead centers, v) geographical balance; and vi) projects funded exclusively from W1 & W2 funds as well as projects receiving bilateral funding support. Analysis results were summarized in team's internal sample project reports and have been used as an input to the findings presented throughout this report.

The overall analysis has included compiling, comparing and cross-checking (triangulating) the findings from the different lines of inquiry (e.g. document review, interviews, group discussions, surveys and meta-evaluation) to address the evaluation questions. The perspectives of a wide range of stakeholders were a key source of evidence used in the evaluation but care was taken to ensure that the perceptions of individuals were cross-checked against those of others and against documentary and other available evidence.

This triangulation process has meant that the Evaluation Team's conclusions are based on sound evidence and the analysis reflects the perspectives of stakeholders in different parts of the WLE system. Variations among the viewpoints of different categories of stakeholders may be valid, particularly with regard to "opinion" questions. For example, there was some disagreement over the utility of the ecosystem services and resilience framework as a conceptual underpinning for research and policy development. In such cases, the purpose of triangulation is not to move towards one verified set of evidence, but rather to explore perceptual variation, which may have fundamental effects on implementation and on the interpretation of results. It is also useful for identifying opinions that are not supported by empirical evidence.

One aspect of the methodology has been the Evaluation Team's frequent interaction with the Management of WLE and other stakeholders. This was in part achieved through consultations with the Reference Group, the composition of which is set out in the inception report. It also entailed direct contact with the central management and with regional coordinators, flagship leaders and others. The Evaluation Team found the Management of WLE at all levels to be open and constructive, including providing requested information in a timely and comprehensive manner.

One further aspect of the interactions with WLE is related to the timing of the evaluation, which occurred just as the pre-proposal for WLE 2 was being prepared. To facilitate this, the Evaluation Team prepared briefing papers on the initial findings at two stages: for WLE Management during their preparation of the pre-proposal and for the ISPC and the Consortium Office when they were reviewing the pre-proposal. This meant that there were structured opportunities to discuss the initial findings and conclusions during the execution of the evaluation. The initial conclusions and recommendations were also discussed in October 2015 in an electronic meeting with the MC and a face-to-face meeting with the SC. Comments made at these meetings helped greatly in verifying and refining the findings and conclusions of the evaluation and has also ensured that the evaluation was able to contribute to the preparation of WLE 2.

1.5 Timeline, Organization and Team Composition

The evaluation started in December 2014 when team members attended the IWMI annual meeting in Colombo. The inception period lasted until March 2015 when the first full team meeting took place at FAO, Rome and a diverse range of other stakeholders (including the SC and MC) were consulted. The evidence collection phase, including visits to the four focal regions, lasted until September 2015. This was followed by the preparation, review and finalization of the final report for January 2016. The evaluation has taken place over a relatively long period of time which has permitted the team to explore in detail the complex issues involved, examine a diversity of evidence and consult with a wide range of stakeholders.

The Evaluation Team was multidisciplinary with a wide range of disciplines, areas of expertise and experience. The team was comprised of six independent international experts (see the bios of the Evaluation Team in Annex B). Their expertise includes experience in evaluations as well as specific technical fields such as ecosystem services, livelihoods and development, policy analysis, crop agronomy and biological sciences, hydrology and water resources management, soils, urban water and wastewater management, irrigation science, agricultural engineering, agronomy and crop ecology, gender, research management, institutional analysis, informatics, policy influencing and poverty reduction.

IEA provided quality assurance throughout the evaluation process and contributed an evaluation analyst to the team. IEA played a crucial role in the coordination of activities, access to documentation, and the analysis of evidence collected by the evaluation.

2. Overview of WLE

2.1 WLE Vision, Goals and Objectives

This chapter provides an overview of the structure and objectives of WLE and sets a context for understanding the more detailed content of the following chapters. WLE was formulated in 2011 and began in 2012 as one of 15 CGIAR CRPs intended to address contemporary challenges in agricultural production and natural resource management.

WLE includes a consortium of 11 CGIAR Centers and the FAO, led by IWMI, and the IWMI Board is contractually responsible for the program. It includes a SC of independent international experts and a MC comprised of WLE senior managers. Partnerships are a central to WLE, and there are more than 450 partners involved in different aspects of its implementation.

The original WLE program document⁴ stated that WLE was designed to contribute to the CGIAR SLO of sustainable natural resource management, with further substantial contributions to outcomes on food security, poverty alleviation and, to a lesser extent, health and nutrition. This would be achieved through a focus on the development of sustainable agricultural management systems within a setting of agricultural intensification to feed a growing world population. Agriculture was to be seen within a landscape perspective:

“Overcoming natural resource management problems and adapting to climate change will be achieved only by understanding and managing the dynamics of water and nutrient flows across the whole landscape and through the complete hydrological cycle. Solutions to water scarcity and variability, land degradation, nutrient management and deteriorating ecosystem services must be developed with a view to what works for communities across landscapes, not just what works on the farm”⁵.

The approach was further elaborated in the 2012 WLE Strategic Plan which articulated a vision of a world “where agriculture thrives in vibrant ecosystems and where people engaged in agriculture live in good health, enjoy food and nutritional security and have access to everything they need to continually improve their livelihoods”⁶. To achieve this, the Strategic Plan identified three broad development goals:

1. To undertake sustainable intensification, to meet food demands predicted to grow by 70 percent over the next 40 years and to do so without “a substantial enlargement of agriculture’s ecological footprint”⁷.
2. To “improve the sharing of benefits and risks associated with eco-efficient agriculture”⁸, as the foundation for long-term investments.
3. To support the political discourse that underpins long-term, collective and balanced investments in water, land and ecosystems.

⁴ CGIAR (2011) **CGIAR Research Program 5: Water, Land and Ecosystems: improving natural resources management for food security and livelihoods**

⁵ See above, page 5.

⁶ See above, page 1.

⁷ See above, page 2.

⁸ See above, page 2

The Strategic Plan presents WLE's 'conceptual framework' as focused on three types of production systems, irrigated agriculture, rainfed cropping and pastoralism, operating within a context of landscapes and river basins. The Strategic Plan also refers to a range of drivers of change such as population growth, economic pressures and climate change, however the drivers of change are not reflected in WLE's ToC in the same document, an issue discussed below.

Following evaluations by the ISPC and the Consortium Office, the approach was further elaborated and somewhat reoriented in the 2014 WLE extension proposal resubmission⁹. The ecosystem services aspect of the goals and approach was given greater emphasis, as is reflected in the overall question guiding WLE:

"WLE hypothesizes that introducing a multidisciplinary ecosystems-based approach into agricultural practices will result in sustainable intensification that increases food and livelihood security by creating resilient and equitable socio-ecological systems that secure the provision of ecosystem services over long time frames"¹⁰.

One further feature of WLE is that it has an explicit science for development character. The targeted program outcomes from the CGIAR SRF are all measures of development impacts and the prominence given to partnerships and uptake pathways in the program further emphasize this character of WLE. The five IDOs listed in the extension proposal include increased productivity, increased incomes, enhanced gender and equity, increased adaptation and strengthened resilience. WLE measures itself against the achievement of these tangible development outcomes and can be expected to have explicit strategies to explain how they will be achieved.

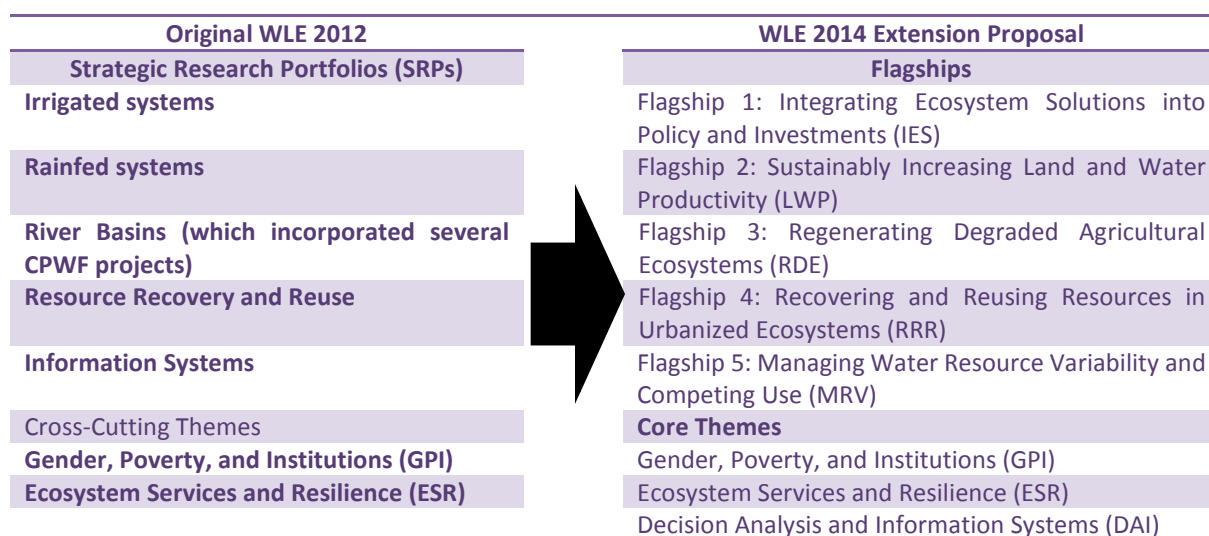
2.2 WLE Structure and Portfolio in 2015

The extension proposal also presented a major restructuring of WLE. The original structure of five SRPs and two core themes was replaced by five flagships (FSs) and three core themes (see Figure 2-1). There were significant differences between the two structures. The original SRPs, which largely consisted of existing projects that were 'mapped' into WLE, was considered to reflect conventional thinking on agriculture and resource management while the new structure from 2014 was seen as more accurately reflecting the central approach and more integrated development challenges that WLE seeks to address. Although each structure has its merits, the Evaluation Team is of the opinion that the new set of flagships and core themes does seem to be more consistent with the approaches that WLE advocates.

⁹ CGIAR (2014) Extension proposal for CGIAR research program on water, land and ecosystems

¹⁰ CGIAR Research Program 5: Water, Land and Ecosystems: improving natural resources management for food security and livelihoods, page 1.

Figure 2-1: The Changing Structure of WLE



In 2015, WLE’s list of activities included 157 activities across the flagships and core themes, 151 of which can be categorized as research projects. They include a combination of earlier projects ‘mapped’ into WLE and projects formulated since WLE started. The balance between these two types of projects is changing over time as old projects finish and new ones come on-stream.

Flagship (Total N. of Activities in FS in 2015)	Cluster	N. of Activities in 2015
FS1 (35)	Focal Regions	32
	Innovation Fund	3
FS2 (35)	Agricultural water and land management	26
	Revitalizing irrigation systems	9
FS3 (30)	Landscape restoration interventions	13
	Ecosystem services assessment, trade-offs and equitable planning	16
	Economic solutions and incentives	1
FS4 (9)	Business opportunities in nutrient, water and energy recovery and reuse	
	Support for healthy ecosystem services under urban growth	
FS5 (37)	Managing water variability	13
	Resource allocation and sharing of benefits for all	19
	Water and energy for food	5
DAI Core Theme (5)		5

The size of projects varies greatly, from less than USD 50,000 to multi-million dollar activities (most with at least partial bilateral funding) implemented over several years. The majority are in the USD 200,000 to USD 900,000 range. Total expenditure in 2014 was USD 55.21 million, of which

USD 25.08 million came from W1 and W2 sources and USD 30.13 million came from W3, bilateral and other sources.

2.3 WLE Funding

The original WLE proposal was based on an anticipated budget of USD 246 million for the first three years of implementation (2012-14), 66 percent of which was going to be financed through W1-2 resources. However, anticipated funding from the CGIAR Fund was drastically reduced and, at the end of 2014 the program had received only 43 percent of the amount envisaged in the Program Implementation Agreement signed between the Consortium and IWMI, the Lead Center. Although the program was successful in raising more bilateral and Windows 3 funding than initially expected (16 percent), the total funding for the program was USD 169.6 million in 2012-14, that is 69 percent of the budget required to implement the original proposal.

Table 2- 1: Sources of Funding for WLE 2012-14

Anticipated Funding		2012	2013	2014	Total
Window 1 and 2		40,367	55,361	68,052	163,781
Window 3 and Bilateral Funding		35,775	27,949	18,748	82,472
Total		76,142	83,311	86,800	246,254

Actual Funding		2012 Expenditures	2013 Expenditures	2014 Expenditures	Total
Window 1 and 2		22,400	23,800	25,100	71,300
Window 3 and Bilateral Funding		33,500	34,700	30,100	98,300
Total		55,900	58,500	55,200	169,600

Sources:

- For anticipated funding, the Program Implementation Agreement on CRP5 –Water, Land and Ecosystems - between the Consortium and IWMI.
- For actual funding in 2012-2014, the CGIAR Financial Reports for 2012, 2013 and 2014.

The bilateral donors who provided more funding to WLE in 2012-14 are shown in Table 2-2 below.

Table 2-2: Top Bilateral Donors in 2012-14

Rank	Donor	Bilateral Funding to WLE in 2012-14 in USD million	Also Fund Donor? ¹¹
1	The Netherlands ¹²	11.0	Yes
2	Australia	8.4	Yes
3	Bill and Melinda Gates Foundation	6.5	Yes
4	Switzerland	5.6	Yes
5	African Development Bank	5.4	No

For the first three years of implementation, program expenditures were distributed across participating Centers as shown in Table 2-3. As could be expected given its role as Lead Center, IWMI spent more than half (61 percent)¹³ of these funds, followed by Bioversity (eight percent), ICRAF (six percent) and CIAT (five percent). As Lead Center, IWMI's expenditures included Program Management as well as costs related to focal regions and the Innovation Fund. IWMI disbursed the funding to implementing partners within FS1, which is mainly funded through Windows 1 and 2, explaining its predominance in W1 & 2 expenditures.

Table 2-3: Share of Center Expenditures in 2012-14 (in percentage)

Centre	W1-2 Expenditures	Total Expenditures
BIOVERSITY	8%	7%
CIAT	5%	11%
CIP	2%	1%
ICARDA	4%	5%
ICRAF	6%	7%
ICRISAT	4%	5%
IFPRI	4%	3%
IITA	1%	9%
ILRI	1%	1%
IRRI	1%	1%
IWMI	61%	52%
WORLD FISH	2%	1%

Figure 2-2 shows how expenditures were distributed across SRPs (in 2012-13) and in flagships in 2014. In 2014, the largest flagship was LWP which accounted for 40 percent of expenditures, followed by MRV. IES was the smallest flagship because the late allocation of W1-2 funding constrained WLE's ability to plan, design and commit to the IES contracts until late in 2014 leading to a large carry forward.

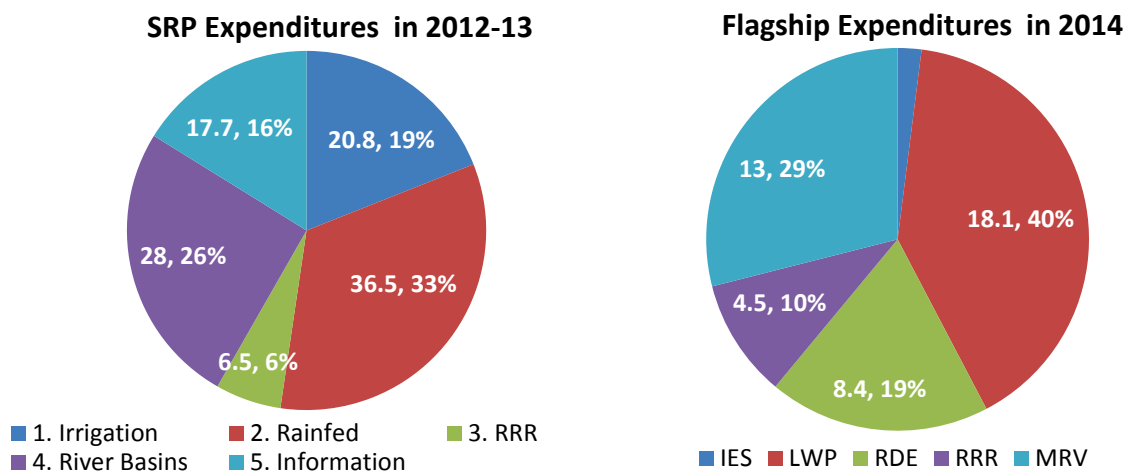
¹¹ Information obtained from Fund Council Website, <http://www.cgiarfund.org/FundDonors>, visited in August 2015.

¹² Funding was channelled through Wageningen University.

¹³ IWMI's expenditures include the WLE Program Management, Engagement and Communication (PMEC) budget, which in addition to coordination, communications and knowledge management, also includes funding for gender, ESR and flagship leadership. The allocation to IWMI in the budget also includes other pass-through funding that supports the overall WLE program, such as through the Focal Regions and Innovation Funds, which were implemented by many Centers and external partners.

It was anticipated that expenditure on IES would be significantly higher in 2015 as the 36 approved projects began implementation.

Figure 2-2: SRP and Flagship Expenditures in 2012-14 (in USD millions)



3. Relevance

This chapter evaluates the strategic relevance of WLE, the coherence of its approach and research strategies, and the rationale for the five flagships and three core research themes. It also reviews the extent to which WLE fulfills its integrative functions, its theories of change and impact pathways and the evolution of WLE's comparative advantage over time. Finally, the chapter evaluates WLE's priority setting process and utilization of W1/W2 funds.

3.1 Strategic Relevance

WLE's focus on water, land and ecosystems has high strategic relevance. The program differentiates itself from crop- and systems-based CRPs by addressing challenges related to restoring and maintaining ecosystem services from the local or field scales up to the regional or basin scales. Additionally, WLE seeks to identify and quantify potential tradeoffs or externalities that may be the unintended consequence of intensification of rainfed and or irrigated agriculture or, in some cases, the result of programs aimed at improving the efficiency and/or productivity of water use¹⁴.

Underpinning the program is the understanding that sustainable management of natural resources is a prerequisite for poverty alleviation and food/water security over the long term. A key hypothesis is that introducing a multidisciplinary ecosystems-based approach into agricultural practices and systems will result in sustainable intensification that increases food and livelihood security for everyone.

The Evaluation Team's widespread stakeholder consultation confirmed that WLE is addressing important challenges relating to food security, water security and environmental sustainability at a range of scales. The consultation also confirmed that WLE is addressing challenges relating to: i) environmental pollution, land degradation, loss of biodiversity (FS1); ii) the water-energy-food nexus (FS5 and the ITP program); iii) urbanisation and urban-rural linkages (e.g. FS4); iv) groundwater use and overdraft (FS2 and FS5); and v) poverty and the livelihoods of women and marginalized social groups (e.g. FS1).

A defining characteristic of WLE is its global relevance. Land degradation, water scarcity and loss of biodiversity are worldwide phenomena. Even in regions that are well endowed with water resources, there are increasing challenges related to point and diffuse sources of pollution linked to agriculture, agricultural value chains, urbanization and/or extreme events such as floods that are exacerbated because of poor land and water management or inadequately designed and managed infrastructure (e.g. flood relief schemes, dams, bulk transfer systems). Although WLE has fewer focal basins/regions than its CPWF predecessor, it continues to undertake important research outside the basins/regions, for example in southern Africa. In addition, WLE has global presence and outreach through the network of CGIAR Centers, its partnerships and formal/informal networks, the FS1 open-call process of contracting out research, and the FAO and other uptake partners such as the World Bank's Water and Sanitation Program.

¹⁴ This is a result of the Jevons paradox which notes that technological progress that increases the efficiency with which a resource is used tends to increase (rather than decrease) the rate of consumption of that resource see e.g. <http://www.sciencedirect.com/science/article/pii/S2214241X13000072>

The strategic relevance of WLE and its CPWF predecessor has changed and evolved over time (see Box 3-1). The CPWF started with a focus on delivering impact in nine benchmark river basins and subsequently adopted a research for development (R4D) implementation strategy in six river basins. Although many areas of research were rolled forward from the CPWF, WLE did not pick up where the CPWF left off. For example, WLE adopted an implementation strategy based primarily on partnerships in four focal basins or regions working with river basin organizations (RBOs) where these exist (e.g. Nile Basin Initiative, Mekong River Commission). While this is to be commended as a means of engaging in dialogue with key stakeholders particularly at the basin and sub-basin levels, the Evaluation Team is of the opinion that WLE could make greater use of stakeholder platforms that have a focus on R4D and iterative cycles of learning and adaptation¹⁵.

Box 3-1: A Short History of CPWF and WLE

CPWF-WLE Timeline

CPWF was one of four challenge programs established by the CGIAR in the early 2000s in an explicit attempt to refocus its agenda onto delivering impact from research. Central to this refocusing was the recognition that the CPWF would require new patterns of partnership between CGIAR centers, national research organizations and development stakeholders. In terms of global outreach, the CPWF established a research program around nine benchmark river basins in 2004.

Following an external review in 2007, the CPWF shifted to a research-for-development (R4D) implementation strategy. This approach included analysis of impact pathways and a proactive engagement through dialogue and partnerships with key stakeholders and change agents in six of the benchmark river basins. The transition to this modified approach took time to gain traction. However by 2009, CPWF was starting to implement a distinctive approach based around challenges that were specific to each of the six basins.

In parallel with the implementation of CPWF, the CGIAR reform process gathered pace and moved on from the challenge program model to the mega project concept of cross-Center research that culminated in the CRPs. CRP-5 on 'Water, Land and Ecosystems' (WLE) was launched in 2011. Some of the governance functions of CPWF were absorbed into WLE and consequent changes in funding arrangements led to substantial budget cuts in CPWF, with a number of activities being terminated or reduced in scope.

The period 2011 to 2013 entailed considerable tension between the ending CPWF and WLE over the nature and value of a R4D approach. This tension was a result, in part of diverging views held by different actors each legitimized by the program development and implementation processes in which respective actors were involved and which ran in parallel. CPWF struggled to articulate its R4D approach in terms that resonated with key CGIAR stakeholders. This, and mismatched timelines, weakened opportunities for learning lessons from CPWF.

CPWF achievements and legacy

Despite good progress in translating research outputs to development outcomes, CPWF was unable to achieve impact at scale. It took time to develop an effective implementation strategy and the scope of activities was reduced as a result of budget cuts. In addition, CPWF had limited success in attracting development financing that would have allowed it to collaborate in the implementation of interventions likely to deliver impact at scale. This has undermined its impact along with its ability to draw lessons about how impact at scale could best have been achieved.

More affirmatively CPWF's legacy included the development and use of methodologies relating to R4D, theories of change, uptake pathways, evidence-informed policy influencing, and outputs to outcomes approaches to research design and management, as well competitive bidding in focal basins and regions.

Main sources: Hall et al (2014), Merrey (2014) and interviews with WLE staff (CGIAR Centers and partner organisations).

¹⁵ This type of stakeholder platform may have different names and forms e.g. a learning alliance (Butterworth et al (2011), a quality improvement collaborative (QIC) (Eppstein et al, 2012), a farmer field school: see <http://www.fao.org/nr/land/sustainable-land-management/farmer-field-school/en/>

Table 3-1 highlights potential direct relevance of individual flagship and core research themes to individual WLE IDOs. Importantly, direct relevance at this level depends on the biophysical and societal context. It can be argued that all flagship and core themes are indirectly relevant to achieving all of WLE IDOs. The program’s theories of change and uptake pathways give more detailed insights into how WLE is achieving its IDOs (see Section 3.1.3).

Table 3-1: Direct Relevance of WLE Flagship and Core Research Themes to WLE IDOs and CGIAR SLOs

CGIAR System-Level Outcomes (SLOs)	WLE Intermediate Development Outcomes (IDOs)	Flagship 1	Flagship 2	Flagship 3	Flagship 4	Flagship 5	ESR	GPI	DAI
A. Reducing rural poverty B. Increasing food security C. Improving human nutrition and health D. Sustainable management of natural resources	1. Productivity: Improve land, water and energy productivity	x	x	x	x		x		x
	2. Income: Generate increased and more equitable income from agricultural and natural resource management, and ecosystem services in rural and peri-urban areas	x	x		x		x	x	
	3. Gender and equity: Enhance the decision-making power of women and marginalised groups, and increase the benefits derived from agricultural and natural resources	x					x	x	x
	4. Adaptation: Increase the ability of low income communities to adapt to environmental and economic variability, demographic shifts, shock and long-term changes	x	x	x	x	x	x	x	x
	5. Environment: Increase the resilience of communities through enhanced eco-system services in agricultural landscape	x	x	x	x	x	x	x	x

3.2 Relevance of WLE Approach and Design

3.2.1 The Ecosystem Services and Resilience Framework

WLE’s Ecosystem Services and Resilience Framework (ESRF) sets out an approach that is seen as the means to achieve the program’s vision of “a world in which agriculture thrives alongside vibrant ecosystems and those engaged in agriculture live in good health, enjoy food and nutritional security and have access to the inputs and resources they need to continually improve their livelihoods”¹⁶. An important evaluation issue is consequently whether the ESRF provides a unifying conceptual base for achievement of WLE’s IDOs.

¹⁶WLE. 2014. Ecosystem Services and Resilience Framework. IWMI, Colombo.

The ESRF states that ecosystem services management can create “multifunctional agricultural landscapes where communities are supported by the multiple ecosystem services and associated benefits provided by natural and agricultural systems” (:2). These ideas are inherently complex and unproven: indeed it can be argued that they are unprovable given the diversity and complexity of the systems in question, the long-term nature of the changes envisaged, and the multiplicity of factors that influence both ecosystems and livelihoods development. Consequently it is unclear whether the ideas behind the ESRF are a hypothesis to be tested or a statement of belief.

The ESRF itself has generated tensions within WLE that were apparent in the interviews and group discussions conducted during the evaluation. A wide range of opinions and views were expressed and documented (see Box 3-2). Some WLE researchers and stakeholders considered the ESRF to be important and/or useful in terms of providing insights and strategic direction to their research while others stated that it does not differ radically from other ecosystem services approaches. Still others were critical, saying that they found the ESRF too abstract, conceptually prescriptive and/or too general to be useful. It is noteworthy also that many researchers and stakeholders mentioned that the ESRF is weak on crucial issues such as institutional processes, politics, economics, formal and informal rights to, for example, water, land, fisheries and forest, socio-cultural issues and/or links with livelihood development.

The ESRF uses ecosystem services terminology often as an alternative to terminology that might be used by, for example, agriculturists, water specialists or political scientists. During key informant interviews, the Evaluation Team learned that this terminology is not always appreciated or welcomed by some senior staff in government ministries and international agencies. This has sometimes resulted in WLE researchers or partners being directed to ministries of environment or environmental advisors that may be less powerful or influential than, for example, ministries or advisors with agriculture or water remits. Further, WLE has adopted “landscape” terminology in defining one of its areas of interest. The issue is that “landscape” is a vague term that, although widely used, is defined and perceived by stakeholders in different ways that are informed by their “*economic, cultural, social, or ecological motives*”¹⁷. Note also that a “landscape” is not a unit of management, administration or ownership nor is it a biophysical unit that lends itself to detailed quantitative analysis, mapping or modelling (unlike a catchment or an irrigation scheme). The Evaluation Team believes that WLE should be wary of using the term “landscape” as a unit of scale, management and/or analysis because it is vague and ill-defined. Instead, the program should use accepted terminology that is well-defined and appropriate to a given context or scale.

¹⁷ Quote taken from:

<http://www.tropenbos.org/news/unravelling+the+%E2%80%98landscape+approach%E2%80%99+%E2%80%93+are+we+on+the+right+track%3F>

Box 3-2: ESRF: a Cross-Section of Views and Opinions

The ESRF was a recurrent topic of discussion during interactions that took place during the evaluation. A wide diversity of views and opinions were recorded. These include:

- **Added value:** The decision to bring ecosystem services and approaches to the forefront of the WLE programme has merit in part because it differentiates WLE from other CRPs and many other research programs that have integrative WLE interests. However, relatively few informants viewed the ESRF as a paradigm shift or a framework that is entirely new.
- **Terminology:** The ESR framework conflates or bundles different WLE services under the term “ecosystem services.” Many informants mentioned that they find it difficult to understand the ESRF terminology and/or the specialized jargon that is used.
- **Gaps:** Many informants stated that the ESRF is lacking in a number of key areas: only limited attention is given to the institutional, social and political challenges of applying and scaling up the ESR framework and, more specifically, the lessons learned from earlier or ongoing WLE-related sector reform programs; the resilience part of the ESRF is not well articulated.
- **Risks:** A few informants mentioned that relatively little attention is given to the risks that adoption of the ESRF at scale may have perverse impacts. For example, interventions aimed at increase water productivity and free up water for other uses (including e-flows) may, somewhat paradoxically increase net water use per unit area or land holding.
- **Access:** Some informants highlighted that the ESRF’s approach is “centered on the needs of poor people” but the ESRF take a rather passive view of poverty and gives limited attention to, for example, issues related to access to or tenure or tenure of ecosystem services and the ways in which power is exercised or mediated in relation to management of ecosystems services.
- **Case studies:** Some informants commented on the case studies in the ESRF and the fact that they are not from WLE (or CPWF) projects nor are they from areas in which agriculture is a predominant land use.
- **Main source:** Interviews with: WLE staff from CG Centers, WLE partner organisations and WLE stakeholders

Flagship leaders have tried to adapt the ESRF for use within their flagships. A draft report presented to the October 2015 Steering Committee¹⁸, summarized the efforts that had been made to use the ESRF. The report stated that there has been increasing adoption of the core concepts of ecosystem services and resilience in research projects, including their recognition as contextual background where the main focus is on other issues (for example in water governance projects in the Mekong or sustainable irrigation management in the LWP flagship). Some level of use of the ESRF is now a feature of most new projects developed within WLE.

However, based on the findings of the Evaluation Team, it is evident that if the ESRF is to continue to be central to WLE it needs considerable further development. It must be made more relevant, understandable and accessible to a wider range of stakeholders. In particular, the weakness of the framework in relation to socio-cultural, economic, political and institutional issues needs to be addressed. Moreover, the framework should be presented in a less abstract manner and should make connections between the key ideas and the biophysical and societal contexts. These shortcomings already have been recognized by WLE’s Management and Steering Committees, and efforts are underway to develop the core conceptual ideas of the program with a more explicit focus on sustainability.

¹⁸ WLE 2015. The ecosystems and resilience based approach within WLE flagships Draft, October 2015, IWMI Colombo

3.2.2 Programmatic Integration

WLE seeks to fill the natural resource management research and development niche within the CGIAR portfolio and to complement productivity and systems-focused CRPs by addressing natural resource constraints at river basin and landscape scales rather than the field to farm level¹⁹. The aim is to add value to the other CRPs with an emphasis on productivity, while recognizing the need for sustainable approaches and mitigation of externalities that are not politically and socially acceptable. While some flagships, such as FS5, have taken a keen interest in externalities and trade-offs the Evaluation Team found only limited evidence that WLE is fulfilling this cross-CRP integrative function. At the programmatic level, the focus of attention has been more on developing and proving the utility of the ESRF.

A defining characteristic of WLE is that it undertakes multidisciplinary and inter-sectoral research across the water, land and ecosystems, encompassing biophysical, social and other sciences and typically involving various government departments or ministries. WLE has a specific interest in the nexus of water, land and ecosystems but it has an even wider interest in a five-way nexus of “water, land, ecosystems, energy and poverty”. However, even this broader approach can be seen as somewhat limiting and prescriptive, for example, by not explicitly including gender and climate change. The Evaluation Team is of the view that WLE’s integrated inter-sectoral research is increasingly relevant and important particularly in regions experiencing increasing water scarcity, land degradation and loss of biodiversity. However, the levels and types of integration should be flexible and, rather than prescriptive, based on specific challenges and societal and biophysical contexts.

The CPWF and the WLE have had a longstanding interest in *integrated river basin management*, *integrated approaches to natural resources management* (NRM) and *integrated water resources management* (IWRM). In the case of IWRM, this has resulted in excellent publications authored by senior WLE researchers²⁰. However, there is a conspicuous lack of attention to integrated approaches to NRM in the ESRF and to the valuable lessons (documented by WLE researchers and others) that have been learned from global attempts to implement these approaches at scale.

A key difference between IWRM and the water, energy and food (WEF) nexus is that IWRM starts with water resources when considering inter-relationships between and among water, land, food, energy, etc., whereas the WEF approach can start from different perspectives (i.e. water, energy, or food)²¹. Similar to IWRM, the ESRF brings eco-systems services to the forefront regardless of the context or challenges. A more pragmatic approach would be to adopt the logic and flexibility of the WEF, since the ESRF is not an end in itself and there are different pathways to the effective restoration and management of ecosystems services. While developing, refining and adapting concepts and approaches, it is recommended that WLE takes more explicit account of earlier WLE or CGIAR analysis of concepts, narratives and policy models that relate to integrated and inter-sectoral management of natural resources²².

WLE flagships work across a range of spatial and temporal scales and institutional levels. It is commendable also that multi-scalar analysis and modelling is used to account for uncertainty,

¹⁹ ISPC, 2011.

²⁰ Recent IWRM-related publications include: Giordano and Shah (2013); van Koppen and Schreiner (2014); and Scott et al, 2014.)

²¹see http://www.water-energy-food.org/en/news/view_1612/the-nexus-approach-vs-iwrm-gaining-conceptual-clarity.html

²² e.g. Molle, F. 2008. Nirvana concepts, narratives and policy models: Insight from the water sector. *Water Alternatives* 1(1): 131-156.

variability and frequency of extreme events such as floods and prolonged droughts). WLE research is also taking innovative and integrated approaches to data collection (e.g. the work on water accounting, soil spectroscopy and hydro-economic modelling). The DAI core theme's work with Bayesian networks also has considerable promise in terms of multi-scalar probabilistic analysis and modelling that integrates societal factors.

Some WLE flagships and projects (e.g. FS2) are undertaking research that involves integration along value chains, for example, with the aim of enhancing income and gender equitable wealth creation for smallholders and other value chain actors through increased and sustained market offtake of high-value livestock and irrigated crop commodities. WLE's work on value chains is worthy of increased attention as a part of development and piloting of integrated approaches to multi-level management of water, land and ecosystem services. For example, WLE should give more attention to the length and complexity of value chains in relation to urbanization and how this affects demand for and impacts on ecosystem services (in terms of space and time) and levels of post-harvest losses and food wastage²³.

3.2.3 Targeting, Theories of Change and Uptake/Impact Pathways

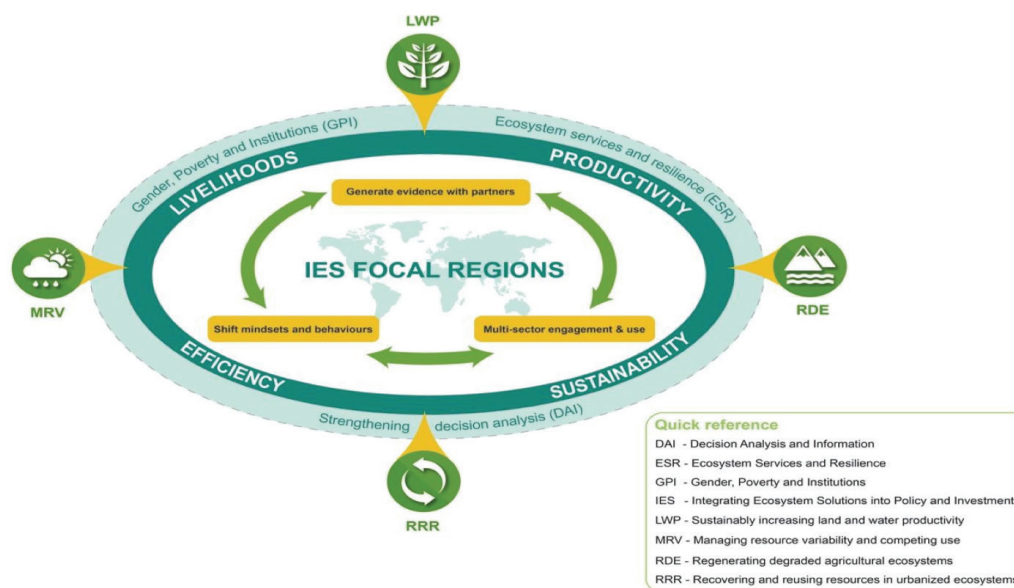
The relevance of WLE is contingent upon the way it approaches the processes of change it is seeking to prompt, facilitate and influence²⁴. The terms "theories of change" (ToC) and "uptake pathways" (UP) and "impact pathways" (IP) are used extensively in WLE documentation and considerable effort has gone into developing ToC, UP and IC narratives and schematics. WLE's theory of change encompasses three interlinked areas: generating evidence-based knowledge with partners, multi-sector engagement, and shifting mind sets and behaviour. Figure 3-1 presents the WLE program structure and ToC as presented in the WLE Extension Proposal resubmission. The main influence appears have come from discussions and dialogue around the ESRF²⁵.

²³ See www.fao.org/docrep/016/i3015e/i3015e.pdf

²⁴ This evaluation assumes that: i) "Uptake pathways" refers to the pathways and processes that are central to moving from research activities/outputs that are shared and adopted by partners and stakeholders; and iii) "Impact pathways" refer to the pathways and processes that are central to moving from research activities to development outcomes, achievement of IDOs and, if relevant, the sub-IDOs mentioned in recent WLE ToC and impact pathway analysis and documentation.

²⁵ The ToC in the WLE 2014 Extension Proposal (resubmit) was presented to the Evaluation team as WLE's main ToC. This is different from the ToC stated in the 2014 ESRF document.

Figure 3-1: WLE Program structure and theory of change (2014 WLE Extension Proposal Resubmission)



WLE’s program is premised on the assumption that opportunities for change exist and/or can be created either by WLE or by uptake and impact partners. The ToC is central to the program’s prospects of achieving the IDOs, but three years in, it has not yet been fully developed and has undergone numerous changes. As a result, there is no unified understanding of the ToC throughout the program. In 2015 a concerted effort was made to remedy this situation, with the preparation of specific ToCs and related activities for each flagship. However, there is still considerable work to be done if WLE is to develop a coherent approach, to understanding change processes has, and to create buy-in from WLE staff, partners, and stakeholders.

Each flagship within WLE has developed its own UP (or UPs), though these were under review at the time of the evaluation. New ToCs also have been developed for all flagships. Flagship 4 was the first to undertake a detailed assessment of its ToC and of the evidence required to assess progress towards development outcomes and relevant sub-IDOs and IDOs. In collaboration with the monitoring, evaluation and learning manager, the flagship team undertook a substantial analysis of the hypotheses underlying impact pathways and the current state of evidence. The work provides a solid foundation for impact pathway analysis, but it also exposes many areas where existing evidence is weak or absent.

FS1 has based its ToC on four pillars: i) engage and align with those public, civil society and private sector partners in each region who create or reframe water, land and ecosystem investments or implementation strategies; ii) integrate WLE research to assess the long- term impacts, risks, and trade-offs of these investments and strategies; iii) strengthen the capacity of decision makers to effectively apply the knowledge, tools, data and models and to develop context- specific solutions; and iv) draw lessons learned on effective modalities for investing in sustainable intensification in other locations. The Evaluation Team believes a similar approach would be beneficial to other flagships.

There are numerous good examples of WLE’s analysis of and engagement in change processes at the flagship level (e.g. FS4’s engagement with the private sector in West Africa on the development and piloting of resource recovery and reuse business models) and at the project level (e.g. ITP’s piloting and planned upscaling of solar energy as a “harvestable crop”). While the Evaluation Team recognizes that the formulation of the ToC is relatively recent, it is not apparent that the flagship and project-level

approaches to change have been informed by or are linked to WLE's overall ToC. More specifically, it is not clear that WLE's CRP and flagship ToCs are being used to inform project management decisions, for example, related to the allocation of resources. It would appear that this is not happening at the CRP level because core themes are relatively under-resourced despite the fact that they are crucial elements of program's ToC.

While recent WLE work on ToCs is good, there is still room for improvement. For example, the ToCs imply that change in a society revolves around or is triggered by WLE, rather than around a range of interrelated contextual factors, of which WLE is just one part. The program's ToCs are rather linear, and give little attention to the wide range of internal and external factors that can halt or derail even the most well-thought out attempt to introduce new approaches. There is limited recognition that ToCs are dynamic and that it is possible to have many different impact pathways in any given context, and it is not acknowledged that impact pathways can change as windows of opportunity for prompting change or overcoming resistance to change open or close.

It appears that little attention was given to behavioral science when the ToCs and UPs were developed despite the fact that the DAI core theme has undertaken research on this topic that is of a high international standard. Indeed, there is increasing evidence that people are often far from rational or deliberative when making judgements or choices (including changing practices or behaviour and/or developing policy alternatives). For example, the World Bank's 2014 World Development Report²⁶ concludes that people make most judgements and choices automatically rather than deliberately, and how people act and think often depends on what others around them behave and think.

3.2.4 Poverty and Institutional Analysis

The approaches to the analysis of poverty, including poverty targeting, and to institutional analysis and change, along with measures to further strengthen and ensure greater coherence in relation to these topics across the program, have emerged as key issues in the evaluation. These subjects were incorporated into WLE in the gender, poverty and institutions (GPI) core theme but, as is discussed further in chapter 6 the implementation of this theme has concentrated primarily on gender.

The global range of development, legal and political systems, culture and history mean that institutional systems are extremely diverse which necessarily limits the transferability of policies and approaches. Uptake and impact pathways need to reflect these diversities and WLE needs to find a balance between ensuring a level of consistency in the attention paid to institutional issues while avoiding the imposition of a uniform framework that may not be appropriate in all contexts.

The focus on improving the knowledge and understanding of key stakeholders, especially those in government, to influence policies and practices is necessary but not sufficient to achieve the types of changes that WLE hopes to realize. The Evaluation Team has identified several issues that, if comprehensively addressed, could strengthen WLE's approach to institutions:

- The extent of engagement with senior officials, politicians, the private sector and international organizations could be improved. At least in some regions, the visibility of WLE could be improved with international agencies and the private sector.
- While WLE's policy-influencing activities are to be commended, there is a disproportionate focus on changing policies. In many cases policies do exist but are not effectively implemented because

²⁶ See

<http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTWDRS/EXTNWDR2013/0,,contentMDK:23459971~pagePK:8261309~piPK:8258028~theSitePK:8258025,00.html>

of budget, capacity and other constraints and/or because of uncertainties over mandates and responsibilities. The questions for WLE are who should do what? Where are the best opportunities for instigating and driving change?

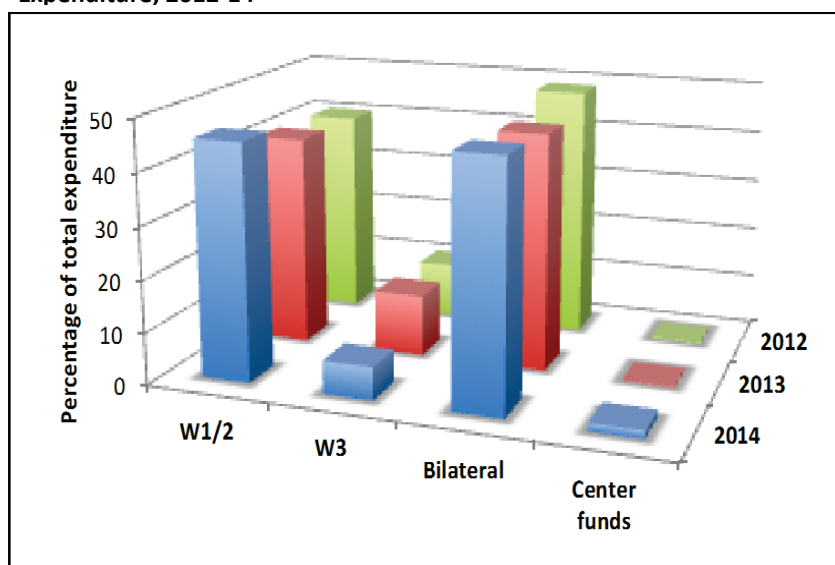
- Institutional research should address the legal and procedural processes needed for changes in policies and practice. For example, in many cases only limited attention has been given to formal or informal rights to different ecosystem services and whether interventions proposed by WLE could have the unintended consequence of impacting negatively on existing rights.
- Research also needs to address the question of divided institutional responsibilities (e.g., many ministries have responsibility for different aspects of water management) and uncertain mandates and responsibilities.
- Research should be done on the assessment of incentives (and disincentives) influencing the willingness of different actors to change. People and institutions often make choices about the allocation of scarce resources on the basis of their understanding of what will best serve their own interests and/or is consistent with their own values and beliefs.

Based on these observations, it is clear that the next phase of WLE needs to consider carefully how the program can develop a more coherent approach to the analysis and pursuit of institutional change. While it is clear that many of the impact pathways associated with improved management of water, land and ecosystems do require institutional change, it is not evident that the programme as a whole is geared to address these challenges.

3.3 Use of W1/2 Funding and Priority Setting

During the period 2012-14, W1/2 expenditure comprised more than 40 percent of total WLE expenditure, and was only slightly lower than bilateral expenditure (see Figure 3-2). WLE used W1/2 funds to initiate new lines of research, gap-filling, and adding value to projects funded from other sources. It is clear that recent cuts in W1/2 funding have reduced ability to undertake research that has high relevance for WLE but is of less interest to bilateral funders.

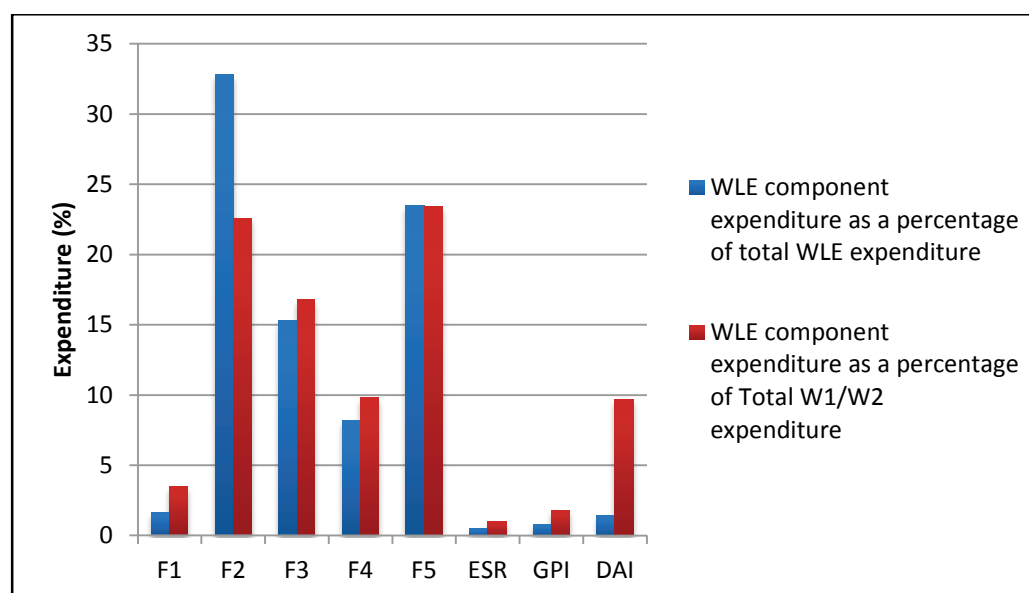
Figure 3-2: Different Sources of Expenditure as a Percentage of Overall WLE Expenditure, 2012-14



In terms of WLE's total expenditure in 2014²⁷, FS2 had the highest spending as a percentage of total WLE expenditure followed by FS5 and FS3 (see Figure 3-2). In terms of W1/2 expenditure in 2014, FS5 had the highest spending followed by FS2 and FS3. Thus the flagships with the highest total expenditure were also the main recipients of W1/2 funding. It is important to note that FS1, ESR and GPI were funded entirely through W 1/2 but received much lower W1/2 allocations than the three larger flagship programs. The relative allocation of W 1/2 funding to GPI seems particularly low not least because it was reported that the bulk of GPI expenditure was used for gender-related activities. Or put another way, very little funding from W1/2 or other sources was allocated to activities on poverty and institutions.

DAI's expenditure in 2014, of which 50 percent was bilateral, was also a small percentage of total WLE expenditure. Interestingly, DAI received Center funds and an allocation of W1/2 funds that was similar to the amount received by FS4. As with GPI, the current level of W1/2 to DAI appears to be low relative to the importance given to changing mind sets, making reliable information available to decision makers at different institutional levels, and influencing WLE's ToC. ESR's percentage total and W1/2 expenditure is also low but ESR activities are also part of FS1.

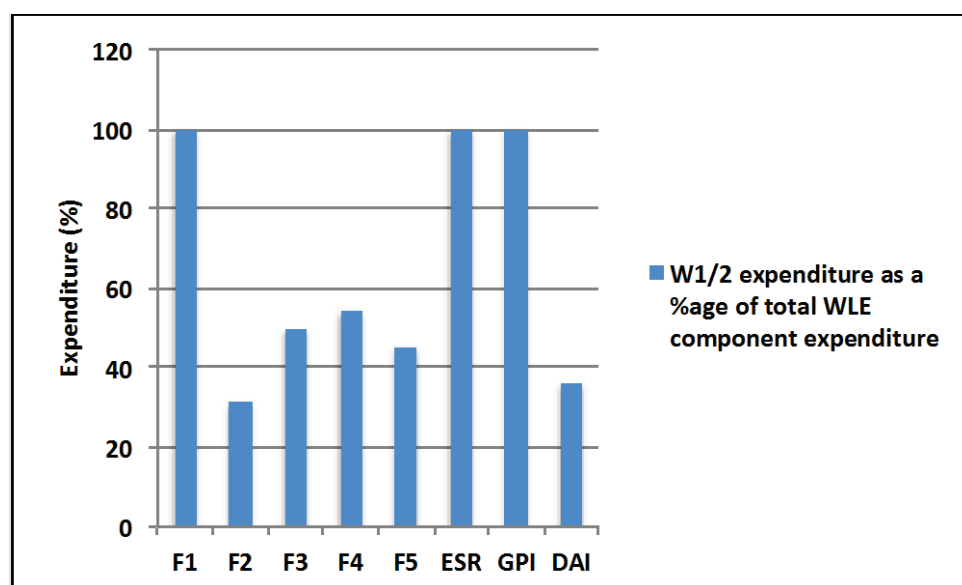
Figure 3-3: Expenditure of WLE Components as a Percentage of Total WLE and W1/2 Expenditure



In 2014, three of WLE's flagship and core research themes relied totally on W1/2 funding (see Figure 3-3). The W1/2 expenditure of the other five flagship and core research themes was higher than 25 percent in all cases. During the period 2012-14, WLE management and coordination expenditure was less than five percent even when communication and research support was included in 2014.

²⁷ I.e. the latest annual expenditure data that are available.

Figure 3-4: W1/2 Expenditure as a Percentage of the Total Expenditure of each WLE Component



The approach to priority setting varies among flagship and project leaders. For example, FS4 sets priorities according to its long-term goals (i.e. closing the nutrient loop using self-financing business models). Some of FS4’s research is supply-driven and relevant to the creation of necessary safeguards, as for example, research into endocrine disrupters and other contaminants that can remain in wastewater even after tertiary treatment. However a large proportion of FS4’s research is demand-driven (e.g. commissions from the World Bank’s Water and Sanitation Program for guidelines and training materials).

FS3’s approach to using W1/W2 monies is not immediately apparent however it is based on “sprinkling” strategies for leveraging additional funding from major donors. The Evaluation Team was told that a direct consequence of current CGIAR budgetary uncertainties and the serendipity of bilateral projects is that a more pre-determined strategy for utilising funds would not be workable.

DAI (in East Africa) has opened several new lines of enquiry, and the ITP programme in India has given a priority to research that is actionable. However, in both cases priorities have also been influenced by availability of funds and/or constraints set by the providers of funds.

Overall, the analysis of expenditure presented above begs the question as to whether the 2014 prioritisation and patterns of W1/2 funds usage and other sources of expenditure are the most appropriate relative to the WLE ToC, impact pathways and IDOs. Put more simply, it can be asked if this pattern of expenditure is likely to deliver the evidence and knowledge WLE needs to promote a *“new approach to sustainable intensification in which a healthy, functioning ecosystem is seen as a prerequisite to agricultural development, resilience of food systems and human well-being”*²⁸ that stands up to scrutiny. The Evaluation Team is of the view that, in general, WLE flagship and projects leaders are skilled in blending and utilizing funds from different sources and balancing specifics of demands of funding agencies with the WLE deliverables, outputs and outcomes. This said, recent and ongoing development of ToCs and a related impact pathway analysis have the potential to better inform integrated analysis and synthesis of knowledge and information at the CRP and inter-CRP levels. It is envisaged that this might lead to better prioritization of funding and expenditure in the future.

²⁸ Taken from the WLE web site: <https://wle.cgiar.org/about-wle>

3.4 Comparative Advantage

The Evaluation Team's own analysis identified some major comparative advantages of WLE, including:

- ability to form and mobilise large multidisciplinary research teams and to design and implement large ambitious research programmes (e.g. at the basin and regional scales);
- capacity to scale up research conducted by other CRPs at the plot and field levels, providing more realistic assessments at the basin and regional levels;
- WLE's character as a research for development program rather than a research program that is not directly linked to goals associated with development outcomes;
- access to relatively large amounts of funding to conduct multidisciplinary research in four focal river basins located in developing regions;
- a status and convening power in developing countries that academics and think tanks do not have when it comes to organising and/or hosting high profile meetings or events;
- a global presence and unique data sets obtained in developing areas;
- a reputation for producing high-quality research outputs; and,
- a wide network of partners including strong partnerships with governments and uptake partners (e.g. international agencies).

Nonetheless, eliciting opinions from external stakeholders about WLE's comparative advantages proved to be challenging because many had limited or no knowledge or awareness of WLE, probably because of the relative newness of the program. It was notable that all external stakeholders that were interviewed were well aware of CGIAR participating Centers. Those external stakeholders who had some knowledge of and/or engagement with WLE, highlighted the following comparative advantages:

- the integrated multi-scalar nature of WLE and the specific focus on ecosystems services;
- the excellence of the research produced particularly by WLE's well-known researchers;
- the cutting edge research in new areas (e.g. ITP's work with solar technologies, DAI's work on advanced cyber-technologies; or agro-biodiversity work in FS3);
- the quality of publications and training materials (e.g. produced by FS4).

WLE makes good use of its comparative advantage, for example, by attracting and forming partnerships with well-respected research institutes, universities, NGOs, international agencies, and private sector organisation that have proven track records. While this is to be commended, it is not so obvious that WLE makes full use of its convening power to ensure regular dialogue with organisations that may have similar interests to WLE but differences of opinion or approach.

3.5 Conclusions and Recommendations

WLE has high strategic relevance for the CGIAR in that the program addresses global challenges related to food security, water security and environmental sustainability. WLE differentiates itself from crop- and systems-based CRPs by working at a range of scales, starting from the field and going up to the basin and beyond. Underpinning WLE is the understanding that sustainable NRM is a prerequisite for long term poverty alleviation and food/water security.

WLE's ESRF was formulated as a unifying concept for achieving the program's IDOs. However, it is not clear whether the ideas behind the ESRF are hypotheses to be tested or statements of belief to which

individuals either do or do not adhere. The ESRF was presented as a means to achieve a paradigm shift in the way ecosystem services are managed and agricultural production is intensified. While most stakeholders agree with the basic principles that inform the ESRF, they stress the need to adopt a more flexible and pragmatic approach that does not always bring ecosystem services to the forefront.

WLE's ToC encompasses three interlinked areas: generating evidence-based knowledge with partners, multi-sector engagement and shifting mindsets and behavior. However, three years into the program it is not yet fully developed and has gone through a number of iterations with the result that there is not a unified understanding throughout the program. Each flagship has developed its own uptake pathway, and new ToCs for all flagships are being developed.

The Evaluation identified a number of important comparative advantages of a program such as WLE. However, it also noted that WLE should give more attention to the central role infrastructure plays in sustaining the productivity of large-scale systems, in restoring and maintaining ecosystem services, and in ensuring that services are used efficiently/productively (e.g. along value chains). By adopting a more affirmative attitude towards the role and use of infrastructure at all scales and levels of complexity, WLE could improve its relevance by reaching out to and by seeking to influence organisations and research programmes that have a keen interest in improvements in the design, operation and management of technology and infrastructure used in the agriculture and water sectors. At the same time WLE should investigate and raise awareness of potential externalities and trade-offs associated with infrastructural development.

Based on evidence analyzed by the Evaluation Team, the following recommendations are made:

Recommendation 1. The conceptual underpinning of WLE

WLE should clarify and further develop the conceptual underpinning of the program, including but not limited to the ESRF. The ESRF should be seen as a 'living' document to be examined and continuously developed by the program. Specific actions should include the following:

- Define testable hypotheses for the overall approach and develop a structured program of research and knowledge aggregation activities to examine these hypotheses. This should include the use of models and modelling based on existing empirical data where this is available.
- Broaden the scope of the ESRF to include a more complete coverage of institutional, social, economic and livelihoods issues and the analysis of transformative change.
- Establish a closer relationship with the PIM CRP which has the mandate and expertise to address a number of the concerns over the scope and focus of the WLE approach, including in relation to institutional and policy analysis.
- Recognize and integrate a wide range of research traditions and methods and avoid prescriptive use of the ESRF in all activities and at all institutional levels.
- Develop the framework as a flexible set of concepts and principles that can be adapted to the specific context and key issues of different focal regions and flagships/clusters.
- Describe the key concepts of WLE in such a way as to make them more accessible to people who are not specialists in the field.
- Be wary of using terminology that is indistinct and/or poorly defined.

Recommendation 2. WLE's Theory of Change

WLE's theory of change needs to be strengthened. It should relate directly to the analysis of change and clearly set out a usable and adaptable approach to examine change processes at all levels. This should be done in parallel with the actions described in Recommendation 1, reflecting the close association between the program's conceptual approach and the theory of change. Specific actions should include the following:

- Undertake an analysis of what the program is seeking to change: in essence to drive agriculture forward along a sustainable intensification pathway while restoring and/or maintaining ecosystem services.
- Undertake an analysis of the drivers of and barriers to change in agricultural systems at all scales and institutional levels: those factors that influence the speed and trajectory of change in different biophysical and societal contexts. This should also include specific attention to the challenges of adapting research recommendations to different biophysical and societal contexts and achieving development outcomes at scale.
- Develop a structured approach to the analysis of social and institutional aspects of the change processes. This should build on and expand the work on behavioural economics currently found in the DAI core theme. Ultimately it would lead to the development of an overall strategy on social and institutional change, ensuring that all parts of the program are able to access support on these issues where needed. This strategy should be developed in collaboration with the PIM CRP.
- Give explicit consideration to potential externalities at all spatial and temporal scales and along relevant value chains. Particular attention should be given to potential unintended consequences of intensification of agriculture on other water users and uses (in space and time).

4. Quality of Science

4.1 Introduction

The evaluation of the Quality of Science (QoS) encompasses people (leadership and scientific staff), internal processes and enabling mechanisms pertinent to conduction of high quality research and science outputs, primarily as captured in the peer-review literature, but inclusive of non-peer reviewed materials important to communicating science results to stakeholders.

The methodologies used in the assessment, in addition to the examination of the publication lists, were:

- Bibliometric analysis of journal articles published between 2012 and 2014 (citation rates and journal impact factors).
- Qualitative, in-depth review focused on merit, relevance and innovation of 51 sample publications published in 2012-14, 34 suggested by WLE leadership and 18 randomly selected.²⁹
- Desk evaluations of other WLE/Center documents including a review of sample projects that involved assessment of proposals where available and annual reports of project plans and completed activities.
- Analysis of the h-index of WLE leadership including flagship/theme, focal region and science focal point leads and lead investigators on all 2015 projects.
- Field visits to WLE focal regions and semi-structured and unstructured interviews with representatives of research leadership, staff, partners and stakeholders which provided contextualizing insights to further inform the document review.
- A survey of WLE researchers to assess perceptions regarding WLE quality of science and the management, policy, infrastructure designed and implemented to facilitate state-of-the-art science.
- Triangulation with previous analyses of WLE QoS including: i) the IWMI-Center Commissioned External Review (CCER) of Science Quality and Relevance; ii) the CGIAR commissioned Elsevier Report on Research Performance of CGIAR Research Programs, and iii) the ISPC evaluations of QoS in the initial proposal and extension proposal.³⁰

²⁹ In keeping with science evaluation approaches common in academia, flagship and core theme leaders were each asked to identify 10 publications that they considered most relevant to WLE. A purposive sampling strategy was deemed necessary by the Evaluation team given that the work encapsulated in much of the publication portfolio predates the creation of WLE and thus contains some publications that are less germane to the program's current goals and objectives. The Evaluation team chose the 34 publications that were reviewed in detail from the sample submitted by WLE.

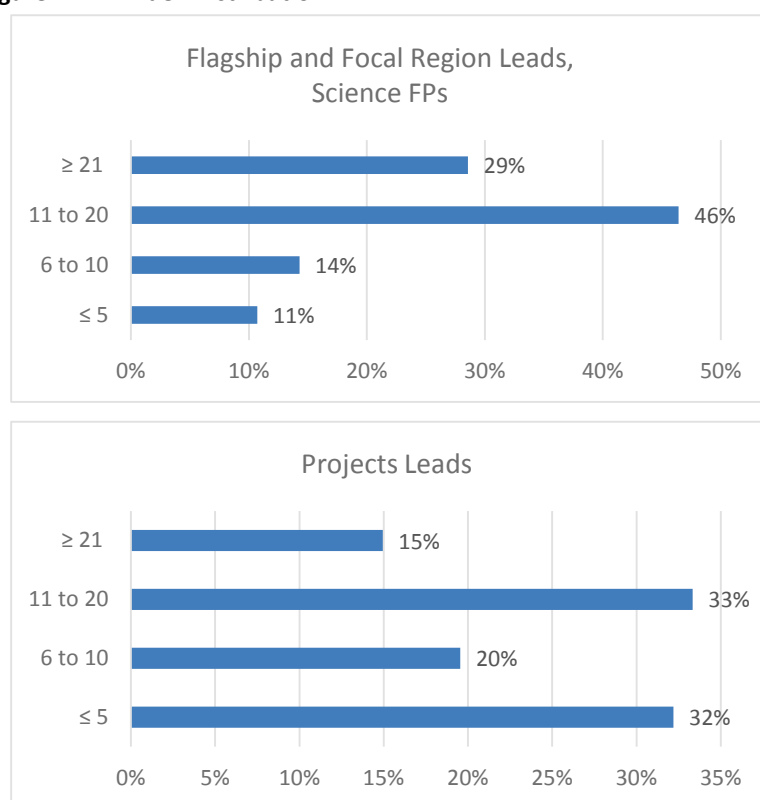
³⁰ Sadoff, C., Haman, D, Uhlenbrook, S. 2013. IWMI – Center Commissioned External Review of Science Quality and Relevance; <https://library.cgiar.org/bitstream/handle/10947/4062/Elsevier%20Report%20%202014.pdf?sequence=1>; ISCP, Commentary on proposal CRP 5: Water, Land and Ecosystems, 18 May 2011; ISPC Commentary on the extension proposal for CRP 5: Water, Land and Ecosystems for 2015-2016, Fund Council, 12th meeting, Brussels, Belgium, November 4-5, 2014.

4.2 Quality of WLE Scientific Staff

The overall assessment of WLE personnel and their management for scientific productivity indicates that the scientific knowledge, skills and rigor of researchers and research leadership is generally good to excellent. Across its array of partnerships, WLE possesses or has access to at or near state-of-the-art knowledge for the domains of WLE’s current and planned research activities. It is important to note, however, that the continued evolution of the WLE program, its research themes and flagship delineations made an evaluation of the overall suitability of expertise and skills to emerging directions difficult for the Evaluation Team to address conclusively.

Specific limitations in expertise are discussed below under the QoS in flagships and core themes (sections 4.4 and 4.5). Primarily, budget uncertainty and also staff retention and turnover threaten the continuity in research direction but also researcher mentoring that is so critical to maintaining scientific excellence at the programmatic level (see open-ended comments to Staff Survey question 9³¹). Key elements, metrics and analyses contributing to the favorable assessment of the Evaluation Team with respect to WLE researcher eminence are summarized below.

Figure 4-1: H Index Distribution



The bibliometric analysis indicates the academic renown of WLE scientists is on par with that of scientists in advanced agricultural research institutions. The h-index analysis³² of WLE leadership at program and project levels (Figure 4-1) finds that an adequate number have achieved prominence in their respective fields. Although it varies widely with discipline and age of the researcher, indices between 10 and 20 in scientific areas such as those covered by WLE would be widely accepted

³¹ Survey question 9: “How would you rate the ability of your Center/CRP to attract and maintain top-class researchers?”

³² The h-index was computed using the Google Scholar database.

benchmarks for tenure and promotion to full professor in academia, and an h-index greater than 20 is often acknowledged to be indicative of significant scientific contributions to a particular field.

Across the three leadership categories responsible for WLE's programmatic direction (flagship/core theme, focal region, and center science focal point leads), six individuals or 25 percent had an h-index ≥ 21 while almost half (46 percent) had indices between 11 and 20. The presence of three individuals with an h-index of 1 or 0 (N/A) on the leadership team was noted. This could be explained by the need for a more managerial/coordination versus chief scientist role in overseeing certain components of the program.

At the project level, the h-index analysis coupled with the more in-depth bibliometric analysis within the Elsevier report suggests a balanced mix between senior, well-known researchers and more junior, emerging scientists. Of the 119 project leaders, 13 percent have an h-index ≥ 21 , while 32 percent have indices indicative of those who have achieved success in their early careers and are entering a mid-career status (h-index of 11 to 20; Figure 4.1, bottom). Approximately a third of project leads have indices ≤ 5 , indicating a limited use of their publications by the scientific community for reasons that Management should investigate.

While the Evaluation Team did not collect data characterizing seniority (e.g. year Ph.D. conferred or year of first publication), the Elsevier report did consider this factor, and found that across the 15 CRPs seniority and h-index were highly correlated. Further, the Elsevier report highlighted WLE for having junior researchers (0 to five years since first publication) with the highest field weighted citation impact (FWCI³³ = 2.44) among all CRPs suggesting WLE's junior researchers are on excellent professional trajectories.

Thus, the Evaluation Team interpreted the high percentage of project leads with a low h-index as indicative of a large junior scientist cohort as opposed to the presence of more senior researchers of limited scientific renown. The fact that junior scientists are leading the individual projects is not inappropriate; indeed, it is required for them to build their professional portfolios and would be essential for promotion and tenure in academic institutions. However, the large percentage of junior scientists creates a substantial need for mentoring, including creating opportunities for co-publishing and highlights the importance of rigorous oversight in proposal development and project execution (discussed under Management and Evaluation) and internal processes to ensure peer-review publications of the highest quality (discussed below).

At the project level, breakdown of h-index results by participating CGIAR Center was attempted, but must be interpreted with care due to lopsided distribution of projects among centers. Only Centers with nine or more projects in 2015 were broken out (IWMI, ICRISAT, and Bioversity); all other project leads were categorized as "Other CGIAR Center" or "Non CGIAR". Among the Centers, few remarkable differences in h-index distributions were observed. On the other hand, more than 60 percent of "Non CGIAR" project leads had an h-index ≤ 5 or not available. An analysis of h-index by flagship found 50 percent of the 32 FS1 project leads were also in this low h-index category. Given the focus of FS1 on knowledge translation and delivery, project leads can be expected to include development professionals from non-research organizations and their record of contributions to research for development may not be reflected in the academic record. When Non-CGIAR project leads are removed from FS1, h-index analysis reveals little difference among flagships (data not shown). Profiles and scientific capacity are examined by flagship and core themes in Section 4.4.

³³ FWCI is an indicator of mean citation impact and compares the actual number of article citations with the expected number of citations for other articles of the same document type, publication year and subject field.

We conclude that much of WLE research is significantly acknowledged by the scientific community, and a majority of WLE researchers have achieved substantive distinction through their citation records, but a large junior scientist cohort makes careful mentoring essential to on-going WLE scientific success.

Table 4- 1: H-Index for Project Leadership by CGIAR Center, 2015

H-index categories for 2015 project leadership broken out by CGIAR Center.*								
		Percent of individuals w/in h-index category						
		#	0	1 - 5	6 - 10	11 - 20	≥ 21	N/A
Entity	IWMI	39	5.1	15.4	17.9	38.5	17.9	5.1
	ICRISAT	10	0	40	30	20	10	0
	Bioversity	9	0	33.3	11.1	44.4	11.1	0
	Other CG	35	8.6	22.9	17.1	34.3	14.3	2.9
	Non CG	26	19.2	38.5	11.5	19.2	7.7	3.8

* Only CGIAR centers with nine or more project leads are individually shown. All other CG project leads are lumped together as “Other CG”. “Non CG” indicates project leadership is from an outside entity. N/A indicates that an h-index could not be computed typically because the researcher could not be uniquely identified.

4.3 Researcher Perspectives and Enabling Environment

WLE produces a wide diversity of outputs but in the WLE researcher survey, 95 percent of respondents thought publications were the main output of their research, highlighting the importance of publications in the WLE culture and strategy for achieving and maintaining pre-eminence.

Seventy percent or more of respondents to the WLE researcher survey felt research processes were well managed with respect to leadership, availability and quality of the research staff, internal quality assurance processes, and research data and knowledge management (score of 4 to 6).

Ratings were less favorable regarding “encouragement for learning from “failure””; less than 10 percent felt this was managed very well (score = 6), and 50 percent had mild to strongly negative perceptions on this key attribute of science (score ≤ 3).

Almost 40 percent of respondents indicated that WLE had good to very good (score ≥ 5) ability to attract and maintain top-class researchers (Q9). However, several open-ended comments specifically identified recruitment, retention and scientific leadership as problematic due to funding volatility, transaction costs, lack of institutional nimbleness and bilateral donor agendas. More detailed description of the survey results regarding this issue are presented in Annex A.

Interviews and field visits with individual researchers generally corroborated the survey results regarding the enabling environment for high quality of science. With respect to access to facilities and equipment required to do the necessary work, researchers acknowledged resource constraints as an ongoing issue but nonetheless had good knowledge of recent and important methodological developments and access to up-to-date software and state-of-the art physical facilities when needed (e.g. core supporting facilities such as the soils laboratory at ICRAF supporting African Soils Information System and soil mapping and fertility analysis). Available funds were sufficient for excellent field measurement and monitoring equipment where required. A dearth of investment in dedicated, long-term field facilities was noted and is discussed below relative to specific Flagships (Section 4.5).

4.4 Science Outputs

4.4.1 Bibliometric Analysis of Publications

In general, the Evaluation Team found WLE’s publication record to be very good with good selection and success in publishing in high impact venues with relevance to a targeted audience, although several caveats to this assessment are noted below.

Table 4- 2: Publications Numbers by Center and Year

Center	Year			
	2012	2013	2014	All
IWMI	64	114	116	294
Bioversity	14	5	29	48
ICRAF	9	10	15	34
ICRISAT	0	11	9	20
IFPRI	2	3	12	17
All Other[†]	7	15	15	37
Total	96	158	196	450
† Combined contributions of CIAT, CIP, IITA, ILRI CIP, ICARDA, World Fish and CPWF				

The initial list of publications provided to the Evaluation Team included an array of lower level outputs that can be viewed as having limited circulation and/or persistence in the scientific record even if they are peer reviewed (e.g. power point presentations, theses, videos, trip reports, etc.). These outputs were removed, and the analysis was conducted on the residual list of 450 publications composed 99 percent of peer-review journal articles.

Twenty-one, 35 and 44 percent of the publications were in 2012, 2013, and 2014, respectively, suggesting a steady rate of increase in WLE’s publication volume. The record was dominated by contributions authored by IWMI (62.5 percent), and is closely associated with funding allocation (61 percent W1/W2; Table 4- 2); Bioversity, ICRAF, ICRISAT, and IFPRI accounted for 10.6, 7.5, 4.4, and 3.8 percent of publications, respectively, with the remaining Centers contributing <2 percent each. This lopsided distribution renders somewhat spurious any analysis of comparative publication productivity among Centers, and we do not provide it here. Likewise, any analyses by current flagship/theme must be viewed with caution given the fluid nature of the program structure (strategic research programs converted to flagships in 2014).

The most commonly used journals are generally good to excellent choices for WLE publications. Table 4-3 presents the list of the most frequently used journals with its bibliometric indicators and is summarized below. The top 12 most frequently used journals by WLE (≥ 7 articles, 2012 – 2014) ranged in impact factor from 0.686 to 3.535 (exclusive of two journals without impact factors). Four of the 12 journals are listed among the top 10 most influential journals by Google Scholar (GS) in relevant subject domains³⁴.

³⁴ Google Scholar ranks journals within a science domain by their h-5 index. The h5-index is the h-index for articles published in the last 5 complete years. It is the largest number h such that h articles published in 2010-2014 have

With seven WLE publications, the **Journal of Hydrology** (IF=3.053) is ranked by GS as the most influential journal in the subject area of hydrology and water resources; **Water Resources Management** (seven WLE publications) and **Hydrogeology Journal** are ranked the sixth and tenth most influential journals, respectively. The second most frequently used journal by WLE authors, **Agricultural Water Management** (19 publications; IF=2.286) is ranked the sixth most influential journal by GS for agronomy and crop sciences.

Even though several frequently used journals have quite low IFs (or even no IF), most of these venues are intended to make science available to non-academic audiences and enjoy significant popularity in their fields. For example, **Water International** and the **International Journal of Water Resources Development** – 30 and 10 WLE publications, respectively – both aim to communicate policy-relevant content to a diverse international readership. Likewise, **Economic and Political Weekly** (IF=0) is a forum published in India for fostering conversation and debate among scientists, policy makers and non-governmental organizations.

Use of these journals suggests appropriate efforts to promote WLE results to key stakeholders in the uptake pathway but a more definitive bibliometric assessment requires separation of scholarly from knowledge translation communications to be able to assess relevance to the scientific community from relevance to stakeholders.

Table 4-3: Journal Citation Report

Table 4-3: Journal Citation Reports IF and GS h5-index and h-5 median (2010 – 2014) for journals publishing seven or more WLE articles (2012 – 2014).*		
Journal	# of articles	IF (JCR 2014)
Water International	30	0.686
Agricultural Water Management	19	2.286
International Journal of Water Resources Development	10	1.094
Water Alternatives	9	0
Agriculture, Ecosystems and Environment	9	3.402
Economic and Political Weekly	8	0
Hydrology and Earth System Sciences	8	3.535
Hydrogeology Journal	8	1.966
Irrigation and Drainage	8	0.51
Journal of Hydrology	7	3.053
Water Resources Management	7	2.6
Water Policy	7	0.833
* Benchmark journals are italicized bold-faced. Benchmarks are in the GS list of top 10 journals in agronomy and crop sciences (Ag. Water Mgmt., 6) and in hydrology and water resources (J. Hydrology, Water Res. Mgmt., and Hydrogeology J. are 1, 6, and 10, respectively).		

at least h citations each. For more information on Google Scholar journal metrics see <http://scholar.google.com/intl/en/scholar/metrics.html>

Indeed, the Evaluation Team took note of the large number of journals used by WLE (237), especially of the number of journals publishing only one (166) or two (36) WLE manuscripts, and of the number of journals with no IF (91). While a low IF and/or an IF=0 is not necessarily indicative of a poor venue for WLE products, it is a proxy indicator for journals that are not intended as the primary venue for peer-reviewed scholarly communication, are too new for the scholarly community to recognize, and/or poor or predatory publications. Management should require that all reported publications be identified as primarily scholarly versus extension/knowledge translation to facilitate the analysis of QoS within WLE.

While it was beyond the scope of this review to assess the suitability of all journals for WLE content and target audiences, we compared all journals without an IF against the journals posted on the Scholarly Open Access website as “Potential, possible, or probable predatory scholarly journals” (<http://scholarlyoa.com/individual-journals/>); four of the journals with one WLE publication appear on this list (note, we only researched journal titles and not publishers for predatory designation). The appearance of any venues used by WLE on this list is concerning.

The finding of predatory journals and those with limited peer review for published scientific results coupled with the large number of venues without IFs suggests, at best, some dilution of WLE product excellence and some inappropriate investment of human and financial resources. Although some of these journals may be considered appropriate popular magazines, WLE should prioritize the quality of its publications before mere quantity and when popular press articles are produced, the link to the evidence in a scholarly publication should be transparent. While WLE has developed a sound publication policy for its partners/Centers (Publications policy 1.0; May 8, 2013), interviews suggest that a key element – rigorous internal review by Centers and partners – is, at best, inconsistently pursued with some Centers requiring no internal review prior to submission to a journal.

4.4.2 Citation Analysis

The citation rate of WLE 2012-2014 publications provides additional evidence that WLE researchers have achieved a good level of global recognition and that their work is being used by others as rationale for and in interpretation of their own research, however there were some ambiguities. As of early July 2015, accrued citations for the entire WLE publication portfolio totaled 2,298, while in December they had increased to 3,068. The number of publications with zero citations as of time-of-assessment decreased from 71 to 23 percent for 2014 and 2012 publications.

Almost one third of the citations were for only 22 articles, each with a citation rate ≥ 20 . Examination of the 13 most highly cited publications shows all are in prominent academic publications. Most of the highly cited publications are narrative, qualitative reviews of the state-of-the-science in topical areas or opinion/position statements on important knowledge gaps and strategic directions for research. Many of these papers have large numbers of co-authors (four w/ ≥ 18 authors) and a significant role for WLE is not immediately apparent (e.g. WLE researchers in a non-corresponding author role). Indeed, WLE is the corresponding author on only three of these most highly cited papers and some papers appear to have had no recorded CGIAR linkage at the time of publication. This observation suggests WLE's prominence in highly academic publications cannot readily be derived from a straightforward bibliometric analysis. On the one hand, the bibliometrics show WLE researchers are affiliating with entities outside of the CGIAR that are renowned for forward thinking and state-of-the-art science. On the other hand, the large authorships with only token participation by WLE raises questions about the actual level of contribution of WLE researchers to the reports.

Table 4- 4: Number of Journal Articles by Year of Publication

Number of Citations (GS)	2012	2013	2014	Total
0-10	59	128	179	366
11-20	28	21	14	63
21-30	3	4	1	8
31-40	2	3	1	6
41-50	1	1	0	2
50-60	1	1	1	3
60-70	1	0	0	1
150+	1	1	0	2

4.4.3 Qualitative Review of Sample Publications

In-depth examination of a subset of 51 WLE publications in the Evaluation Team’s qualitative review generally supports the findings of bibliometric analysis of overall good quality in WLE publications although the team noted uneven quality even among the publications WLE self-selected to highlight.

Across all five ranked criteria mean scores ranged from a low of 4.5 (C1 and C2) to a high of 4.9 (C4) on a scale of 1 (very poor) to 6 (very good). The Evaluation Team noted that rankings were lower for randomly selected publications when compared with those recommended by the program on questions of methodological rigor (C1) and relevance (C4/C5), results that are not unexpected.

The Evaluation Team found the overall quality of the sample publications to be “good” (27 percent), “good to excellent” (23 percent) or “excellent” (15 percent) and only about five percent were ranked as “poor” or “poor to fair”³⁵. Approximately 92 percent of the publications evaluated were considered to “fit” with WLE objectives (C9). Thirty seven percent of publications were considered highly innovative while less than 20 percent were assessed as “not innovative” where innovation was expected. A fair number of publications (31 percent) were not necessarily considered innovative but were considered valuable and useful (e.g. publications that extend previous findings to a new set of conditions, compilations of information in narrative reports, etc.).

The vast majority of publications (79 percent) were considered to be in venues that were of high quality and/or suited to their target audience. Only 12 percent of the articles were considered not to be well placed for their quality or readership. The Evaluation Team found it somewhat more difficult to assess the suitability of the extent of interdisciplinary authorships relative to the scope of the article. Forty percent of publications were considered to have either authorship that was not necessarily interdisciplinary but appropriate to scope or an excellent team for addressing a highly interdisciplinary project. For 10 publications, the Evaluation Team thought the manuscript could have been strengthened with better representation of multiple disciplines on the authoring team.

³⁵ Criteria used included methodological rigor, narrative comprehensiveness, referencing suitability, relevance to policy/development challenges, and relevance to key WLE goals

4.5 Quality in Flagships and Core Themes

The objective of this section is to assess Flagships-specific performance and challenges in terms of quality of science, with a focus on being illustrative of key findings. The QoS assessment for Flagships focused on innovation, rigor and importance of projects and publications, scientific capability of project leads, highlights of interdisciplinary collaboration and/or knowledge synthesis and adequacy of physical facilities (if relevant).

4.5.1 Quality in Flagship 1

The Evaluation Team reviewed all expressions of interest (EoI) and full proposals in Flagship 1, and successful proposals were found to be of high quality, whereas non-successful EoI were generally poor to good suggesting the write-shop strategy was effective in elevating the quality of science of proposals. The open call strategy permitted leadership from outside WLE, and a number of project leaders do not have a scientific record in terms of citations (low or no h-index). However, through interviews and field visits, the Evaluation Team found project leads were experienced and had relevant knowledge and expertise for the project, region, and/or issue context and that the research teams contained a number of established scholars. Partners appeared to be good choices with good reputations in science for development. Methodologies proposed were innovative and/or appropriate and demonstrated effective integration of new knowledge from research with stakeholder involvement to deliver locally-relevant solutions. As yet, outputs from FS1 are very limited reflecting its recent creation and do not yet include scientific outputs that can be evaluated for quality.

4.5.2 Quality in Flagship 2

Flagship 2 was deemed to be well-focused on research for development, based on the relevance of the assessed projects and the nature of the partnerships in them. Flagship projects and activity clusters were observed to be working at the higher biophysical (landscape, watershed, regional, global) and social (socio-economic, institutional) scales in keeping with WLE's comparative advantage among CRPs. The scaling and integrative focus renders the work innovative when compared with mainstream academic work in land and water productivity. The flagship leaders have complimentary expertise in the social and engineering/biophysical domains, a suitable mechanism for ensuring rigor across the current portfolio of projects. In general, the flagship and project leadership was deemed highly competent, including some individuals of high international caliber with exceptional research experience.

LWP sample publications that were qualitatively reviewed were found to be highly interdisciplinary, with several good to excellent publications, including a non-external peer-reviewed IWMI series publication and a highly relevant review giving incisive analysis of bureaucratic problems in irrigation management. Five publications were average to good in quality and relevant to WLE, and flagship goals but were considered to be confirmatory but not necessarily innovative.

Further, the Evaluation Team perceives that qualitative and quantitative (with statistical meta-analysis) systematic review represents an unexplored opportunity to leverage the confirmatory work into a synthesis that can characterize the broader inference space for technology deployment. Finally, in field visits, the Evaluation Team noted that the majority of field experiments and monitoring activities were not intended to be of long duration and thus could not be expected to produce the temporal datasets important to understanding the biophysical changes that occur more slowly over time.

4.5.3 Quality in Flagship 3

Among flagships, RDE has by far the largest portfolio of projects on assessment and restoration of agrobiodiversity and soil resources. The Evaluation Team found that researchers were generally selecting appropriate methods for projects including using simple approaches when most suitable. Although WLE-mandated reporting on plans and activities was not adequate to thoroughly assess rigor and innovation in experimental design, the interviews, field visits and assessment of proposals to bilateral donors all suggest RDE methodologies are sound.

Review of the portfolio suggests project leads have appropriate expertise and capability. Further, resources for flagship leadership reside with an individual with excellent credentials in soils research ensuring the build-out of the soils research agenda within WLE will be rigorous. Analysis of sample projects for the interdisciplinary nature of the teams suggests an appropriate level of domain integration.

The qualitative review of the sample publications of RDE found variable quality, but with a few good to excellent publications well-placed in high quality journals, including articles on complex, innovative projects linking risk to agro-biodiversity. Together with MRV, RDE accounted for the majority of the 13 most highly cited publications (five per flagship) although WLE did not serve as the corresponding author on the five RDE publications. There were also examples of opinion or state-of-the-science essays that were unexpectedly lax in the rigor with which previous literature was used to support assertions regarding the current state of ecosystem services, known drivers and causality of ecosystem service degradation, and knowledge gaps (e.g. for the ESR approach).

This observation echoes that of the ISPC (2011) in their evaluation of the original WLE proposal who remarked on a tendency of the text to oversimplify problems and make claims about approaches to ecosystem service management that are insufficiently substantiated. Further, some author teams showed appropriate domain diversity for the subject matter of the article but others seemed to have authors lacking in key expertise; these articles could have been strengthened with better cross-disciplinary insights. The Evaluation Team views RDE as not carrying out sufficient science synthesis through systematic review especially in the area of sustainable intensification. Among CRPs, WLE has a mandate for synthesizing field-scale results from the agronomic CRPs with WLE results yet such synthetic research does not appear to be currently on-going as a major effort within projects.

4.5.4 Quality in Flagship 4

Collectively, the science within RRR represents an innovative and evidence-based approach to closing rural-urban nutrient loops and uses a novel adaptive, interdisciplinary approach across projects. Additional innovation was observed in demonstrating the business case for the technology and in structuring multi-entity partnerships and consortia to leverage knowledge with convening power. The flagship leadership was rated as extremely effective and detail-oriented such that excellent buy-in to RRR goals and objectives has been achieved. On balance, a good mix of experienced senior and high-committed junior researchers was observed.

The sample publication review found RRR outputs to be of high quality and useful. Only five publications were evaluated and all were ranked good to very good, which was attributed to rigorous adherence to IMWI internal policies for publication review prior to submission to a journal. A major book³⁶ was among the reviewed publications; it was found to be an excellent compilation of knowledge

³⁶ Drechsel, P., Qadir, M. & Wichelns, D. (eds, 2015) *Wastewater: economic asset in an urbanizing world* Springer, New York.

and the book is expected to be highly useful to RRR stakeholders. In general, the sample publications were characterized as presenting results in formats useful to stakeholders. Interviews with well-respected specialists in the field of sanitation and treatment of solid and liquid wastes recognize and laud RRRs scientific record and efforts at knowledge translation. Among flagships, RRR is the most highly focused on piloting activities related to knowledge outputs with government and the private sector.

4.5.5 Quality in Flagship 5

Flagship 5 combines research addressed at managing variability in water resources with a portfolio of projects more centered on water policy issues. The two leaders have expertise in hydrology and environmental economics and complement each other well. Their scientific trajectories are excellent; both enjoy high international reputations and are considered leaders in their fields of expertise.

The flagship has made substantial advances in providing solutions for the risks associated with variability in water supply and with the competing uses of water among sectors. In particular, research on innovative approaches to groundwater management and on the food-water-energy nexus has made significant contributions internationally. The flagship has a wide variety of relevant partners, often from the most advanced research groups but at the same time, covering most possible stakeholders. The Evaluation Team noted that such a diverse range of partners contributed in some focal regions to bridging the gap between agriculturalists and environmentalists by encouraging productive dialogue between the two camps.

The research portfolio is of high scientific quality, the leadership is open to and proactive in expanding an emphasis on gender and the focus on partnerships is commendable. Five of the 13 most highly cited publications are mapped to MRV, and, in the sample publication assessment, all were ranked as relevant to highly relevant to WLE. The publication sample was dominated by narrative reviews (four) and modeling studies (five) and contained excellent contributions in both categories. However, only 50 percent of the sample publications were ranked as good or good-to-excellent as some reviews lacked comprehensiveness, sufficient literature review and/or did not seem to contribute new insights. There are some overlaps with FS2 activities which could be coordinated through more effective dialogue. One important feature is the interest and capacity to tackle issues which are very difficult and debatable to assess rigorously at the global level, such as a critical review of past projections of global water use and scarcity, and a recent assessment of global water pollution.

4.5.6 Quality in WLE Core Theme: Decision Analysis and Integration, DAI and GPI

The core themes were challenging to evaluate for QofS in parallel to the approach used for flagships. Although a group of publications for ESR were recommended, the publication database did not map papers to ESR and therefore an ESR subset was not assessed in the qualitative review of sample publications. Further, ESR is covered extensively in chapter 3, above, and direct comments are not provided here under QofS. Here the Evaluation Team notes only that in evaluating both the original and extension proposals the ISPC repeatedly remarked on the lack of focus on real hypotheses for objectively testing the overarching research problems WLE is intended to address (ISPC, 2011 and 2014).

The role of core themes in WLE is such that their impact is expected to be reflected in the research of flagships rather than as stand-alone research areas. This is particularly true of the ESR and GPI core themes, with the DAI core theme acting more like a flagship – indeed it was initially a separate SRP and the logic for calling it a core theme is not apparent giving the nature of its activities.

DAI is piloting a novel approach to addressing uncertainty in decision making. The application of Monte Carlo and Bayesian approaches was considered innovative, and the use of non WLE CRP research was notable and commendable. Equally positive is DAI's explicit effort to build on earlier work including the water accounting research of IWMI. Further, the Africa Soils Information System was considered a high quality research contribution critical to supporting an expansion in WLE soils research. The Evaluation Team found the theme leadership innovative and effective both in efforts to ensure synergistic coherence and in pursuing and maintaining long-term essential partnerships.

The Evaluation Team noted that DAI capability is centered in East Africa and the Mekong with reduced presence elsewhere, raising concerns that DAI impacts will not be as prominent in the other focal regions. The sample publication review found the majority of publications were good to very good and highly relevant to theme and CRP goals. The usefulness of DAI publications to stakeholders was somewhat varied with some rated as highly useful and relevant while others were found to have no clearly identified audience or purpose. The DAI software capabilities were rated as up-to-date and on-trend with respect to relying on open source software wherever available and appropriate. In the view of the Evaluation Team, DAI'S major limitation is the lack of critical mass given its vision for contributions to WLE as a whole.

The selection of GPI-papers suggested by WLE for the qualitative review was weak with respect to gender. Only two papers directly addressed gender while the remainder were concerned primarily with institutions and governance and mostly written from a gender-neutral perspective. The quality of the papers was generally very good. However, given that WLE has put much emphasis on gender, it was surprising to find such a limited publication output on gender. In addition, the sample publication were not reflective of the solid history of work by various WLE partners in this area nor of IWMI's contributions in particular.

4.6 Knowledge Syntheses and Aggregation within WLE

Knowledge aggregation (KA) is a critical step towards identification of generic and specific conclusions both in relation to the science generated and the uptake/policy influencing process. This said, the aim of KA is not to produce a unique set of findings or recommendations; rather it is to recognize that, in relation to any given research hypothesis or question, evidence may be lacking or conflicting and a range of inferences may be drawn. This diversity of inferences often prompts exchange of views, and lively debate is desirable to achieve outcomes that are more likely to stand up to scrutiny. Typically, KA includes rigorous synergistic analysis that is often interdisciplinary and multi-scalar; quality assurance of information and evidence including conclusions and recommendations that are transparent to the underpinning science, and strategies for managing and sharing the KA products (e.g. via open-access information bases).

The Evaluation Team finds that knowledge aggregation efforts are lacking in WLE. For example, past IWMI work on revitalizing irrigation systems and on gender issues in water management, and recent/ongoing work on sustainable intensification conducted by many CGIAR centers are cases where KA would be desirable and feasible. Similarly, earlier work under CPWF on institutions in water management and governance has not been sufficiently exploited in WLE. The Evaluation Team believes that a more outward looking scientific strategy, founded on the past research achievements of CPWF and of other CGIAR projects, and leveraging but not replicating the on-going work of agronomic CRPs is critical for WLE to successfully deliver on its mission and at scale. In addition to budget instability, the Evaluation Team views staff turnover and changes in leadership and co-leadership as a significant barrier to successful implementation of many KA strategies.

4.6.1 Sharing Data

Interviews with project/flagship leadership and data managers for the Centers suggest that while significant progress is being made, major barriers still exist to curation and preservation of WLE data in a repository distributed among the participating Centers. At present, Centers appear to lack formal mechanisms for review of datasets prior to repository ingestion, quality assurance and control mechanisms typically necessary to ensure datasets are appropriately described with standardized metadata and appropriately tagged for discovery via standard search engines.

Further, from June 2015 onward all projects were required to have data management plans but not necessarily to allocate budgets to these plans. Tools and workflows to assist researchers in preparing their data do not appear to be universally available and/or used. Interviews indicated few projects seemed to be explicitly using curated data as their foundation or synthesizing repository data with newly collected data although this type of work is anticipated.

4.6.2 Partnering

In document review and in field visits, the Evaluation Team found collaborative linkages to some notable international programs of scientific renown, including research entities and institutes in Europe and the US, suggesting WLE efforts are well positioned to take advantage of the best KA intellectual capabilities. In contrast, linkages with other CRPs and Centers were weaker than expected, and relevant results from the agronomic CRPs (e.g. field scale work on sustainable intensification) do not seem to be providing a foundation for the work WLE is pursuing at greater scales.

Indeed, in the sample publication review, the Evaluation Team noted both the lack of co-authorship among Centers (only four of 51 publications were co-authored by more than one CGIAR Center) and a tendency to be overly dismissive of previous work on conservation agriculture and ongoing work on sustainable intensification as not relevant under the ESRF within which WLE operates.

4.6.3 Knowledge Aggregation within WLE

Within and across WLE flagships and clusters, the Evaluation Team observed overlooked or unexplored opportunities for KA. The write-shops in FS1 were identified by as an excellent mechanism for fostering closer project-to-project linkages although explicit plans for synthesis across projects at their completion do not seem to be planned. Further, budget cuts meant that some inter-project meetings within focal regions have had to be cancelled.

In other flagships, the Evaluation Team noted that the substantial partnerships led to some natural collaborations, but overall there was a need to carefully consider which mechanisms might enhance inter-project work and synthesis. Specifically, sample publication review in FS3 revealed projects where broader expertise on research teams would have enhanced interpretation of interdisciplinary projects. Additionally, researchers in both FS2 and FS3 seem well positioned to lead systematic reviews of significant bodies of existing work (e.g. on practices to restore soil productivity) but research teams had not yet pursued the opportunities.

4.6.4 Incentives and Resources for KA

In some cases, narrower clusters of small projects with similar goals could enhance cooperative, inter-project work eventually leading to better integration. However, the trend towards increased bilateral funding appears to be driving projects that are planned in response to an articulated development need, but with less attention to the potential relationships and leveraging within the WLE portfolio. Although W1/W2 monies would seem a natural mechanism through which to ensure synthesis, budget

cuts seem to impact synergy and lateral learning opportunities as individual project budgets are protected. Nonetheless, it was not apparent to the Evaluation Team that an explicit process of visualizing desired syntheses and soliciting/designing projects for a prioritized contribution had been undertaken within WLE.

4.6.5 KA tools: Statistical Meta-analyses and Modelling

Systematic review with statistical meta-analyses is a low cost, powerful tool for KA and knowledge translation into evidence-based policy and recommendations and is well-suited to the aggregation of many studies with common goals conducted across varying agro-ecozones. The Evaluation Team noted that some papers in the sample publication assessment were narrative reviews but did not follow the accepted protocols of rigorous systematic reviews (e.g. reporting literature search strategies and inclusion/exclusion criteria) nor were they using meta-analytical statistical techniques. Future reviews conducted by WLE should include statistical meta-analysis where appropriate, be systematic and develop the data infrastructure such that new literature can easily be added to permit cumulative reviews of accruing literature on a particular question.

Similarly, modelling and/or scenario building were used effectively for KA and characterization of inference space and probability in many WLE endeavors but were absent in others. For example, modelling seemed absent from work in northern Ghana where modeling benefits, tradeoffs and externalities associated with allocation strategies for water permits could inform decision making. Again, an explicit strategy or process for identifying where modeling can add value to projects or clusters of projects could enhance the scientific value of overall project outcomes.

4.7 Conclusions and Recommendations

The overall assessment of the quality of science within WLE is good to very good with some examples of excellence that are of an international leading edge standard. The program size and the geographical and thematic areas covered in the research of WLE are impressive. Similarly, the scientific standard of researchers across WLE was found to be high with a number of internationally recognized researchers that is balanced by younger researchers in the development stages of their careers. It was found that the academic renown of WLE scientists is generally on par with that of advanced agricultural research institutions.

The number of publications is high and the program was successful in publishing in high impact venues with relevance to a targeted audience. The most commonly used journals are generally good to excellent choices for WLE publications, and they include journals of the highest reputation in WLE areas. The detailed assessment of a sample of publications supported the assessment that the overall quality of publications was good although some variability in quality was noted; the citation rates were generally good to excellent. The large number of publications relative to the apparent body of knowledge created suggests that the accruing knowledge from WLE projects is not synthesized sufficiently, and/or sometimes may be channeled through unknown journals. Also, there were concerns over attribution, with publications cited that may contain WLE researchers, but that are not clearly outputs of WLE work, and with the prevalence in the portfolio of too many journals with no IF suggesting limited use of the material in scholarly communication.

At the project level, there are many scientifically sound, good to very good research efforts with promising outputs under way. The Evaluation Team observed important initiatives and found some good examples of aggregated research around key themes (such as the RRR work in FS4 and on water governance in the Mekong) and of complex transdisciplinary projects combining diverse scientific methodologies.

Collaborative linkages exist with some notable international programs of scientific renown. In contrast, linkages with other CRPs are weaker than expected and the lack of such linkages seems to curtail opportunities to leverage relevant work conducted in other CRPs into WLE for synthesis at scale. The Evaluation Team recognizes that the program is now seeking strategic collaborations with the AFS CRP and others that have field facilities within basins/focal regions where WLE is already working. From the physical and research focus viewpoints, the integration of such facilities will greatly enhance the opportunities for working at different scales, as per Recommendation 1.

A lack of consistent, rigorous scientific synthesis and knowledge aggregation to a higher level represents a notable, missed opportunity for WLE to leverage its comparative advantage. The clusters and flagships were described as designed/intended to create a suitable foundation for such syntheses, but explicit mechanisms, resources and a scientific management strategy specific to the purpose of testing a defined set of program-wide hypotheses seem lacking or inadequate to the task.

With respect to the Quality of Science, the Evaluation Team makes the following recommendations:

Recommendation 3. Nurturing young scientists.

WLE should assign sufficient resources to maintain the positive feature of having a significant number of junior scientists as project leaders. Specific actions should include the following:

- Encourage collaboration between young scientists and senior scientists
- Encourage mentoring of young scientists by senior scientists to generate good publications and visibility

Recommendation 4. WLE publication policy.

WLE participating Centers should commit to fully following WLE publication policy. Specific actions should include the following:

- All publications should be internally peer-reviewed
- No WLE publications should appear in predatory journals.

Recommendation 5. Dedicated research facilities.

There is need, opportunity and capability for long-term research at dedicated field facilities strategically located in developing countries. WLE should play a role in maintaining and establishing such long-term research facilities because well-managed and well-instrumented field and catchment scale laboratories are needed to underpin the research of WLE and other CRPs. Such studies are also essential to provide much needed empirical data for calibrating and validating the extensive WLE's modelling efforts. Specific actions that are needed include:

- Development of seek strategic collaboration with institutes that have field and catchment scale laboratories or are willing to invest in them.
- Undertaking of multi-scalar research at spatial scales that range from the field to the river basin.

Recommendation 6. Learning, knowledge synthesis and aggregation.

WLE should make a focussed effort to learn from its experience in different types of projects and within and across focal regions. Specific actions should include the following:

- Development of a strategy for knowledge synthesis and aggregation across the program. (Some efforts in this direction have already been made by WLE within the context of developing a novel “Solutions Database/Platform.”)
- Allocation of sufficient resources, and leadership from among the strongest researchers in WLE. For the program to reach its potential in the production of innovative global knowledge goods, some priorities will need to be established. To facilitate this process, WLE should establish a strategic group working directly under the Program Director to be responsible both for the development of the overall program strategy and the identification and management of key syntheses products. The Evaluation Team notes that this was a recommendation in 2011 from the ISPC to improve the original proposal for hypothesis driven research, and it was reiterated in the ISPC commentary on the 2015-16 extension proposal.
- Provision of resources to flagship leaders to instigate and facilitate discussions on key themes in project clusters, with support from lead researchers in the field (both inside and outside WLE), to identify generic conclusions and areas where results are specific to the context of individual projects. Synthesis research integrating outputs from WLE projects and/or other CRP projects should be encouraged and prioritized where such work can bring significant added value. The approach developed in the RRR flagship provides an example of how this can be done.
- Where this has not happened, undertaking of global reviews of the ‘state of the art’ for the key themes, including a discussion of the state of knowledge and main methodological approaches and challenges. These reviews should be of high quality, adhere to systematic protocols, be quantitative where appropriate, and contribute novel insights.

5. Effectiveness and Impacts

This chapter assesses the results achieved by WLE, including outputs produced and likely effectiveness of WLE. The assessment of effectiveness looks in particular at progress towards planned outputs and outcomes. WLE has been active only for a limited time, and it is not realistic to expect that it has already produced many relevant outcomes. However, the program had a solid foundation in the earlier Challenge Program on Water and Food (CPWF) and other initiatives that were ‘mapped’ into WLE at its outset that can be expected to have produced outcomes and impacts. The present chapter, therefore, also reports on impacts of legacy research relevant to and/or still ongoing in WLE.

The Evaluation Team assessed the likely effectiveness of WLE by reviewing selected projects, annual reports, and interviews with more than 100 program scientists, partners, donors, and other stakeholders as well as visits to a sample of field sites where WLE is actively involved in research. The primary information for the last section on impacts on the other hand, comes from the results of available impact assessment studies of research carried out prior to WLE. Among other documented evidence of legacy research impacts, the Evaluation Team used impact narratives when supported by evidence provided by each of the Centers for the purpose of the Evaluation.

5.1 Progress against Targets

5.1.1 Means to Measure Progress

The current state of knowledge on the progress and results of WLE is summarized in the annual reports, the format of which is set by the Consortium Office. These contain a comprehensive presentation of information focused largely on progress along impact pathways. Progress towards outputs is covered in considerable detail, although at a descriptive level, across flagships and themes.

Although much information is presented, using theory of change vocabulary, it is often difficult to assess the proposed impact pathways, as discussed in chapter 3. This is because the theories outlined for individual projects or larger aggregations are not systematically followed through, but rather are illustrated by examples at output and outcome (or potential outcome) level, often without an attempt to explore the cause and effect chains associated with theory. Annex 1 of annual reports lists numerous outputs, but the information is difficult to interpret or aggregate since such outputs are not always clearly connected to their intended research-for-development benefits. Many of the benefits that are suggested in the Annex tables seem somewhat speculative at this stage without further evidence.

Concerns over the limitations of WLE’s ToC were discussed in chapter 3. These limitations make the assessment of effectiveness difficult and, more importantly, make it equally hard for the program to understand the relationship among outputs, outcomes and impacts at both project and program levels. Similarly, while it is recognized that the program’s monitoring and evaluation (M&E) system is developing new approaches to better document its influence and the degree of adoption of new WLE concepts and solutions (as discussed in chapter 7), there has to date been insufficient monitoring and very little evaluation of the range and quality of outputs and the existing or likely outcomes from these outputs. This is true at the project level, and even more so at cluster, flagship and program levels.

5.1.2 Activities and Outputs

Since 2012, WLE has delivered a substantial and diverse range of outputs, which are listed in detailed tables in Annex 1 of their annual reports. Outputs other than publications, are classified into four

categories: i) knowledge, tools and data; ii) capacity enhancement and innovation platforms; iii) technologies and practices; and iv) policies. The most relevant results are briefly analysed below.

5.1.2.1 Knowledge, Tools and Data

WLE was on target in 2013 and 2014 in the delivery of overall flagship products. Relevant examples in 2013 include the ESR framework, contributions to the water accounting framework and new approaches to turning waste into wealth. In 2014, 12 flagship products were delivered (eight had been targeted). The most relevant ones were the first global assessment of urban and peri-urban agriculture, a framework on the economics of land degradation, new flood mapping approaches using remote sensing, and a book on water scarcity, livelihoods and food security.

In 2013 and 2014, 114 tools of different nature were produced. The highlights included practical booklets and videos for grey water use at the farm level, remote sensing approaches for crop phenotyping, simulation models for groundwater management, and new tools for mapping floods and droughts. The Evaluation Team considers most of these tools to be important building blocks in the solution packages that WLE is developing to tackle its targeted problems.

Participatory methods were developed to help assess how ecosystem services are valued differently by men and women. The use of the SWAT model based on input data from men and women separately, revealed markedly different land and water availabilities by sex, suggesting that land and water resource planning should be done with both women's and men's groups. Overall, a number of gender-responsive tools and methods are emerging from WLE research.

In the same period, WLE developed and maintained 88 open access databases and launched a water accounting portal. Open access databases included a geodatabase on land degradation in Africa, online maps of irrigated and rainfed areas in Asia, and a website on nitrogen fixation in Africa. The number of downloads rose from 12,000 in 2013 to more than 20,000 in 2014, suggesting a significant growth in visibility and possible uptake of these products.

5.1.2.2 Training and Innovation Platforms

The number of participants in short-term training programs increased significantly from 2013 to 2014, from around eight thousand to more than 14,000 per year, out of which about 40 percent were female. A more detailed discussion of capacity building can be found in chapter 6.

WLE promoted 22 multiple stakeholder platforms across the different regions in 2013 and 24 in 2014. These platforms had diffuse goals, ranging from dialogues to broader stakeholder groups put together to develop joint research proposals and/or to promote the dissemination of research results. Examples of useful platforms include five soil health consortia in Africa and the Mekong hydropower platform. Although WLE already participates in the platform of the India National Mission for Clean Ganga, there is potential to develop stakeholder platforms in other basins in India along the lines of the Nile Basin Initiative or the Mekong Commission.

5.1.2.3 Technologies and Practices in Various Stages of Development

WLE outputs include 246 technologies/practices under research in 2013-14, about half of which are already at the field test stage. The Evaluation Team assessed many of the technologies and practices produced by WLE and found them to be rational outputs of the ongoing research projects. Some are related to holistic approaches to crop and farm management, including the role of species diversity for crop protection, use of indigenous species/practices and traditional varieties, conservation of

ecosystem services, etc. Others, considered relevant as part of solutions to regional problems, included a simple wastewater treatment system, ICT applications to irrigation management, the underground taming of floods for irrigation and a methodology for determining the carbon and water footprint of agriculture. The targets set for technologies/practices addressing specific gender goals were not reached in 2013, although there was an improvement in 2014.

Finally, each year, there were about 12 activities devoted to developing new solutions, which have reached a third phase (release by public or private sector partners). Examples include the solar power for pumping concept in India and the production of biofertilizers in Ethiopia and Uganda. These results are derived from projects that pre-date the formulation of WLE, including CPWF.

5.1.2.4 Policies in Various Stages of Development

In 2013 and 2014, WLE analysed more than 250 policies mainly dealing with NRM and water in particular, in the Mekong region and in many other areas in Asia, Africa and South America. The Evaluation Team is of the opinion that policy analysis is a normal part of the research projects and is not necessarily indicative of specific plans to influence the policies in question. Nonetheless, there are a few notable successes of influencing policies that are in more advanced stages of development, and that have yielded tangible results (see section below).

For most activities, the production rate of WLE increased significantly from 2013 to 2014, indicating more effective mechanisms for delivering results. Regarding timeliness of delivery, with the exception of FS1 which cannot be expected to have measurable outputs at this time, all other flagships and the DAI core theme have been delivering their outputs on time with an overall delivery rate of 84 percent in 2014. Specifically, the status of output delivery per flagship in 2014 is shown in Table 5-1 below.

Table 5-1: Status of Output Delivery for 2014

	Number. of Planned Outputs	Delivered	Delayed/Cancelled	Not reported
Flagship 2	168	82%	16%	2%
Flagship 3	171	79%	18%	3%
Flagship 4	35	87% (+8 partially delivered)	5%	
Flagship 5	218	87%	13%	
DAI	52	88%	12%	

The variation in timeliness of outputs delivery among flagships is small and overall WLE is meeting most of its output delivery targets. Discussions with WLE managers and a range of project leaders suggest that the rate of output delivery in 2015 is likely to stay on track. The targets were generally found by the Evaluation Team to be adequate for the achievement of progress in all research activities undertaken by WLE.

5.1.3 Progress towards Outcomes

The following paragraphs highlight progress towards outcomes for the different flagships and themes (except for FS1 which is still too new for assessment of outcomes). Box 5-1 provides examples of some outcomes from CPWF, which have relevance for WLE.

Box 5-1: Some CPWF Outcomes as a Legacy to WLE

CPWF catalysed emerging communities of practice in its basin programs, focussed on the approach of integrating science-informed research results into processes aimed at impact delivery. Research conducted by CPWF in the Mekong river basin has contributed to the development of policies aimed at more equitable distribution of the costs and benefits of hydropower development. It has also aided in the improvement of the management and operation of dams to prevent flood risks and to foster multiple uses of water without affecting hydropower generation. In the Nile basin, the use of modelling techniques assisted in delineating the downstream consequences of upstream decisions, and participatory research on rainfed systems in Ethiopia has contributed to improving its productivity. In the Ganges river basin, innovation platforms for the sustainable intensification of rice-based crop-fish-livestock agroecosystems have been introduced for uptake by regional and local authorities. Finally, in the Volta river basin, authorities have used knowledge and recommendations developed in CPWF to foster integrated water management at the catchment level, and work on small reservoirs and small scale irrigation has been scaled out to sites in several countries.

Research by CPWF in basins outside the current WLE focal regions has produced outcomes that also contribute to the knowledge base of WLE. In the Andes of South America, research in a number of small river basins has led to the resolution of conflicts between upstream and downstream users assisted by decision support tools and through dialogue. In the Limpopo basin in Africa, the development of market value chains has provided farmers with new opportunities to improve their livelihoods. This brief list of positive outcomes by CPWF, including projects mapped into WLE, illustrates the rich resource of achievements upon which WLE could build and profit from continuity that is essential for measurable impacts on the management of land and water.

Sources: CPWF annual reports and Harrington, L. & Fisher, M. 2014. **Water Scarcity, Livelihoods and Food Security**. Routledge, 264 p.

5.1.3.1 Flagship 2: Sustainably Increasing Land and Water Productivity

FS2 is a very diverse flagship and has shown significant advances towards outcomes often based on long-term WLE (and CPWF; see Box 5-1) research and dialogue efforts, to facilitate policy changes, frequently with respect to farmer access to groundwater resources. Notable are the current WLE activities under the IWMI-TATA program in India, which started in 2001 and has a trajectory of delivering relevant development outcomes, as it has directly influenced policy decisions involving USD2.5 billion of public investments. Representative outcomes in the area of **policy** under FS2 are:

- Contribution to the expansion of groundwater use in West Bengal, India, as indicated by more than 140,000 new electric connections for wells which improved the reliability of irrigation on 250,000 hectares for approximately 1.3 million users (mostly smallholders).
- Promotion of solar energy for pumping irrigation water in the state of Karnataka, India, is progressing well as a pilot program and holds significant promise as a development outcome that may be scaled out to other regions and countries in Asia and Africa (see Box 5-2).
- Contribution to the formulation of national policies for hydropower development in Lao PDR, specifically in the areas of resettlement and in the assessment and mitigation of environmental damage.

In the area of irrigation management, representative examples of valuable outcomes are:

- Improving irrigation benchmarking indicators in the state of Maharashtra in India where more than 1,000 irrigation systems have been benchmarked and are benefitting from the use of improved indicators.
- Research on public irrigation networks is assisting the government of Pakistan to formulate strategies and rules on new volumetric and billing measures that may aid in collecting badly needed revenues for adequate network maintenance.
- In the domain of smallholder irrigation, solutions developed in past IWMI projects (the AgWater Solutions project and others) are being actively promoted by the governments of Tanzania and Ethiopia through policy and investment actions with the participation of WLE.

Box 5-2: Solar Powered Pumps in India: Irrigation Assets or Environmental Threats

In India, solar-powered pumps are being promoted as a technology that has the potential to: increase the area under irrigation; enhance the livelihoods of farmers; and reduce the load groundwater pumping places on overburdened electricity boards and companies. Despite the fact that the costs of solar pump systems are falling, subsidies are available from central and state governments. For example, Rajasthan's state government provides a 56 percent subsidy under Rashtriya Krishi Vikas Yojana and central government provides a 30 percent subsidy via the Ministry of New and Renewable Energy's Jawaharlal Nehru National Solar Mission. This reduces the farmer cost of a solar pump system from about USD6,000-7,000 to only USD850-950. While these policies are commendable in making green energy irrigation available to relatively poorer farmers, there are potential trade-offs particularly in areas of India with increasing water scarcity. The IWMI-Tata Water Policy Programme (ITWPP) which started in 2002, recognised that the rapid increase in the use of solar pumps might exacerbate the problem of groundwater decline. The ITWPP established the SPaRC (Solar Power as a Remunerative Crop) initiative to offer farmers a guaranteed buy-back of the surplus power that they produce thereby providing them with an additional source of income that is not linked to increased groundwater use. A key attribute of SPaRC is the attention that is being given to maximising benefits of solar energy while minimising potential tradeoffs. SPaRC was established by IWMI as part of the WLE programme in 2013. It is managed by the ITWPP and supported by Tata Trusts. The CCAFS CRP programme has pledged additional support for scaling the existing pilot(s). In terms of future impact, the ITWPP estimates that around 11 million farmers in India currently connected to the electricity grid could, in principle, install solar-powered pumps and the sell surplus energy they produce. However, the ITWPP recognises that widespread adoption of this approach will depend upon multiple factors that include the commitment of local electricity companies.

Main Source: <http://www.iwmi.cgiar.org/2015/06/payday-for-indias-first-ever-sunshine-farmer/>

5.1.3.2 Flagship 3: Regenerating Degraded Agricultural Ecosystems

Many FS3 projects started only in 2013 and 2014 and it is too early to identify outcomes in two of the three clusters in the flagship. Research focused on the restoration of degraded lands has brought in a broad range of stakeholders, including farmers and private corporations and has used interested farmers' groups as the main uptake pathway. Outcomes in the cluster on landscape restoration interventions include:

- WLE contributions to the launching of the Nairobi Water Fund as an instrument of the Kenya Water Authority. In a visit to Kenya, the Evaluation Team observed that this is resulting in improved watershed management and changes to land management practices such as the implementation of terracing and drip irrigation on smallholder farms in the Tana Basin.

- In Ethiopia WLE is working closely with Ethiopian government agencies and NGOs and pilot work in one watershed that has shown considerable potential for wide replication across other catchments in Ethiopia's highlands.
- WLE researchers from Bioversity have promoted the use of fruit trees for restoration of degraded lands in a region subjected to significant salinization and soil erosion. A Bioversity researcher indicated that now 50 new fruit tree nurseries are producing more than 1.5 million seedlings of different fruit tree species. This is an area that has great potential for expansion in Central Asia, given its richness in fruit tree diversity.

Finally, some research projects have not generated outcomes at scale yet but seems to be promising. Bioversity established a community seed bank in Uganda in an effort to maintain genetic diversity in local bean production. WLE researchers have helped to make the seed bank a successful business, and in the initial site the bank now is providing 30 percent of the seeds that were originally provided by local markets. It presently benefits 220 households in 32 villages³⁷ which WLE researchers consider to be still at the pilot stages. The pilot project shows that the seed bank business model is sustainable when managed by the local community and women are active partners in the activity, both as seed managers and users. The Evaluation Team is of the opinion that the piloted model is a good candidate for scaling up to other locations within the focal region.

5.1.3.3 Flagship 4: Recovering and Reusing Resources in Urbanized Ecosystems

FS4 has had positive outcomes in developing new business opportunities in the area of water, nutrient and energy recovery, with current activities in the RRR field building on a sustained effort originally developed under CPWF and continued by IWMI until the activities were mapped into WLE. Significant progress towards outcomes is definable in a number of areas. The focus of RRR on economic analysis and the development of business models for resource recovery and reuse are regarded as innovative and of an international standard in global wastewater research and development. It is an approach that is attracting interest from the World Bank, the EU, the Government of India and others and should lead to significant outcomes in terms of long-term uptake pathways.

Some of the most notable examples of outcomes in RRR are:

- Four public-private partnerships are being established in Ghana for recycling human waste into fertilizer pellets.
- The Madhya Pradesh government in India is developing a program for resource recovery from sludge in small rural towns with the assistance of WLE researchers. A similar program was to be launched in 2015 in Tamil Nadu.
- In Sri Lanka, WLE assisted the government to revise the national sanitation policy which at the time of the Evaluation was being considered in the parliament.

On the issues related to waste water reuse, FS4 has contributed its research results to global databases such as AQUASTAT of FAO. WLE was invited by WHO and UNEP to contribute to expert consultations on water quality management and fecal and wastewater management which have led to new SDG targets.

³⁷ CGIAR Research Program on Water, Land and Ecosystems: Annual Report 2014

5.1.3.4 Flagship 5: Managing Resource Variability and Competing Uses

FS5 has three clusters that are using results to produce some notable outcomes, as highlighted below:

Managing water variability:

- Tools and models for mapping flood risks are being used by the government of Sri Lanka, and in several international initiatives, including a regional UN support office for emergency responses and disaster management.
- Planning tools for the comprehensive assessment of physical, sociological, and ecological issues in water infrastructure development processes are being used in Nepal for hydropower development in the Koshi Basin.
- An innovative approach has been developed for capturing excess rainfall in groundwater for flood control, with funds committed for the implementation of pilot solutions in Uttar Pradesh in India,

Resource allocation and sharing of benefits for all:

- WLE researchers have been active participants in the definition of new indicators and targets for the SDG, specifically those related to water use efficiency and sustainable ecosystems, and on quantifying sustainable water withdrawals.
- Experimental games for strengthening collective action have been tried successfully in South America and South Asia to assist with the governance of contested surface and groundwater resources. In a visit to the focal region, the Evaluation Team found that in India three organizations have used the games in 50 communities reaching more than 5,000 people.

Water, food and energy nexus:

The water, food and energy nexus approach of the third cluster has been successfully promoted by WLE in water development issues in the Mekong river basin and in Central Asia. (See Box 5-3). Specifically:

- Successful participation in conflict resolution in the Mekong focal region in areas related to hydropower generation and fisheries. For example, WLE has uncovered potential negative environmental impacts of large infrastructure to be built in Cambodia and are cooperating with the government in finding solutions to the problem.
- WLE has promoted the creation of irrigation water users associations to empower water users in several countries of Central Asia.
- WLE researchers have co-authored publications on important global assessments such as a global map of pollution or the analysis of past and present predictions of global irrigation water use and on water scarcity.

Box 5-3: WLE in the Greater Mekong: the Naga House in LAO PDR

Over the last two decades, the waters of the Greater Mekong are being developed at an increasing rate. An important goal there is to balance in an equitable fashion the costs and benefits related to water, food, energy and environment in order to achieve the sustainable development of the region. WLE has built a successful program based on the accomplishments of CPWF which provided the needed continuity critical in the development of these outcomes so early in the WLE period. The program gets robust leadership and is enthusiastically run from the WLE regional office in Vientiane (the Naga House). Research activities are diverse and are mapped in FS5 and FS2, but are now increasingly focused on improving the livelihoods and the ecological benefits derived from reservoirs and their catchments without impairing the economic and social gains of development.

The Evaluation team reviewed the activities on site and interviewed independently an extensive number of partners, including NGO's, local universities, IWMI scientists, private sector, and government officials. There was an overwhelming positive view of the role that WLE (and CPWF in the past) has played and continue to play in the improvement of the governance and management of the water resources of the region. The Evaluation team found that WLE plays an important role as a facilitator of a much needed dialogue among the different sectors of society. WLE conducts relevant research and, at the same time, disseminates results and practices related to integrated water management that are useful to its many stakeholders. The team gathered evidence of outcomes of WLE activities regarding the influence WLE has had in the recent formulation of policies for hydropower development at national level, as described above. NGO's and the private sector valued the role of WLE in bringing the water development dialogue to a much more productive state. Local universities pointed out at capacity enhancement as an important benefit of their interactions with WLE. The interview with a main donor also captured a positive perception of the program accomplishments and of its future trajectory, including the new projects under FS1. WLE continuing support of this long-term effort based on the Naga House is highly desirable.

5.1.3.5 Core Theme on Decision Analysis and Information Systems

Under the DAI core theme, the Habaswein-Wajir water supply project in Northern Kenya used a stochastic impact evaluation model developed by DAI to successfully uncover hidden risks in the development plans and this led to changes in future plans of the government of Kenya. ICRAF will be providing advice on decision analysis to the local authorities in Bungoma, Kenya on a pilot basis which may be extended to other counties.

Ten countries in Africa are now receiving assistance on the use of soil and plant spectral diagnostic tools to characterize soil fertility and crop plant mineral nutrition through the Africa Soil Information Service Soil-Plant Spectral Diagnostics Lab, and plans for further expansion have been funded. These new tools should facilitate greatly the formulation of fertilizer recommendations at the local level. Further, a request has been received from the government of India to assist in the development of a soil spectroscopy program.

DAI has participated in the formulation of several targets related to water and food security of the SDG and has extended the use of the water accounting framework to many agencies inside (e.g. the Nile Basin) and outside WLE focal regions, such as the Arab Water Council, the Asian Development Bank via UNESCO-IHE, FAO, and others.

5.1.3.6 Core Theme on Gender, Institutions and Poverty

GPI does not have a dedicated research budget and most of its research has been carried out through the flagships and focal regions. A few gender-responsive outcomes have emerged. For example,

research in Nepal highlighted the importance of irrigation scheduling for access to water by women, particularly if irrigation is done at night when women often are not able to go out to the fields. Value-chain work influenced the African Ministers' Council on Water (AMCOW) to adopt a policy and strategy for mainstreaming gender in the water sector in Africa. Work with Adivasi women dairy farmers, showed that those with access to minimal supplemental irrigation were able to maintain significantly larger herds of more productive milk animals.

5.2 Impacts

5.2.1 Evidence of Impacts of Research Related to WLE

The Evaluation Team looked for evidence of impacts from different parts of the program. A report was provided by WLE management in response to a specific request from the team³⁸. However, the information in this report focused mainly on early outcomes, with a few reported incipient impacts in a number of research areas. The report also included methods developed, data collected, and awareness raised which may contribute to impacts in the future but cannot be considered as such at this stage. The team analysed and validated the different items listed and, where possible, triangulated with information from interviews, other documents, including the WLE annual reports, field visits and other sources of evidence to assess the robustness of the information provided.

Following are representative WLE research activities that were identified as having led to impacts:

- The business model approach on resource recovery and reuse in Ghana, including a plant in Accra/Tema for fecal sludge compost pellets that will produce 500 tons of waste-based fertilizers a year.
- The rehabilitation of degraded landscapes in the Ethiopian Highlands through integrated watershed management in the Yewol watershed, leading to improved productivity, crop diversification, improved downstream water availability and strengthened livelihoods for an estimated 15,000 beneficiaries. The ICRISAT initiative was considered by the local government as a show case, and the approach has been institutionalized by the local government.
- Development of the Upper Tana Nairobi Water Fund, with the active involvement of NGOs, farmer organizations, the Nairobi Water Company, and the Water Resources Management Agency of Kenya for the identification and assessment of watershed management investments.
- Integrated watershed management in the Kothapaly village in India, with interventions that have resulted in an increase in water availability and in income and employment opportunities for a population of 1,492 semi-subsistence farmers.

5.2.2 Results from Impact Assessment Studies

Assessing research outputs is straightforward relative to the significant challenges present in the assessment of research impacts in agricultural systems, including the impacts of WLE. First is the issue of attribution: where changes can be measured, how much of it is due to the specific research? And within research, how much should it be attributed to its different components? (e.g., genetic improvement vs. NRM). Furthermore, in complex systems there generally is no one-directional cause-effect relationship that attributes a change to a specific intervention, as such systems constantly respond to a multitude of external and internal drivers. There are also externalities, unintended costs

³⁸ Submission to IEA Evaluation of WLE: narrative report of claims of impacts from past research related to WLE, 11th September 2015.

or benefits, for example changes to ecosystem services such as carbon sequestration, that are not planned or measured during the research but are a consequence of changes to the systems in question.

These challenges are particularly relevant to a program such as WLE, which is focused on large and complex systems. Early studies on the impact of agricultural research showed outstanding returns which were routinely attributed to the adoption of improved germplasm by farmers as part of the Green Revolution. Efforts to assess the impact of NRM research in the CGIAR are recent compared to the considerable work and methodologies developed for assessing the impact of genetic improvement. A review on the impacts of CGIAR research³⁹ conducted in 2010 clearly showed substantial rates of return on the investments made on genetic improvement, but lower ones from some other research areas, including NRM. The authors pointed to the problems of quantifying impacts of NRM research, and recommended that the CGIAR should prioritize studies to document the impact of its NRM and policy research, including the development of specific methodologies for that purpose.

A study commissioned by the ISPC, on impact assessment of irrigation and water management research⁴⁰, was conducted by Merrey in 2015. Although one of its major conclusions is that the CGIAR has seriously under-invested in both *ex-ante* and *ex-post* economic, social and environmental impact assessments on irrigation and water management, the report contains evidence of impacts of research programs that were carried out before WLE.

The Merrey study reviewed impact assessments (IAs) of water-related research conducted at CGIAR centers since 1991. A total of 32 studies were reviewed, but only 14 were considered to be specifically on water management and examined in detail. The long timeframe commonly used to measure impact of NRM research implies not only that impacts of WLE research cannot yet be evaluated, but that even *ex-post* IA studies of CPWF are lacking, supporting the view that there is a dearth of IA studies in WLE's scientific domain. Among the 14 studies that are related to WLE, only a few had clearly documented impacts, while the majority were not comprehensive and did not effectively cover important components of IA such as environmental, social and policy issues.

The study identified the IA studies on zero tillage in India, on alternate wetting and drying, and on aerobic rice as meeting most of IA requirements. They all had significant positive impacts; for example, in the case of aerobic rice, which was a program partly funded by CPWF, a rate of return of 11:1 was estimated. Overall, however, while there were indications of some positive impacts, there were so many weaknesses in the IA studies examined that it was quite difficult to assess the economic, social and environmental returns of the research that preceded WLE.

5.3 Conclusions and Recommendations

The overall assessment of effectiveness in WLE indicates that the program has been successful in producing a significant number of relevant outputs across a large portfolio of projects, which mostly have been delivered according to plans and in a timely manner. This has been achieved despite the diversity and geographical spread of the portfolio and the challenging context in which WLE has been implemented.

³⁹ Renkow, M. and Byerlee, D. 2010. The impacts of CGIAR research: A review of recent evidence. *Food Policy*, 35: 391-402.

⁴⁰ Merrey, D.J. 2015. An Evaluation of CGIAR Centers' Impact Assessment Work on Irrigation and Water Management Research. Rome, Italy, Standing Panel on Impact Assessment (SPIA), CGIAR Independent Science and Partnership Council (ISPC). 83 pp.

Balanced against this are the constraints imposed by the lack of methodologies in use for measuring progress, and by the limited extent to which project-level outputs and outcomes are being aggregated and synthesized to be converted into knowledge goods that directly inform discourses on the management of water, land and ecosystems to sustainably improve productivity and enhance livelihoods. Project-level results have not been assessed at the higher levels, or compared across the program, and there has been little attempt to provide systematic support to the analysis of change. At the program level, there has been no discussion or analysis of how such changes can be stimulated. In a number of cases, there seems to be an implicit understanding that the working model follows a 'knowledge deficit' approach based on two assumptions: i) that change to agricultural practices and ecosystems management can be accomplished simply by changes in policies; and ii) that policy processes respond in a rational and linear manner to the provision of evidence on the efficacy of alternative production and management options. The Evaluation Team believes that such an approach limits the effectiveness of delivery of important results from WLE research.

WLE is producing outcomes at the regional and global levels that contribute effectively to the sustainable management of land, water, and ecosystems. The advances through the IWMI-Tata program in water policy in the Ganges river basin is an outstanding example of successful conversion of research outputs into outcomes, and where new concepts of using groundwater sustainably are being introduced. Some relevant achievements have occurred in the Mekong region where a community of practice of sustainable hydropower development has been established encompassing five countries. The uptake of business models for wastewater treatment and waste recycling in rural areas of Ghana and other countries clearly shows the positive impact of well-focused research. The use of the water, food and energy nexus has been useful for positive dialogue at several scales including the global level, and, finally, the use of soil spectroscopy methods in many African countries has created a promising network on which outreach efforts on soil fertility and plant nutrition could be based.

Overall WLE is effective in the production of outputs and, as far as it can be assessed at this stage, outcomes at the project and, in some cases, cluster level. However it is far less effective in translating this into program-level outputs and outcomes that will lead directly to the realization of the program's goals and objectives. Despite the recognition that WLE is still a young program, this is a key conclusion of the Evaluation and one that needs to be addressed in the future development of WLE. The Evaluation Team believes that there is still time to do this with some prioritization of resources and capacities, by identifying the areas with the highest potential for delivery, and developing the structures to achieve it. However, this will not happen without a clear strategy that in turn flows from a more effective theory of change.

With respect to effectiveness, the Evaluation Team makes the following recommendation:

Recommendation 7. Impact Assessment

The Evaluation Team recommends that WLE should make strategic investment in impact assessment, taking into account available resources. Specific actions should include the following:

- Undertaking of new impact assessment studies, as previously recommended by Merrey (2015), starting with the Comprehensive Assessment of water management in agriculture of the CPWF and including the IWMI-TATA water policy program in India which is still ongoing in WLE. Also to be included in the priority list is the Ag-Water Solutions project which is one of the foundations of WLE's on-going efforts in the area of smallholder irrigation in Africa.
- Definition of a plan of impact assessments, based on key criteria including scale of intervention, degree of innovation, strategic importance to the flagship or region, availability of baseline data,

impact assessment capacity of key researchers and partners, and duration of commitment from partners.

- Inclusion in the plan of meta-syntheses that assess outcomes across projects to provide an understanding of the effectiveness (or otherwise) of different approaches to addressing key development themes within the program

6. Partnerships, Capacity Development and Gender

6.1 Introduction

This chapter discusses the approach to and achievements of three cross-cutting topics within WLE: partnerships, capacity development and gender. They are central to WLE, and each was expected to develop a specific strategy to provide a unified approach within the program. There are some specific activities related to each cross-cutting topic, but the Evaluation Team’s main assessment is based on the extent to which they are integrated into and influence the development of the full portfolio of projects across all flagships and, where relevant, core themes. The assessment below draws on document review, interviews with a wide range of stakeholders at all levels, written submissions by projects, and the survey of WLE researchers.

6.2 Partnerships

Partnerships are a key component of WLE’s work, and their importance will continue to grow as the program develops with the piloting of technologies, processes, frameworks and models that can be brought up to scale. Partnership approaches are used at all stages of WLE’s impact pathway, from setting the agenda, to generating evidence, engaging multiple sectors to contribute to and influence decision-making, and shifting mind-sets in how people view agricultural development and the environment. Many of WLE’s long-standing relationships began in the context of the CPWF or even earlier, while others were formed more recently to work specifically with WLE.

6.2.1 WLE’s Partnership Strategy

The program’s partnership strategy, completed in February 2015, defines five types of partners including: i) core partners, consisting of 11 CGIAR centers and FAO; ii) research partners including national, regional and international research organizations; iii) enabling and leverage partners to provide entry points to decision-makers; iv) investment partners, including public and private entities and users of research; and v) capacity strengthening partners that can enhance the capacity of potential research users to improve development decisions.

Table 6-1: WLE Partnerships Categories

Partner Category	Number of Partners
Core Partners	12
Research Partners	204
Enabling and Leverage (Uptake) Partners	54
Investment Partners	10
Capacity Development Partners	177
Total	457

The partnership strategy emphasizes the importance of building strong partnership processes in the four focal regions and one of the tasks of the regional coordinators is to foster partnerships at both national and regional levels. This is seen as a key to the development of uptake pathways in the focal regions.

Table 6-1 provides information on the numbers of partners claimed by WLE at the time of the Evaluation. It is noteworthy that 44 percent (204 of 457) are research partners and 83 percent (381 of the 457 partners) are engaged in research and capacity development.

The Evaluation Team collected different forms of evidence through contacts with almost 80 partners in the four focal regions. The team also received 34 written submissions from FS1 projects in which partnerships were discussed. Overall, partners had a very positive opinion about the effectiveness and utility of their WLE partnership experience.

6.2.2 Evaluation of WLE Partnerships

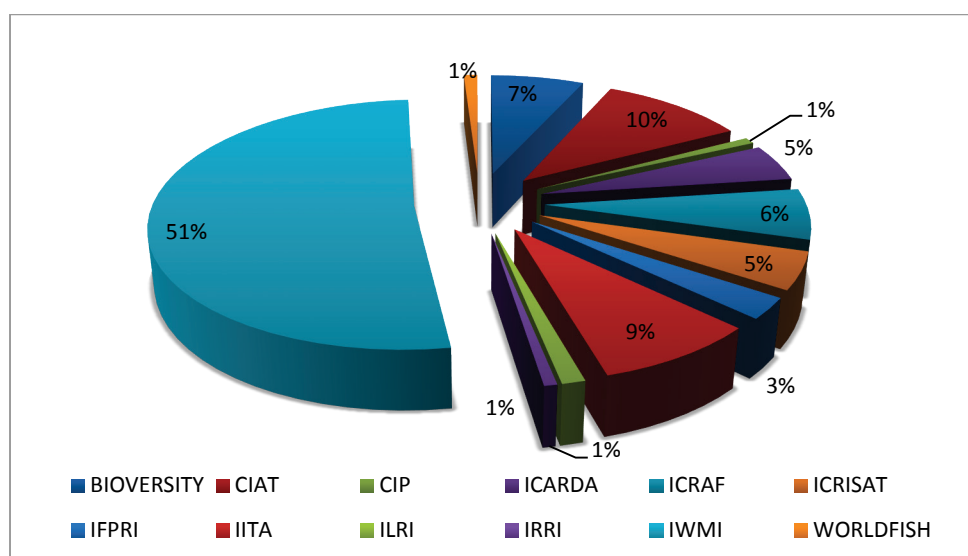
i) Core Partnerships

Core partners, which include CGIAR centers and FAO, are responsible for program design, management, implementation and monitoring, evaluation and learning from program performance.

CGIAR Centers

WLE has been very successful in attracting a broad spectrum of CGIAR centers to participate in its program. Overall the program has 11 CGIAR partners, including IWMI. This suggests that the work done by WLE is consistent with the interests and expertise of most of the CGIAR system and in fact, only three other CRPs appear to have such a high level of participation from across the system. However, as is seen in Figure 6- 1 below, IWMI as the lead center, has spent more than half of the program funding (see Chapter 3). All other CGIAR partners have spent 10 percent or less.

Figure 6- 1: Expenditures by Center (2012-14)



Interviews suggested that the cross-center partnerships work reasonably well, one contributing factor being the relative inclusiveness of WLE's MC. CGIAR Centers with a significant stake in the program are members of the MC. However, there is room for improvement. It was noted that the transaction costs involved in participating in any CRP are high unless a partner center is allocated a substantial proportion of funds. Some said that the focal basin/region/corridor approach does not work equally well for all and others thought that their areas of technical focus were not given sufficient importance in the WLE framework.

FAO

FAO is WLE's only non-CGIAR core partner. Given FAO's strong global and in-country presence in WLE focus areas and the complementary nature with WLE of its development activities, it was given a prominent role in the design of WLE. FAO is represented on the WLE SC, and has participated in many joint initiatives. Within a general framework of improved FAO-CGIAR relations, some positive outcomes have emerged from FAO's participation in WLE, such as, for example, collaboration on a recent ICARDA publication about conservation agriculture in the Middle East. One advantage of the partnership is that the mandates of the two entities are somewhat complementary. While FAO has direct access to governments and national agriculture systems at the highest levels, WLE brings a strong research focus and track record as well as a capacity to act quickly to take advantage of new opportunities as they arise. It should be noted, however, that their mandates are not totally binary. FAO has undertaken many studies over the years in critical areas such as land tenure, forestry, water, fisheries, etc. Therefore it brings a solid base of technical knowledge to the relationship with WLE. Nonetheless, there are important differences in approach and strategy. This is particularly true with respect to the ESR framework which sometimes is in conflict with other frameworks being used and promoted to national governments by FAO.

Most WLE-FAO interactions have been between IWMI and the Land and Water Division (NRL) of FAO. Here, the perceptions are more mixed. FAO-NRL has undertaken joint workshops and seminars with WLE but at the time of the Evaluation little collaborative work had been done on the ground, from research to implementation. CGIAR has traditionally viewed FAO as a donor, and this perception has created some tensions in the relationship. In actual fact, FAO had funding expectations from WLE that have not materialized. The failure of an NRL-led proposal to obtain funding through WLE's Innovation Fund was seen as further evidence of the difficulty of obtaining financial support for joint activities in the field. A new opportunity has emerged recently with a joint project, funded by IFAD, in which the two partners are working together on smallholder irrigation in several African countries. This suggests that collaboration between FAO and WLE is improving, and it may lead to further joint activities.

ii) Research Partnerships

WLE's research-based partnerships include international research organizations that are global leaders on ecosystem services mapping, assessment and valuation such as Stockholm Resilience Centre, Stanford University, CIRAD, Kings College and The Natural Capital Project. Wageningen University (WUR) in the Netherlands is a key partner both in terms of intellectual input and as a conduit for funding provided by the Netherlands. For example, WLE has worked with WUR and UNESCO-IHE to build synergies and design innovative research and partnerships for gender and ecosystems. A December 2014 workshop in WUR looked at the issue of masculinities in water, and resulted in both a special journal issue and the identification of a series of research questions. In addition, UNESCO-IHE is playing a major role in the focal regions with an emphasis on gender in the Ganges.

In some focal regions, such as the Mekong (See Box 5-3) and the Niger/Volta basins, there is substantial collaboration with local research partners that have a solid rapport with stakeholders, institutional memory of earlier research, and are well placed to act as project facilitators, intermediaries and knowledge brokers. However, further work must be done to identify and cultivate local research partners in other areas. For example, no project leaders and few partners are located in the Indian part of the Ganges basin, which hosts important WLE programs. Recognition of the WLE brand was generally low in India, even when partners and stakeholders were aware of and appreciative of projects in which WLE was a participant. This was also true in the Nile basin where the CIAT or IWMI names often were recognized but WLE was not (given the relatively short lifespan of the WLE program, this lack of visibility was not surprising). Overall, in the Nile basin there is an acceptable level of

collaboration with local partners. Partnerships with local universities and other institutions are also numerous in the work carried out in Central and South America and in African countries outside the Volta focal region.

iii) Enabling and Leveraging Partnerships

WLE's enabling partners provide entry points to decision makers. For instance, WLE works with regional and national agencies, e.g. Nile Basin Initiative (NBI), the Volta Basin Authority (VBA), Southern African Development Community (SADC), the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) and the Mekong River Commission. Working through such partners, WLE has had influence on policy in different regions (as discussed in chapter 5). For example, local partners were able to use their experience to influence the Uganda National Seed Policy. In Cambodia, a partnership on data collection and analysis was forged with the Ministry of Water Resources and Meteorology. In Sri Lanka, researchers found significant potential in groundwater-driven high value cropping to alleviate poverty in the country's dry zones and the government asked WLE to scale out the research and to replicate an adapted version of the methodology in other regions. In Maharashtra, India, work was initiated at the request of the government to strengthen irrigation benchmark indicators. This demand-led process is providing an opportunity to extend the existing suite of indicators from traditional metrics to include those that integrate gender equity and agro-ecosystem considerations.

iv) Investment Partnerships

WLE works directly with users of research including donors, development organizations and government ministries and the private sector. For example, in many African countries, the program is working with government agencies on different agricultural water management solutions. In India, WLE was asked to assist in drafting the irrigation component for the Twelfth Five Year Plan (2012-2017) and is influencing the next five-year plan.

Efforts also have been made to create partnerships with the private sector. The RRR flagship works specifically with entrepreneurs, public-private partnerships, business schools, investment banks and the private sector as next-step users of research outputs. So far, donors have pledged USD 4 million to test RRR business models, including a public-private partnership model to turn fecal sludge into fertilizer pellets that started in Accra in 2013. Similarly, WLE is working closely with hydropower companies in the Mekong.

Additionally, WLE has other private sector partnerships. ICRISAT and IWMI received support from the Tata group, Coca-Cola India Foundation, JSW Foundation, Jain Irrigation Systems Limited and SABMiller to enhance resource-use efficiency and incomes in dryland areas. SABMiller is investing in natural capital accounting, which recognizes the important role of both ecosystem services and resilience in the sustainability of a value chain in a landscape. WLE also works with traditional large-scale companies such as Unilever and Nestle to incorporate sustainability into its operations. Finally WLE is working in multi-stakeholder platforms such as Tana Water Fund which bring together local NGOs, private sector and government agencies to improve benefit sharing arrangements.

v) Capacity Strengthening Partnerships

Achieving WLE's IDOs requires significant capacity strengthening of partners, enabling them to utilize the program's research in order to improve development decisions. In this work, WLE applies the CGIAR capacity development framework which begins with needs assessment, and includes nine elements. However, as is discussed in the capacity-building section below, WLE's capacity

strengthening efforts have been somewhat scattered and lack a coherent plan. The Evaluation Team is of the opinion that WLE needs additional partners in this area with global expertise in institutional reform and in the politics of moving from outputs to outcomes.

Table 6-2 below presents data on WLE researchers' perceptions of partnerships. For the most part they consider them to be highly positive. Partners are seen as most important in conducting project activities and in building research capacity. However they are regarded as somewhat less important in research prioritization, in analysing data and in interpreting results and publishing results.

Table 6-2: WLE Researchers' Perception of Partnerships

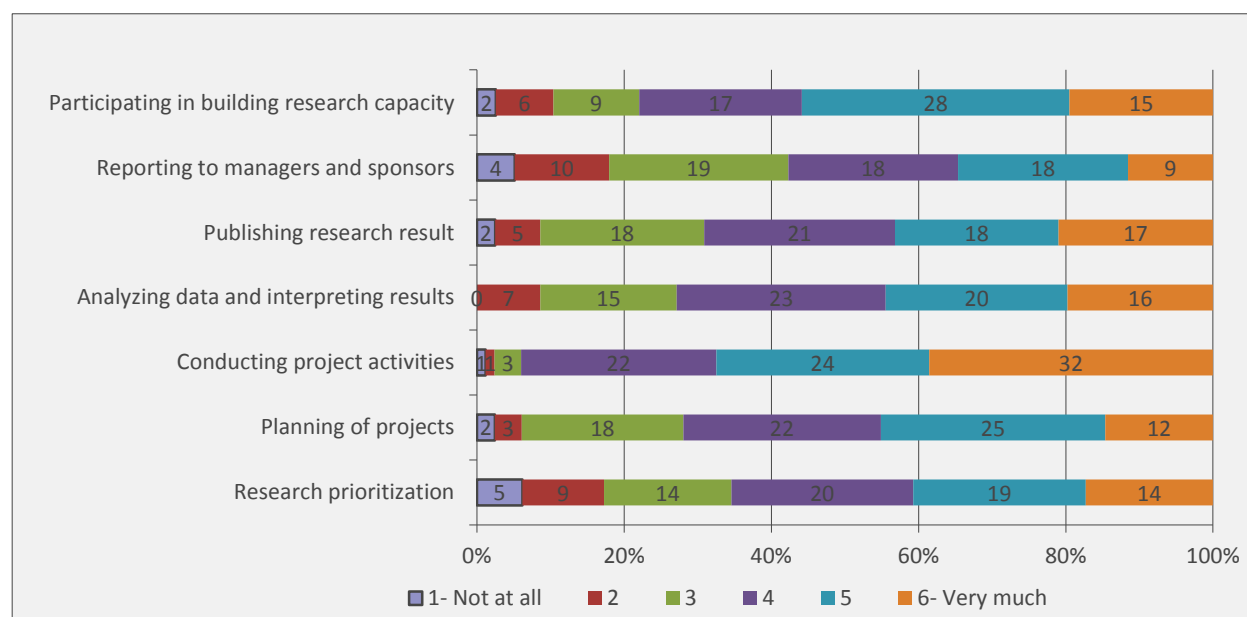
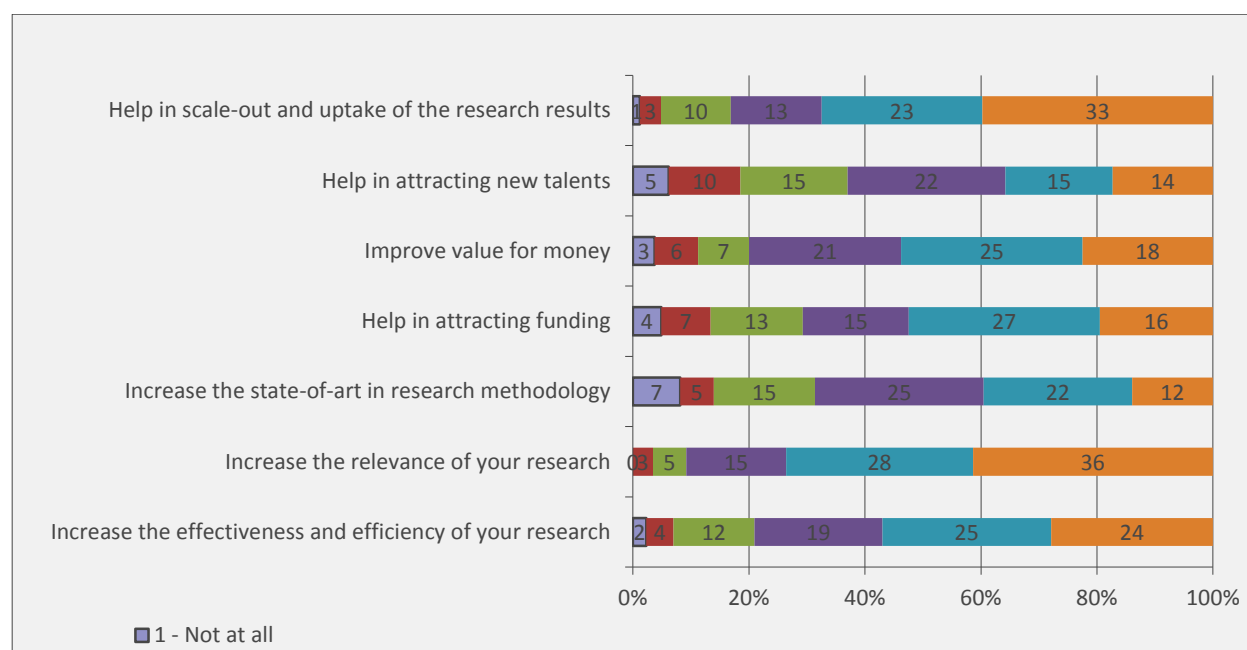


Table 6-3 is revealing of researchers' views of the effectiveness of partnerships. They see them as important vehicles for scaling out and up-taking research results, for increasing the relevance of research and for increasing the effectiveness and efficiency of research but less so for attracting new talent or developing state of the art methodologies.

Table 6-3: Researchers' Views on Partnership Effectiveness



6.2.3 Overall View of WLE's Partnerships Work

WLE's approach to partnerships continues to evolve in the direction of more active involvement of non-CGIAR partners. FS1 represents a departure from the program's standard approach to funding partnerships in that its 32 open call projects received a total of USD 16.562 million (including DFAT funding). Twenty-five of these projects are led by non-CGIAR organizations (72 percent of the total with an average budget of USD 0.479 million) and the remaining seven are led by CGIAR Centers (28 percent with an average budget USD 0.657 million). While some concern was expressed in interviews about the high level of funding going to non-CGIAR partners, the Evaluation Team saw merit in building strong partnerships through the F1 funding approach

Despite these ongoing innovations, WLE's partnership track record is mixed. On the positive side, the program has thought about its strategy and identified the specific types of partners that are required to achieve its objectives and goals. It has built on a large number of partnerships, many dating back to the CPWF days. It has been very successful in attracting private sector partners and also has had policy influence in different regions. On the other hand, the program has been less successful in working with national and local research institutions, and due to its budgetary fluctuations, has created some frustration with core partners, such as FAO, and with donors who have found that the program has not followed through with activities to which earlier commitments had been made. Various partners, including government and donor representatives were skeptical of the value of the ESR framework.

Finally, in the publications review in chapter 4, the Evaluation Team noted that only three of the 50 publications were authored by more than one CGIAR center. On the other hand, many were co-authored with non-CGIAR research institutions. This begs the question as to how much true collaboration is going on among Centers even within a CRP (vs with other CRPs on which we comment in chapter 4 and elsewhere).

6.3 Capacity Development

The CGIAR capacity development framework, developed in 2015, emphasizes the need to learn, innovate and adapt along impact pathways framed by theories of change⁴¹. The framework states that CRPs should move from individual learning to demonstrating livelihood outcomes and impact through relevant science and partnerships that facilitate research use by a wide range of stakeholders. It identifies nine key capacity development elements.

Although some of the nine elements are captured in WLE's original project document (2011) the CGIAR framework puts greater emphasis on institutional strengthening, organizational learning and gender mainstreaming. WLE stated that the program's "approach is to play a catalytic role in capacity building by working with local capacity-building institutions, designing and disseminating training materials in appropriate formats and, most importantly, leveraging investments in capacity building". The proposal identified four elements of a capacity-building strategy: i) learning through research for development; ii) learning alliances and partnerships; iii) technical skills, training and mentoring; and iv) institutional and organizational capacity. WLE's 2014 extension proposal did not include a specific section on capacity building but it is seen as an activity or objective in several areas of the proposed new structure of WLE.

The Evaluation Team identified several weaknesses in the WLE capacity-building approach. It does not provide a plan for capacity building nor does it talk about allocation of human resources and program funds for this purpose. It overlooks admittedly old but well-established approaches such as farmer field schools, participatory technology development, etc. These approaches are still used by FAO, and have proved effective at building capacity, adaptation, establishing local level ownership, etc. The WLE approach does not provide insights into how it will create "learning alliances", and during interviews the team was told that establishing and building the capacity of learning alliances, as well as facilitating their functioning, was outside the work of the program. WLE prefers to work with already-established alliances. Finally, the focus on "institutional reform processes" will be very difficult to achieve, particularly if the impact pathway involves only institutional and organizational capacity building.

6.3.1 WLE's Capacity Building Activities

Although there have been many capacity development activities in WLE, at the time of the Evaluation there was no overall capacity development strategy. The program has an online categorization of activities (including capacity development activities), and in 2015 WLE formed a small working group to review its strategy for capacity building. WLE's approach is intended to be flexible and rooted in project-level experiences, especially through learning from shared experiences in multi-stakeholder dialogues and partnership processes. Different elements of capacity development have been identified and there is flexibility for individual activities to select an approach that is appropriate for the context within which they are working and the needs expressed by uptake and other partners.

This approach has clear merits and has led to a large and diverse range of activities at the project level that demonstrate an effective use of resources. Many stakeholders interviewed by the Evaluation Team were positive about the approach and said that they had learned from their engagement with WLE. The perception that they had participated in defining capacity building needs and activities greatly increased the sense of ownership and relevance of many of these activities. This was especially true in the case of FS1 which is intended to build national and regional capacities in the four focal regions. However, in the Ganges basin it proved difficult to achieve in a context of declining budgets,

⁴¹(<https://library.cgiar.org/bitstream/handle/10947/3414/CGIAR%20Capacity%20Development%20Framework%20Working%20Draft.pdf?sequence=4>.)

project leaders and partners being located outside the basin, and/or with limited funds and time to spend with key stakeholders in the riparian countries. The situation in Niger/Volta potentially is better because there is a good district-level partner in Ghana.

In all the flagships, capacity development is seen as a specific objective of the partnership processes, and some partnerships are formed around capacity building activities. In many cases this is equated with the provision of new knowledge or access to new tools and sources of data, so that in essence capacity building is seen through the lens of a knowledge deficit approach to the process of change.

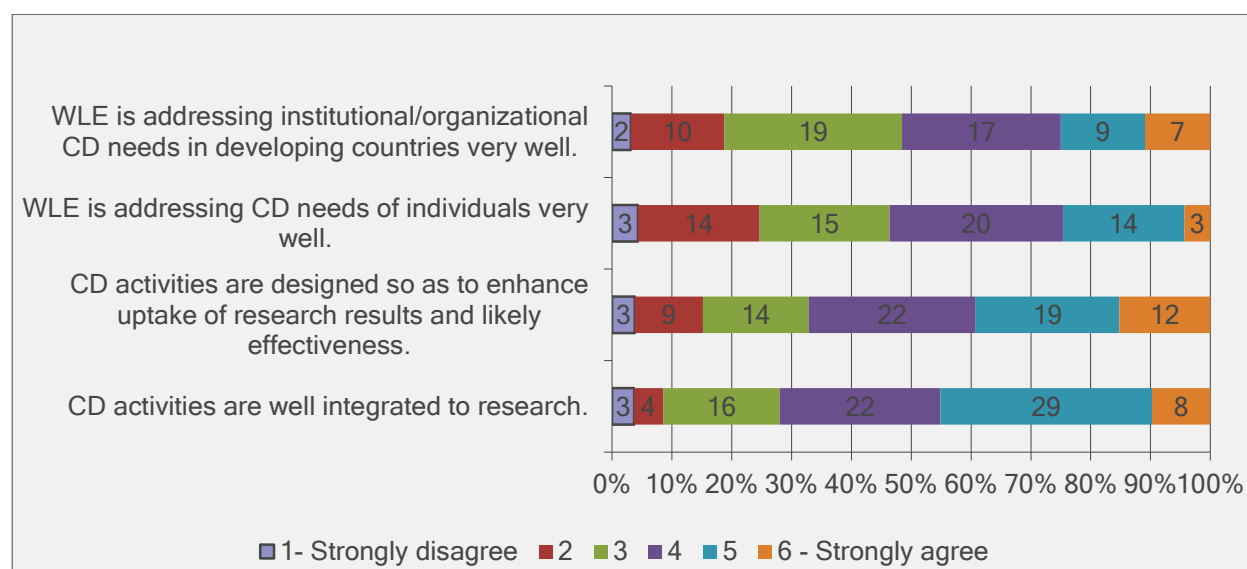
WLE provided short-term training to several thousand participants, increasing from 8,107 in 2013 to 14,287 (WLE Annual Report 2014). In addition, there were 197 long-term trainees (MSc and PhD students) in 2013 and 296 in 2014. The majority of these training activities took place at the project level with diverse focus and geographical location. The evaluation did not collect information on the duration, content and methods of training activities and therefore did not assess the effectiveness of these training activities beyond the numbers of participants.

There have been a few structured capacity building activities. In FS1, the projects funded under the open call in the Mekong include two fellowship programs for younger researchers on water governance, which follow on from a successful fellowship program under CPWF and are furthering the development of a community of practice on water governance issues. The process of proposal preparation in FS1 included four regional 'write-shops' in which proposal leaders were taken through a five day process to create a better understanding of core WLE approaches and improve their capacities to prepare research proposals. These write-shops were an important factor in the successful launch of open call projects in the focal regions. All participants interviewed by the Evaluation Team, including some who admitted to being initially sceptical, said that they benefited greatly from participating in the write-shops and that it also contributed to the development of synergies among the different research projects.

In some areas, as for example in the Nile focal region, capacity development has proved especially challenging. WLE personnel expressed a strong desire to engage with partners to develop capacity at the M.Sc. level – e.g. an M.Sc. program with thesis projects integrated into WLE projects – but it proved frustrating to implement because of limited existing capacity at the national research institutions and lack of donor interest. In a visit to the region, the Evaluation Team found there were post-graduate and post-doctoral students in evidence – participating in meetings and field tours – but in discussions with WLE researchers, the students were never featured as part of a conscious effort.

As seen in Table 6-4 below, most WLE researchers feel that the program is doing at least an adequate job in capacity development although almost all think there is room for improvement, especially in addressing the capacity building needs of individuals.

Table 6-4: Researcher Survey Results on Capacity Development



6.3.2 WLE's Capacity-Building Performance

The Evaluation Team is of the view that WLE's capacity building is not particularly "purposeful" and effectively directed at anything other than knowledge deficit at large. The program justifies its open-ended strategy as necessary for flexibility, but this approach requires some methods of identifying specific, high priority need for capacity development and some ways of demonstrating that WLE activities are meeting that need.

The overall picture on capacity development in WLE has parallels in other parts of the program: there is a diverse range of activities at the project level that are effective and appropriate to the specific context of the projects in which they are being implemented. This is a positive result, but these project-level activities are taking place in isolation with no overall program strategy and no process in place to draw generic lessons, including assessment of what types of capacity development are the most effective for achieving specific objectives for different categories of stakeholders. This is true at both overall program and, in most cases, at flagship levels.

In discussions with the Evaluation Team, WLE management acknowledged this shortcoming and explained how they are trying to address the situation. They have initiated a program-wide review of capacity development activities aimed at: i) assessing what was done, where and by whom; ii) using the analysis to enable planning and management of capacity development in WLE 2; and iii) identifying a few cases for showcasing capacity development under WLE. It is perhaps late in the program to initiate this review, but it is nonetheless important that it is being done, and it should provide a basis for the development of a more coherent program-wide approach to capacity development in the future. In fact, as the Team is finalizing this report, WLE is developing a strategy for Capacity Development in preparation of Phase II.

6.4 Gender within WLE

Since mid-2013 the main emphasis of WLE's gender work has been to promote gender responsiveness, ensuring that women and men both participate in and benefit from WLE activities. Although WLE's gender strategy emphasizes the need to work with both women and men, so far the primary focus has been on women. Within this context, there have been a number of important achievements.

6.4.1 Gender staff and resources

The core GPI team is small, encompassing a gender coordinator and two post-doctoral fellows. Each of the core WLE partners (mostly other CGIAR centers) has at least one person working on gender although often not full-time. By mid-2015, gender research officers had been hired for the four focal regions, but they report to the regional director and are not directly responsible to the gender coordinator (although she acts as second manager). Their presence in the field means that researchers receive local gender input and advice as needed. At the time of the Evaluation, the research officers were developing gender basin profiles and gender plans for each focal region, but these are being done on an ad hoc basis rather than following specific guidelines with the result that the quality is mixed.

Table 6-5: Gender Balance in WLE Management

Position	Male	Female	% Female
Flagship and core theme leaders	6	4	40
Regional leaders/ Region managers	7	1	12.5
Operations Team	2	6	75
Science Focal Points	9	3	25
Project Leaders	77	42	35
Steering Committee	8	3	27

The gender coordinator participates in WLE's MC and has a voice in strategic resource decisions. WLE has tried to ensure that women are present in all aspects of management, with mixed results (Table 6-5). Women have high representation in the Operations Team (OT) but are less present in regional leadership, as science focal points and on the steering committee. Of course, the participation of women does not in itself guarantee that gender equity will be an important issue for Program Management, but it is an important starting point.

WLE was one of the first CRPs to institute obligatory 10 percent gender budgeting across the program, and currently GPI is developing a system to track the gender budget in a transparent manner. Flagship leaders can decide with their teams whether all projects include a gender budget or whether 10 percent of the overall research budget should be allocated to gender. Based on interview data, early indications are that gender work in flagships that have chosen to allocate larger amounts of funding to a few projects is having a greater impact. Responses to the Evaluation survey suggest that in order to meet the 10 percent gender expenditure guidelines, some researchers have had to introduce gender components that they do not consider to be totally relevant to their work.

6.4.2 Gender research

In 2014, GPI developed a system with clear baselines, outputs and outcomes, and a mechanism to track progress on whether and how projects are mainstreaming gender into their work. The system revealed that three-quarters of WLE's projects reported good progress towards reaching their gender-related objectives. GPI has only a small operational budget, and relies on the work done within the flagships and focal regions to carry out the research part of its mandate. The unit has been able to support some small research initiatives by its two post-doctoral fellows, but there is little capacity to develop cutting edge research specifically on gender, and especially to move beyond gender responsive work towards gender transformative research. A few research projects undertaken within the flagships are breaking new ground, but the limited capacity of GPI to identify and work on gender issues that fall beyond the interests of existing programs is a major weakness (although some might

argue it is a reflection of gender mainstreaming). Moreover, although the lack of a dedicated budget has helped to generate a sense of collective responsibility for gender research across the flagships, in practical terms it has meant that some flagships have a stronger portfolio of gender work than others and there is little accountability to the GPI for the quality of gender work.

Although some of WLE's gender mainstreaming work is concerned primarily with the provision of sex-disaggregated data, other projects are highly innovative. For example, a pilot study in Ethiopia has used a transdisciplinary approach in socio-hydrology to map the land use perceptions of male and female farmers and compare them with those of researchers. The study showed that each group saw the land differently, consistent with their own biases, and developed preliminary socio-technical feedback mechanisms that can be used to make hydrological models less static. Mapping results indicated important distinctions in how men and women view landscapes with regard to the number and types of ecosystem services identified.

Some ongoing research builds on earlier CGIAR work. For example, the Gender in Irrigation Learning and Improvement Tool (GILIT), based on research carried out by IWMI, is intended for use by irrigation scheme managers, project managers and other interested stakeholders. The tool has sparked interest beyond the CGIAR and is being tested in Central Asia. US AID has invited a proposal for further support. IFPRI studied whether experimental games can be used as means of strengthening collective action in water management. Preliminary findings in India indicated that women were at least as likely as men to over-extract groundwater resources.

6.4.3 GPI Partnerships

Although there are some exceptions, especially in the Volta region, WLE appears to have given little priority to attracting partners with gender expertise at the grassroots level. Interviews suggested that there has been a tendency to identify partners with technical expertise, and ask them to include gender in their work. At the research level, WLE has several partners with strong gender credentials including Wageningen University, UNESCO-IHE, and others. However, at the level of outreach and uptake, which will become increasingly important as research products are ready to be tested and scaled out, the program has few links with NGOs known for their grassroots gender work. The limited effectiveness of partnership development in this area requires attention.

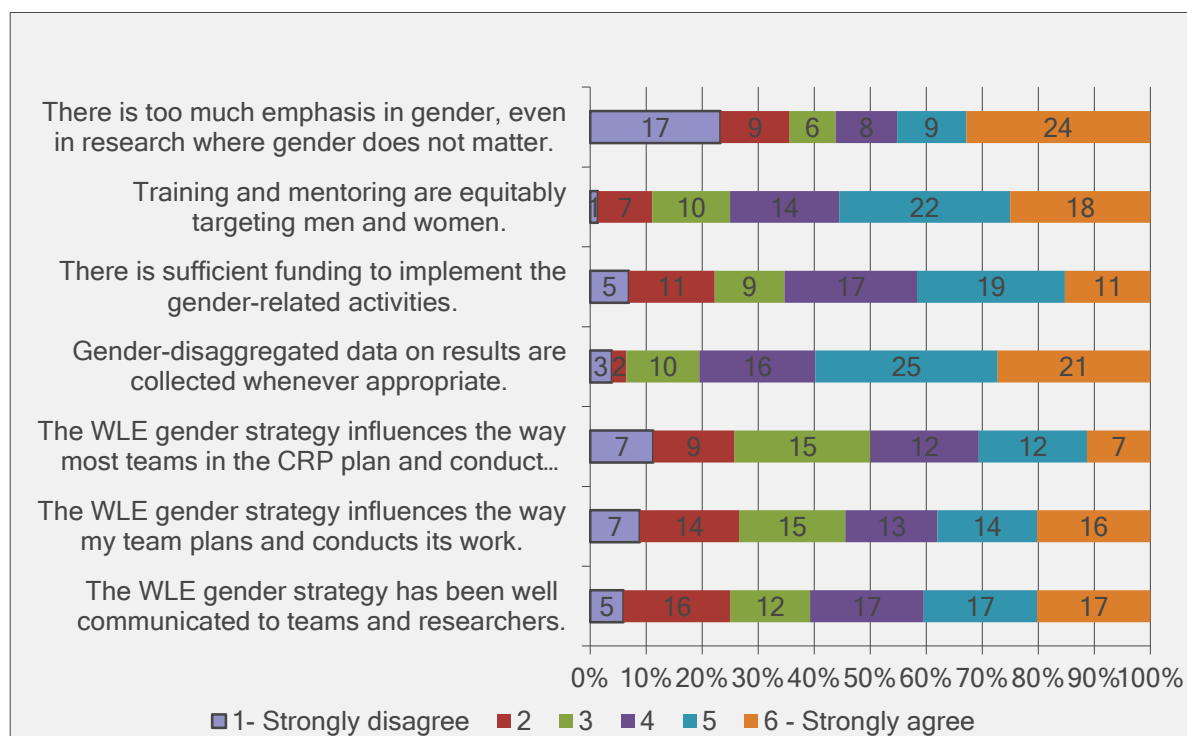
6.4.4 *The effectiveness of gender work in WLE*

WLE's gender strategy was not finalized until mid-2013, and it is difficult to judge the impact of social research or the integration of gender at the project level after such a short time, but the trajectory of inclusion of gender across the program is positive. GPI has done a good job of formulating gender objectives, sharing them with researchers, providing one-on-one assistance to scientists to bring gender questions into research proposals and design, and facilitating numerous communications platforms for the sharing of gender-related experiences and ideas. A number of WLE researchers interviewed said that this support had resulted in improved integration of gender as a core issue across the research program, including the stimulation of project level gender discussions that otherwise would not have occurred.

Nevertheless there are important areas that need improvement. Most of the respondents to the Evaluation Team's survey were not strongly convinced that W1 and W2 funds in WLE have increased gender relevant research (Table 6-6). Only about half the respondents thought that the gender strategy is important in planning and conducting research in WLE, and several respondents thought that gender is over-emphasized and forced into research projects that they would consider to be gender-neutral. More than one person, including a regional gender coordinator, described the budget allocation

requirement as a blunt tool, and felt the resources could be used more effectively to promote and integrate gender across the research program. These attitudes reinforce the need for more targeted gender capacity-building and training among scientists. Most of WLE’s gender work to date has fallen into the category of strategic and gender-responsive research. For the most part, WLE is not yet undertaking research that addresses power inequalities between women and men and has the potential to lead to structural changes.

Table 6-6: Researcher Survey Responses on Mainstreaming of Gender Issues in WLE



With respect to partnerships, capacity development and gender, the Evaluation Team makes the following recommendations:

Recommendation 8. Partnerships

WLE management should do a comprehensive stocktaking of existing partnerships across the program. Specific actions should include the following:

- Identify where the best potential exists for consolidating partnerships at cluster and regional levels.
- Initiate a dialogue with partners on actions to ensure continuity in partnerships to mitigate the impact of existing funding uncertainties over the future of the program.
- Recognise that different partnerships may be needed for different ToC steps or pathways (e.g. for moving from research outputs to development outcomes).

Recommendation 9. Gender.

WLE should employ a dual strategy in its gender work. Specific actions should include the following:

- Examine how gender integrates into WLE's technical priorities (as is being done) but also identify a few separate gender priorities and develop research questions around them.
- Provide GPI with research resources to support some cutting edge transformative work specifically on gender, aimed at understanding how gender disparities and gender relations effect agricultural innovation, productivity and sustainability.
- Identify a few partners that have expertise in working with women and technology at the grassroots level.

7. Governance and Management of WLE

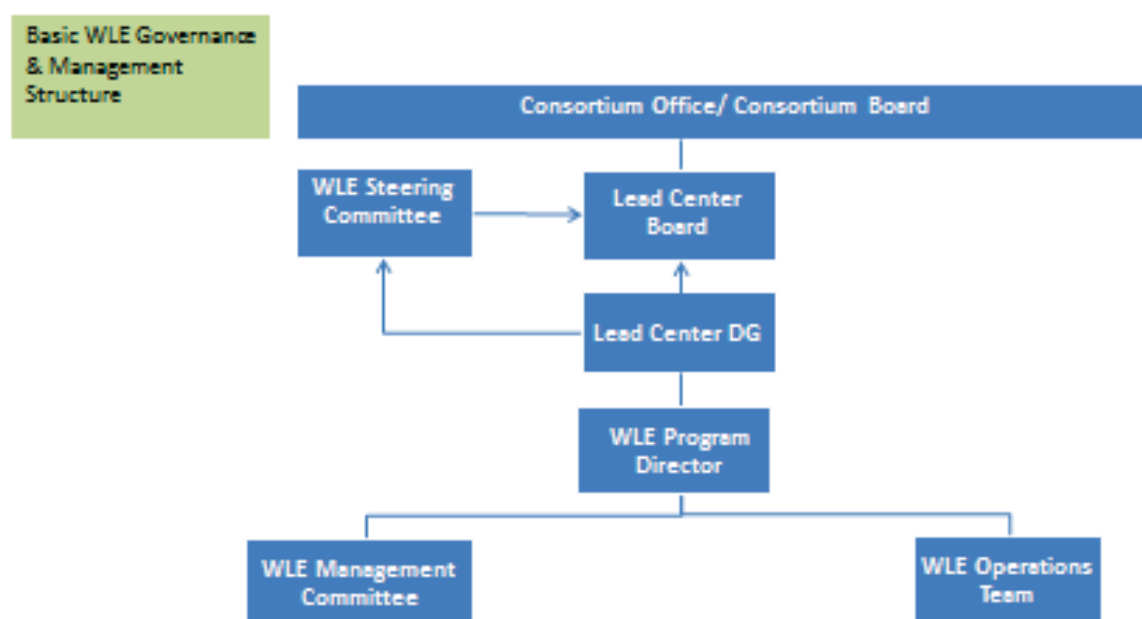
This chapter reviews the extent to which governance and management arrangements and functions have provided effective leadership and have supported the implementation of the program. The analysis has drawn on an extensive review of program documents, minutes of the WLE steering and management committees, interviews with WLE management, members of governance bodies and researchers and the results of the staff survey.

7.1 Structure and Functions of Governance and Management

The governance and management structure of WLE is set out in Figure 7-1. WLE is managed by the program director who reports to the IWMI director general who, in turn, reports to the IWMI Board that is contractually responsible to the CGIAR Consortium for WLE's implementation. Strategic oversight is provided by a SC of independent experts with international standing in WLE research areas, with the director general of IWMI and director of WLE as ex officio members.

The SC has 11 members (including a representative from FAO and from a CGIAR partner) and was established in 2012. According to its terms of reference (ToR), the SC is responsible for oversight of and advice on the strategic direction, the quality of science and the monitoring of the implementation of WLE. The SC also provides advice on budget allocations among program participants. At the time of the Evaluation, the SC had met six times, twice in 2012, 2013 and 2014 respectively, in accordance with its planned bi-annual minimum frequency.

Figure 7-1: WLE Governance and Management Structure



The management of WLE is shared between two bodies, both headed by the WLE program director, who reports to the Lead Center DG on administrative matters, and to the WLE SC Chair on strategic matters. On one side, the central OT is responsible for day-to-day operations, and includes a communications and knowledge management unit. On the other, the MC, established in 2012, comprises flagship and theme leaders and is responsible for research performance of the flagships and operational implementation of WLE. IWMI and the 11 partner Centers (and FAO) each have a science

focal point for that Center's participation in WLE. According to its' ToR, the MC is to meet regularly (at least monthly) to "execute planning and strategic management of WLE" and also to "make recommendations to the SC and the IWMI Board for decisions on matters of strategy and governance."

The 2014 IEA CRP Governance and Management Review⁴² found that WLE had a balanced and independent governance body in place, which brought together appropriate expertise, included a majority of independent expert members, and accommodated lead center and partner representation. The IEA review led to a new model for the governance of the CRPs in the second phase, agreed between the Consortium and the Fund Council.

The analysis of the minutes of the S C meetings indicates that its major concerns in terms of strategic guidance have been:

- Alignment of program activities. The SC has made a number of recommendations concerning the alignment of WLE activities, and especially those funded through W1/2 resources. The budget cuts suffered in 2014 were seen by the SC as an opportunity for every activity in the WLE portfolio to demonstrate clear alignment with the program and it recommended that projects that did not meet its criteria for alignment should not receive funding.
- Overarching ESR hypotheses. Based on discussions in 2013, the SC decided to propose a new research paradigm that could bring in new partners and focus on testing the main hypotheses of the program. This resulted in the development of the IES flagship (FS1), mostly funded through W1/2 resources.

A source of tension between the SC and the MC was the feeling that the SC was too "directional" when advising the management committee, especially in respect to the approach to developing and piloting the ESR framework. Some considered the SC to have been too dogmatic and prescriptive in pushing an abstract construct, the "paradigm shift", which many feel is not grounded in reality and does not reflect either funding channels or the needs and demands of stakeholders on the ground. In 2011, in its commentary on the revised WLE proposal, the ISPC noted that "a remaining concern is that some of the hypotheses being formulated are pre-assigned beliefs for which information will be sought to provide justification, rather than undergoing rigorous, objective testing"⁴³.

This was in part also due to an imbalance of expertise in the composition of the SC, which is strong in some core areas of WLE but lacking in areas such as political economy and other social sciences. These internal tensions at the beginning of the program, which have now diminished significantly, created uncertainties and mitigated against the development of a shared vision and sense of purpose throughout the program.

7.2 Program Management

The WLE OT is responsible for the day-to-day management and coordination of the program, as well as internal and external communications. The OT consists of a small group of full- and part-time staff attached to the program, led by the program director and supported by IWMI, as WLE's lead center, in particular its finance and administration, human resources, business development, and communications and marketing functions.

⁴² CGIAR-IEA (2014). Review of CGIAR Research Programs' Governance and Management. Rome, Italy: Independent Evaluation Arrangement (IEA) of CGIAR (iea.cgiar.org).

⁴³ ISPC (2011). ISPC Commentary on the revised proposal CRP 5: Water, Land and Ecosystems, 23 October 2011.

The WLE program director works in a full-time capacity and reports to the IWMI director general on functional, operational, and administrative matters, and to the chair of the WLE SC on strategic matters related to the program. At the time of the Evaluation, WLE was beginning to search for a new program director after the incumbent, who had led the program since 2012, accepted another professional opportunity. During this process, the WLE senior program manager took on the role of acting program director.

The Program Management, engagement and coordination (PMEC) budget includes: management; research coordination; engagement, knowledge management and communication; monitoring and evaluation; and support for the GPI and Ecosystems and Resilience core themes. In the extension proposal, the PMEC budget was reduced from USD 9.7 to USD 7.2 million for 2015-16 (to be funded entirely from W1-2 resources) following pressures from the Consortium to reduce management expenditure. The PMEC budget however, covers activities that go beyond managing the program and that WLE staff believes are essential if the program's goals on processes of change are to be realized. While the Evaluation Team believes that increasing the resources available to management, communications, knowledge sharing and other non-research parts of the programs would increase the effectiveness of the program (especially given the need for a more effective cross-CRP collaboration and greater uptake through partnerships), the current CGIAR financial context of budget cuts makes it difficult to achieve such an increase.

The bilateral project mapping is part of annual planning, when work plans of all participating centers are reviewed and approved. As there are no approved written criteria for mapping shared by all centers, there is a risk that projects may be mapped to the CRP without careful consideration of their contribution to the program/flagship objective. According to WLE Management, this lack of real scrutiny and veto power initially resulted in some participating centers submitting activities that to an extent were discordant with the strategy and vision of WLE. The situation has recently improved, and the WLE program office now filters activities to a much larger extent than earlier.

The operational management of WLE has generally been good despite the challenging environment within which it has been implemented. Restructuring, both of the CGIAR and the WLE CRP, budget cuts and changes to personnel have created challenges and a considerable burden in terms of reporting and adjusting the planned program of work. Interviews with flagship and theme leaders, project leaders and other staff have indicated that operational procedures to establish and implement research activities, to define and manage budgets and to provide reporting feedback are all clear and efficiently administered.

Results from the staff survey indicated that the majority of researchers think that major aspects of the WLE program are well managed. The share of response in the three more positive categories (4 to 6) ranged from 76 percent to 46 percent across the eight areas. The least positive item was related to lack of feedback from adoption/impact pathways to research, supporting the views of the Evaluation Team about the need for internal learning within the program (see chapter 5). There were some comments about the high level of reporting requirements for flagships and projects and there are concerns that this has created redundancy and/or duplications. This should be reviewed, but overall there are no serious concerns over the performance of WLE in terms of day-to-day operational management. Adequate operational management has likely contributed to the program's delivery of the outputs it had set out to produce as discussed in chapter 5 of this report. More details on different aspects of the management of WLE in areas such as finances, communications and knowledge management, are provided in the following sections of this chapter.

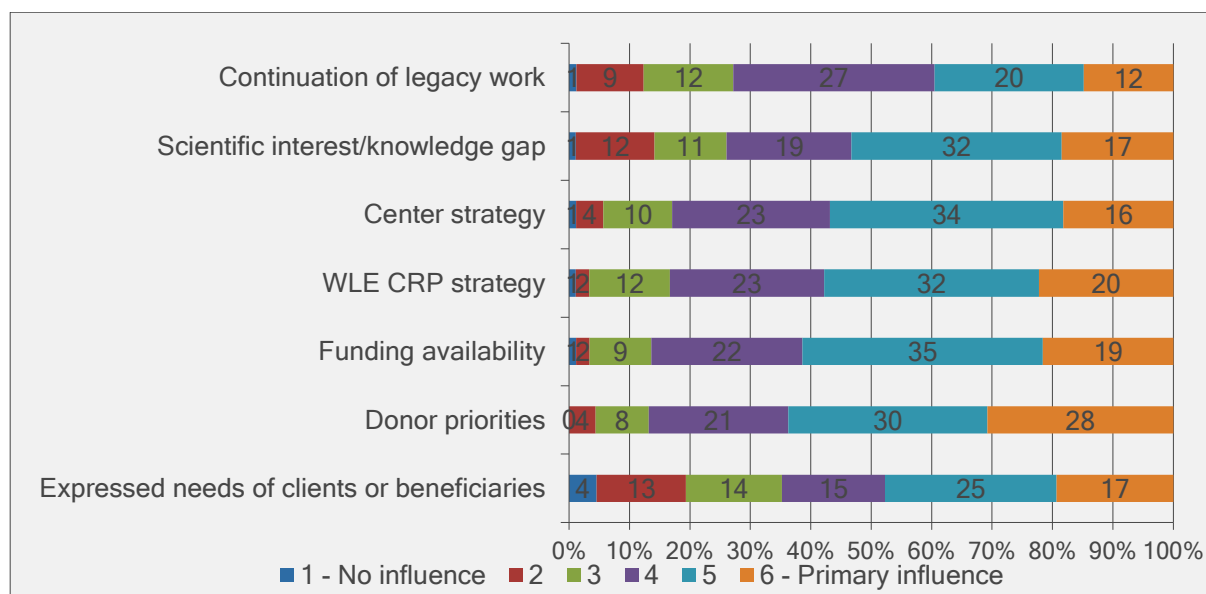
7.2.1 *Research Commissioning and Management*

The research management system includes the process through which research themes and projects are identified, proposals prepared and approved and the flagships, clusters and projects are managed. This includes the extent to which program-wide criteria are adhered to, such as the inclusion of gender in projects, the focus on ecosystem services and resilience and the development of partnerships in projects. It is difficult to establish an overall view on where WLE stands on these issues. Some are fairly straightforward, especially in relation to the integration of central themes in the research process, but it is harder to establish a clear position on other issues such as the process of research commissioning. There is a regular reporting system where overall progress and the integration of specific themes are reported. This appears to operate efficiently and in a timely manner. The supervision of implementation is consequently at an expected standard.

Flagship leaders play an important role in coordinating the research program. They have prime responsibility for ensuring that projects fit within the overall focus of WLE and include stipulated actions on gender, partnerships and the integration of ESR. They also provide support to the different project leaders, and interact with management while at the same time carrying out substantial research activities on their own. Some are internationally recognized leaders in their fields. The Evaluation Team found that, in general, the role of flagship leader was more one of coordination rather than actually leading and prioritizing project proposals. While a more active role in steering the flagships might be desirable, the present role of leaders mainly as facilitators seems appropriate in the current environment. Budget fluctuations are outside the influence of flagships leaders, and consequently project leaders must play a dominant role in seeking support for the funding of new projects or for the continuation of existing ones.

For most flagships (FSs2-5) the process through which research projects are identified and approved is not clear. Most new projects seem to be identified informally through discussions among the flagship leaders and individual researchers in CGIAR centers involved with WLE, and in many cases the projects were a continuation of activities that pre-dated WLE, though often with adaptations to better reflect the WLE approach. In the case of bilateral funding, the projects are generally developed through negotiations between researchers or CGIAR centers and the bilateral donor (often organizations such as government agencies or NGOs also involved, in some cases as the lead agency). They are subsequently integrated into WLE flagships, reflecting the overall CGIAR policy on CRPs. The Evaluation Team noted that in some cases bilateral proposals had very accurate work descriptions, and underwent rigorous scrutiny, thus contributing to the program as a whole. Figure 7-2 summarizes the survey responses regarding factors influencing the choice of research topics. Donor priorities and funding availability were the two items that were signaled as having the primary influence, reflecting the current funding realities.

Figure 7-2: Factors Influencing the Choice of Research Topics



The lack of a formal, standardized research identification and proposal preparation process in Flagships 2 to 5 makes it difficult to determine whether the projects that were approved were the most appropriate in terms of the overall intent of WLE and represent a coherent research portfolio. Nevertheless, FS4 has done a good job in terms of prioritizing areas of research and has built a coherent program using funds from different sources.

Based on interviews and a thorough review of the process and the available documentation, the Evaluation Team found that the research management process established under FS1 is structured and efficient. The evidence (from interviews or written submissions) from the great majority of the stakeholders is that the calls and commissioning of the 32 research projects were executed through a well-organized management structure that was clear and transparent. All projects had to describe how the ESRF is included in their research strategies, stipulate how gender issues would be addressed, and have a range of partners that included ‘uptake’ partners, specifying explicitly how uptake pathways would be developed by the project. Projects selected at the EoI stage participated in ‘write-shops’ where support on the preparation of full proposals was provided. All participants interviewed agreed that the write-shops were extremely useful and it is worth noting that the Rockefeller Foundation has adopted this approach in one of their research programs.

7.2.2 Financial Management⁴⁴

a) Accountability Framework

A “Program Implementation Agreement” signed between the Consortium and IWMI, as WLE Lead Center, holds IWMI accountable to the Consortium Board for the entire program. IWMI, in turn, has signed several “Program Participant Agreements” with WLE Centers, rendering those institutions, in turn, accountable for their respective contributions to WLE. This accountability framework covers all

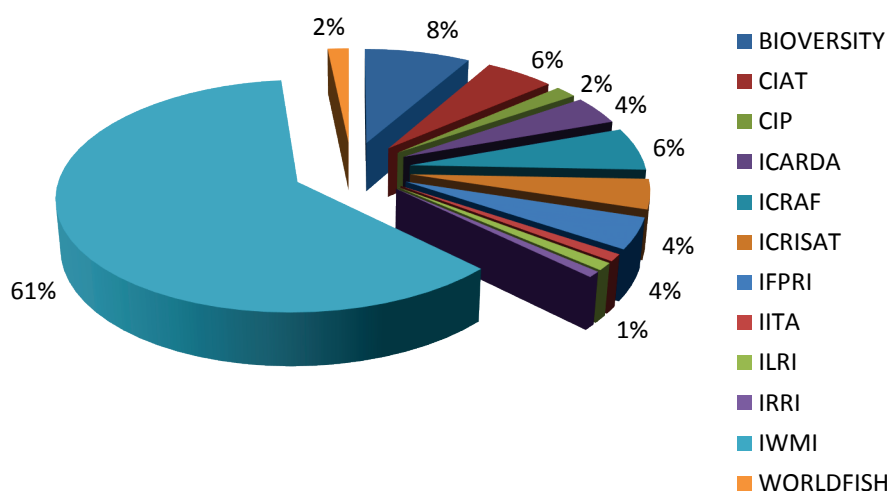
⁴⁴ WLE underwent internal audit by the Consortium in 2015. Conducted by the IAU, the audit was concurrent with the IEA evaluation and completed in August. The Evaluation team has not covered issues of compliance and controls as these are covered in detail by the internal audit. The Evaluation team has not detected a significant discrepancy between the findings of the audit and the observations made by the evaluation team.

of WLE, i.e. activities funded by programmatic funds from W1 and W2 of the CGIAR Fund as well as those funded by bilateral project donors and mapped to WLE.

b) Allocation of W1-2 Resources

WLE grants W1-2 funds to its participant centers in accordance with a proportional formula that was fixed at inception of the CRP. Cuts in W1-2 funding were passed down proportionally to participating centers, due to original commitments by Centers to the different CRPs. Figure 7-3 shows the allocation of W1 and W2 expenditures among the centers involved in implementing the CRP-WLE. IWMI spent more than half (61 percent) of these funds⁴⁵, followed by Bioversity (eight percent) ICRAF and CIAT (four percent). As Lead Center, IWMI's expenditures include Program Management as well as costs related to focal region and the innovation fund. IWMI disburses the funding to implementing partners within FS1, which is mainly funded through W1 and W2. This explains its predominance in W1 and W2 expenditures. It seems desirable that the CRP participating centres discuss how to leverage bilateral funds in order to make participation in the CRP more attractive.

Figure 7-3: W1 and 2 Expenditures by Center (2012-14)



c) Budget Uncertainties and Funding Cuts

Funding uncertainties and cuts have had a disruptive effect on project planning, and were cited as a major concern in stakeholder consultations. In numerous interviews, WLE managers and researchers expressed their concern over changing and unpredictable CGIAR system-wide policies on budget and disbursement, and the impact of major budget cuts that were imposed with no warning. These cuts resulted in planned activities being curtailed or removed from the program, and led to difficulties in developing effective partner relationships. This already had been identified as a matter of concern. In 2014, the IEA governance and management review found that “Uncertainty about the levels and timing of W1 and W2 allocations and the year-to-year nature of funding is an impediment to CRP planning and to developing multi-year strategies.”

⁴⁵ See footnote in para.80

The main consequences of these financial uncertainties, many of which may be relevant for other CRPs, have been:

- ***Activities dropped:*** WLE has had to reduce the number of projects, cancel a budget reserve to commission research of strategic importance and curtail activities such as regional coordination meetings that were a key part of the overall outreach and uptake strategy.
- ***Reputational risks:*** The uncertain ability of WLE to make commitments to partners in the longer term, and the budget cuts that WLE was forced to pass on to its partners after agreements had already been signed, can lead to a loss of credibility, and are directly counter-productive for the development of effective partner relationships. During interviews, various partners in the regions cited this as a concern that would likely affect their willingness to engage in future WLE activities if the situation continues.
- ***Pre-financing:*** Given that W1-2 budget allocation is not fully disbursed until the end of the year, participating CGIAR Centers and non-CGIAR project lead organizations must prepay much of the year's project activities from reserves, trusting that the money will come by the end of the year. This is a great challenge in FS1, where many projects are led by small regional organizations, that cannot be expected (much less required) to prepay their WLE activities from reserves that they may not possess.
- ***Time spent raising funds:*** To ensure continuity of their research activities, WLE researchers have to seek funding from bilateral donors by participating in time-consuming calls for proposals. This means that they must also meet the policies and requirements of the bilateral funders that are not necessarily well aligned with those of WLE. A paradoxical situation occurs in which the most predictable and longer-term funds come from bilateral donors, for most of whom the specifics of the WLE design (such as the ESRF) are of marginal importance in comparison with their own policies, strategies and priorities. This reduces the extent to which the new ESRF of WLE could be tested, since it is only of fundamental importance to activities supported directly by W1/2 funding.

As discussed in chapter 5, although the program has been effective in delivering most of the planned outputs on time, the uncertainties and the curtailment of intended activities may affect the effectiveness of the program, and WLE runs the risk of being perceived as an increasingly unreliable collaborator.

7.3 Monitoring and Evaluation

Effective monitoring and evaluation (M&E) is essential to identify problems early and to recommend improvements for research that is underway. The 2011 CGIAR Strategy and Results Framework (against which WLE is evaluated) sets high requirements for M&E systems of CRPs, including the specification of input-output-outcome-impact chains for all components of the program. Full compliance with this requirement would place significant burdens on all levels of WLE, including partners leading the implementation of projects. Progress in WLE towards a systematic overall approach for M&E has been slow, owing largely to a substantial delay in recruitment of an appropriate specialist (a monitoring, evaluation and learning manager was hired in January 2015).

To help develop a more coherent overall M&E system, the new manager initially focused at the flagship level, working with the teams to collate information on their activities that might provide the building blocks necessary for an M&E system. FS4 was the first to be addressed in detail under this process and others will follow. The initial element of the approach is to create a “bottom up” system to complement the existing “top down” ToC-based approach. All of the activities in a flagship will be

classified into two or three clusters. Individual activities implemented in each cluster and the effects they have had will then be traced and related to others in the cluster to develop an overview of the extent to which investments and activities have been sufficient to push forward towards impacts.

Substantial work towards the development of an M&E approach for WLE is underway. An April 2015 presentation of the WLE “Theory of Change: context to strategies, outputs, outcomes and impacts” provides extensive details of the expected impact pathways across the entire portfolio, and of how results might be measured. The document illustrates the extensive range of data that needs to be collected, analyzed, and interpreted to gain an overall picture of the results associated with WLE. For example, a few of the areas to be measured include: “gender-equitable control of productive assets and resources,” “increased resilience of agro-ecosystems and communities, especially those including smallholders,” and “land and water degradation minimized and reversed.” Each of these would present a substantial challenge for empirical measurement, even in a limited geographic area. Hence, the selective approach adopted by the M&E Team to select a small number, so outcomes and targets on which measurement is being focused is going in the right direction. The Evaluation Team believes the program should pursue its efforts to focus on a prioritized set of activities that can make important contributions to assessing the eventual outcomes and possible impacts of WLE. This includes providing information to inform the iterative adaptation and improvement of, for example, research outputs and change processes.

Currently, to meet CGIAR reporting requirements, WLE has to approach M&E from two different directions: firstly, what will be useful for effectively managing WLE to maximize progress towards its intended objectives; and secondly, what information can best demonstrate to CGIAR management that WLE is making an appropriate contribution to the SRF? It is difficult to encompass these two approaches in one system because WLE management needs to promote a focus on relatively low levels of the system, such as research projects, sub-basins, basins and regions, while results reported to the CGIAR need to feed into global aspirational objectives and indicators, which face major challenges of attribution. The development of a Monitoring, Evaluation and Learning Community of Practice in the CRPs, in which WLE has played an important role should help to address this issue.

It is clear that WLE is making significant efforts to develop an M&E system that serves these two purposes while at the same time also facing tremendous challenges of data and resources availability. Balancing the two M&E aspirations is further hampered by the lack of effective knowledge aggregation and synthesis, discussed elsewhere in this report. The program needs to communicate with the CGIAR to agree upon a realistic level of M&E information and needs to prioritize actions to develop M&E within WLE in a way that reflects the time and resources available.

7.4 Knowledge Management and Communications

The development of an effective communication process is essential, both for internal communication among researchers and partners involved in WLE activities, and to the wider community interested in the work of WLE. The program’s communications strategy also needs to find an appropriate balance between promoting the development approaches and options that emerge from the research with creating platforms for scientific discourse reflecting the wider debate and inherent uncertainties that characterize such research.

WLE has a dedicated knowledge management and communications (KMC) team that has acted as the focal point for the development of a program-wide strategy. Many of the CGIAR partner centers also have communications teams involved in individual projects or flagships. WLE management has recognized the importance of communications as an essential part of the program, and has devoted an appropriate level of resources. The KMC uses a wide range of both electronic and hard media to

communicate the program's activities (including the WLE website, the AgEco blog, published and promotional materials, etc.).

The KMC team surveyed WLE partners in December 2014 to assess how the program's communications products and services are perceived and used. The results were positive, with 90 percent of respondents happy or very happy with the support provided in communications and knowledge management. There was also overall positive feedback on the utility of the different KMC media. The survey also asked for suggestions as to how to improve the KMC activities, and these results have subsequently been used to refine WLE's KMC strategy.

One important development has been the distribution of an internal "WLE messaging" document to all flagship and project managers. This document sets out in clear and easily communicated terms a series of key messages about the purpose and 'selling points' of WLE, which the researchers can use in their communications with stakeholders and uptake pathway partners. This is a useful step in the promotion of a consistent message from the program.

It is encouraging to see that the program has assigned sufficient resources to communications, and that the communications team has taken a flexible, iterative approach that has evolved the program strategy based on internal learning and reflection. The range of media used is impressive, and communication products appear to be of good quality. Media intended to reach practitioners are given the same attention as more academic outputs, and effective management ensures that different messages are transmitted appropriately to the intended audiences.

However some aspects of WLE's KMC activities could benefit from further consideration. In particular the website is designed principally for the promotion of WLE development options. This reflects a conscious decision to use the website for this purpose rather than for academic debate. However, the Evaluation Team is of the opinion that there is a need to temper this approach, and to discuss, especially with respect to case studies and the promotion of development options, some of the inherent uncertainties and limiting factors. In parallel with the need to develop testable hypotheses under the ESRF indicated above, it is important that the website reflects more adequately the diversity of options and the multitude of factors that influence development outcomes.

7.5 Conclusions and Recommendations

WLE has a balanced and independent governance body, that brings together appropriate expertise, includes a majority of independent expert members, and accommodates lead center and partner representation. Nevertheless, tensions arose between the steering and the MC due to the perception by the MC that the SC was being too directive in its advice. The Evaluation Team was told that such tensions have now diminished significantly.

While operational management of WLE is of a good standard, a multiplicity of observations lead the Evaluation Team to conclude strategic management for science and delivery on outputs and outcomes needs strengthening. Strategic management is not only critical to ensuring the commissioning of most-appropriate projects for the portfolio and best use of W1/2 funds (discussed above) but to ensuring that higher level syntheses of project-level outputs and objectives for cross-cutting themes are fully pursued (discussed elsewhere). Weaker than expected strategic management may be reflective of the lack of both time and resources to focus on nurturing scientific synthesis toward flagship level goals and objectives, but also of the disruptive nature of the ever-increasing number of bilateral projects with their predetermined donor-driven goals, objectives and priorities.

Funding uncertainties and cuts have had a disruptive effect on project planning, with these uncertainties cited as a major concern in stakeholder consultations. The cuts have resulted in planned activities being curtailed or removed from the program, and have led to difficulties in developing effective partner relationships. An unwanted consequence has been the need to search for funding from bilateral donors, whose goals may not always be well aligned with those of WLE.

The research management process established under FS1 is very structured and transparent. All projects have been selected through competitive tendering based on calls for expressions of interest. The process in the other flagships is less clear, as there is a diversity of mechanisms partly due to the history of the program and its predecessors. Nevertheless, there are examples of flagship incoherence, probably at least partly due to the many different mechanisms used for managing the research process.

Substantial progress has been made in developing WLE's monitoring and evaluation system but unrealistic M&E requirements combined with a lack of sufficient resources to ensure consistent data collection suggest that a system-wide rethink is needed of the role and functioning of M&E.

WLE has a coherent and well-developed communications and knowledge management strategy that is appropriate for a program attempting to reach both academic and practitioner audiences. A wide range of media is used and the overall quality appears to be of a high standard but there is at times, a need to ensure that the promotion of specific case studies and approaches is supported by adequate evidence to ensure that they have global significance.

With respect to governance and management, the Evaluation Team makes the following recommendations:

Recommendation 10. Composition and role of the WLE Steering Committee.

The Steering Committee should reassess its composition. Specific actions should include the following:

- Include one or more members with training in social sciences research.
- Undertake a rigorous and holistic debate on the role of ESR in the sustainable intensification of production by closely engaging researchers from various disciplines, including scientists who can bring agriculturalists' perspectives.

Recommendation 11. Strategic management and Program Planning and Integration

Specific actions should include the following:

- Develop a prioritization mechanism to deal with budget cuts, focused on WLE's own primary objectives as a CRP. This is preferable to using a proportional formula to allocate budget cuts across flagships.
- Ensure the new system is transparent and agreed upon by main players. The criteria for mapping bilateral projects into WLE should be documented and the responsibility for reviewing and approving of this mapping should be assigned to flagship leaders with the WLE director providing final approval.

8. Overall Conclusions and Recommendations

8.1 Introduction

The conclusions and recommendations presented in this chapter reflect the overall assessment of the WLE program. The chapter begins with the presentation of some overall conclusions and recommendations, and then a range of conclusions are presented, structured around the six key evaluation questions defined in the Inception report and discussed in chapter 1. The conclusions are based on the detailed analysis presented in the preceding chapters.

The recommendations are intended to be actionable and address the major issues and concerns that the Evaluation has identified. Although they are implementable within the time and resources available to the program, in some cases they will require careful prioritization of the use of these resources. Some hard choices may have to be made but, in many cases, such choices are unavoidable if WLE is to develop into a fully coherent and effective program that will achieve its goals and attract interest and funding from a wide range of stakeholders.

8.2 Overall Conclusions

The **scope of WLE**, as a research program that aims to achieve ambitious development outcomes on the interactions among water, land and ecosystems in agricultural production, is unique in many respects and can be considered as an essential research issue for the CGIAR. These interactions need to be understood if present challenges in sustainable livelihoods and improvements to agricultural productivity are to be addressed. The Evaluation Team concludes that the original rationale for establishing WLE as a CRP was and continues to be valid, and is further demonstrated by the potential contributions that WLE research can make to the CGIAR SRF. Extensive stakeholder consultations have provided evidence that the demand for such research is strong at all levels, particularly where it can contribute to improvements in the management of natural resource systems to preserve and enhance their contributions to sustainable development.

The **overall progress** made in WLE is generally positive. While there are areas where there is room for improvement, the Evaluation Team thinks that WLE is doing well under difficult circumstances. Various components of the program are on track to produce interesting and innovative results that have the potential to move towards achieving the program's IDOs. Some of WLE's activities and outputs can be considered to be of the highest international standard. Additionally, the excellent quality of many of the personnel involved in the program is noted, with flagships and regions managed by staff who are experienced, dedicated and respected in their areas of competence and responsibility.

The assessment of the effectiveness of the program is limited by the lack of methodologies for measuring progress, and by the limited extent to which project-level outputs and outcomes are being aggregated and synthesized to be converted into knowledge goods that directly inform discourses on: management of water, land and ecosystems; sustainable improvement in agricultural productivity; and, livelihood enhancement. The program must tackle the challenges of making progress along impact pathways from research outputs to development outcomes in a more effective fashion to achieve positive impacts. So far, as might be expected given the short duration of the program, the impacts that have emerged have come primarily from activities that pre-date and were mapped into WLE.

The **focal regions model** is a distinctive feature of WLE, and is a key aspect of change processes under the program. For the focal regions model to work, WLE needs clear strategies and priorities focused on the regions. The regions also need time and resources to reach their full potential, and it is essential that these be allocated in the future development of the program. However, this should not be done at the expense of good research outside the regions

The **context** within which the program is being implemented is challenging. The future of the program is uncertain at the time of writing, something that is a concern for WLE researchers, as well as program partners and stakeholders. Specifically, the program has been through two major restructurings in recent years, new flagships and core themes were introduced in the extension proposal in 2014, and currently considerable staff time is focused on the preparation of the proposal for the second cycle of CRPs. Significant budget cuts have added uncertainty with some activities dropped or curtailed, and anticipated further cuts for 2016 are likely to deepen these uncertainties. The program has undergone a number of changes in management, with a third program director being recruited at the time of the Evaluation and further changes or delays in recruitment of key personnel. Taken together, the effect of these factors has been to create a setting in which long-term planning of research and uptake pathways are difficult. It is hard to envisage how a program such as WLE will be able to fully achieve its objectives without a more stable planning and funding environment.

The scope and strategic relevance of the **flagships and core themes** were considered. The post-2014 flagships represent an improvement over the original SRPs, which included a large number of “mapped in” projects that were designed during the CPWF. The current set of flagships has a broad focus and contain a number of clusters of projects on quite different thematic issues. This broad focus of flagships is acceptable, but priorities within their scope need to be identified to provide coherence as a grouping of research around key themes. A coherent program strategy is needed to provide a framework within which future decisions are made. Such decisions should in part be a response to funding opportunities in the geographical areas where the program is working, and to reflect the interests of bilateral donors. Flagship leaders, working with the overall strategic management of WLE, should have the initiative to develop strategies at this level to ensure the development of the individual flagships over time.

Recommendation 12. The Continuing Imperative of WLE.

The Evaluation Team strongly recommends that the CGIAR retains a program with WLE’s focus on the interactions between ecosystems and agricultural production. It should serve as an integrative CRP at levels of organization beyond the plot or field which are the targets of many other CRPs (e.g. at the catchment, basin and regional scales), and it should take explicit account of externalities and trade-offs that can become apparent at these scales. The specific form of such a program and its relationship to other CRPs needs to be established, but to not have such a program, whatever the details of its form and institutional focus, would risk the momentum that has been established by WLE in the CGIAR’s long term efforts and programs on natural resources management.

The future configuration of such a program should build on existing strengths. It should be flexible, adaptable and inclusive, so that partners in individual research projects and clusters of projects can develop approaches that are appropriate to their context, but that can also be placed in the wider program framework. Such a program will make a substantial contribution to ensuring that the CGIAR system as a whole remains relevant and is able to engage with and inform contemporary sustainable development and poverty reduction approaches at all institutional levels.

8.3 Conclusions and Recommendations on the Key Evaluation Questions

8.3.1 Are the conceptual framework and key hypotheses of WLE coherent, effectively communicated and appropriate for the wide range of issues and diversity of locations included in the program?

The Evaluation Team sees strong merits in examining agriculture within an ecosystem context and ensuring that ecosystem services are considered as a core issue in agricultural development. However, WLE's approach, in terms of both the content and the manner in which it was developed and disseminated, is considered by the team to be somewhat dogmatic and incomplete, with a lack of internal learning mechanisms through which key hypotheses can be examined and developed. The underlying hypothesis of WLE, as set out in the ESR framework, is complex and unproven: indeed it may be unprovable. This overall conclusion reflects the detailed analysis presented in chapter 3, that described the very widely divergent views on the ESRF found throughout the program.

The Gender, Poverty and Institutions core theme has been developed unevenly. The focus of work has been almost exclusively on gender. This has resulted in a wide integration of gender issues at the project level, but there has been insufficient attention given to the "poverty" and "institutions" aspects of the core theme. The GPI core theme and WLE as a whole, lacks a clear focus on poverty and poverty targeting, and on the analysis of institutions and institutional change. There seems to have been minimal program-wide discussion of these issues, both of which are central to the development of WLE and achievement of IDOs.

8.3.2 Are the impact pathways identified by the program ones that are likely to achieve the desired development outcomes and are they consistently developed across the different components of the program?

The approach to impact pathways, as reflected in the WLE theories of change, has scope for improvement. While recent activities and analysis related to WLE's ToCs are commendable, a concern persists that a 'knowledge deficit' stance or approach is being taken, whereby it is believed that presenting evidence on the benefits of new approaches is in itself sufficient to catalyze change. There has been i) limited discussion of key issues in the understanding of change such as drivers of change, the effects of markets, incentive systems, barriers to change and others; and ii) no guidance on the analysis of institutions and institutional change that are central to any overall theory of change. Similarly, strategies and protocols to research and understand decision-making processes in agricultural change and management of natural resources and ecosystem services have not been developed sufficiently.

There are good examples at project and cluster levels where attention has been paid to understanding and relating to change processes, but these are isolated and only in some case have attempts been made to draw generic conclusions to inform further development of WLE's ToC. The potential for effective uptake is strong, as indicated by the range of partnerships and the evidence found in the focal regions, but a more coherent, iterative and adaptive approach to the development of uptake pathways is needed if this potential is to be realized. There is also a need for substantial research on the nature of change as part of the overall strategic direction of the program. This should be directed to testing and developing the overall program theory of change, which itself should be seen as something that systematically evolves as new evidence accumulates.

Capacity enhancement is central to WLE and a key part of the theory of change, but this program component has no clear overall strategy (although WLE is currently developing a strategy for Capacity Development in preparation for Phase II). There are a large number of capacity development activities,

and 177 organizations were identified by the program as capacity development partners in the portfolio. Some flagships, such as FS1, have received high praise from participants for its capacity development activities. Overall, however, there is no coherent capacity development strategy, and to date no evaluation of the diverse range of activities that have taken place. This makes it impossible to make any program-level judgment on the role of capacity development in WLE's change process, or the effectiveness above project level of different types of capacity development activities.

8.3.3 Is the quality of science in the program of an appropriate standard, does it reflect the CGIAR's comparative advantage in science and is it engaged with and reflective of international developments in the different fields included in the program?

The quality of science is overall of a good standard and was found to be relevant to the target audiences. At the project level the links between their conceptual base, the selection of methods and the analytical techniques used were frequently found to be of a high standard. The number of publications being generated is high, and the research outputs examined were similarly overall of a good to very good standard, with some examples of excellent, world class research published in high impact journals. Among WLE staff there are a number of outstanding researchers who are recognized internationally as leaders in their fields.

The Evaluation Team is concerned that the good quality results at project and, to some extent, cluster level is not enhanced by effective mechanisms for the aggregation and synthesis of results to produce overall analyses and conclusions at the regional, global CRP and inter-CRP levels. Overall, there is a sense that the whole of WLE is not greater than the sum of the parts, or that the many interesting individual findings are not adding up to something larger. This means that the cumulative findings that are found in groups of similar projects in a number of thematic areas are not being integrated together to give valuable insights on key program themes.

This is not merely because the program is at an early stage, with few results to aggregate. WLE initially was created by mapping a large number of existing projects into the program, many started long before WLE and were completed in the first years of WLE. There is also a concern that processes to relate results to meta-hypotheses and program IDOs are under-resourced and not adequately used. As a consequence, it is difficult to understand how or why individual project outputs and outcomes contribute to overall program objectives. This conclusion is tied to the limitations of the overall conceptual framework and the lack of strategic management and direction in the program.

WLE needs to develop a strategy and allocate resources to aggregate and synthesize results from project/cluster level and relate them to overall program purpose. This is essential if the results emerging at the project level are to be translated into global public goods on key issues that are relevant to the CGIAR. Achieving this will require careful planning and the allocation of appropriate levels of resources, which in turn will necessitate some difficult choices in prioritization of the existing range of activities, but this must be done if WLE is to realize its potential. A set of recommendations on how to achieve this objective are set out in chapter 4.

8.3.4 Are the partnership strategy and range of partnerships being developed in the program consistent with the program's overall goals and the development of impact pathways within the program?

WLE's partnership track record is mixed. The program has thought about its strategy and identified the specific types of partners that are required to achieve its objectives and goals. It has a large number of partnerships, many dating back to the CPWF. WLE has been very successful in attracting private sector

partners and also has had policy influence in different regions. On the other hand, the program has been less successful in working with national and local research institutions, and due to its budgetary fluctuations, has created some frustration with core partners such as FAO and with other stakeholders, who have found that the program has not always followed through with activities to which earlier commitments had been made.

One concern expressed by a number of stakeholders is that uncertainties over the future of the program and budget cuts have had a negative influence on the consolidation of partnership processes. Two words that were repeatedly raised in discussion of partnerships were continuity and trust, both of which require time and a consistent effort to achieve and maintain. The development of partnerships in WLE can be seen as a key strategic resource for the program, but one that needs to be nurtured. It is essential that existing commitments be honoured, and that program partnerships continue to be developed as a central part of the program. A large partnership base is a key resource for attracting additional future bilateral funding, thereby extending the program's resource base.

8.3.5 Are the management procedures and governance structure of the program appropriate, efficient and consistently applied and is there clarity on the roles and operational procedures of different components of the management structure?

The Operational Management of WLE is very good despite the challenging context within which the program has been implemented. The Program Management has ensured that the day-to-day operation of WLE is efficient, and the impacts of challenges associated with restructuring and budget cuts have not compromised the overall implementation of the program. The management has effectively ensured that transaction costs associated with these challenges have not been passed down to project levels. This is an important conclusion given the size, complexity and geographical scope of WLE, and has ensured that the large number of individual activities in the program have been able to be implemented.

Strategic Management is more of a concern, with insufficient internal discussion and leadership leading to a lack of clear guidance on some key issues such as: i) the translation of the abstract core concepts of WLE into testable hypotheses that are reflected in strategic program decisions; ii) the aggregation of results to produce novel and insightful syntheses on core research issues; and iii) the development of consistent approaches to issues such as poverty analysis and targeting, institutional change, social, cultural and livelihood issues, markets, valuation and other socio-economic dimensions of the program. The need for such strategic leadership was recognized in an early stage of the program, but such leadership has not yet developed.

Tensions within the governance structure were observed and traced to perceptions that the SC was too directional and dogmatic in its strategic guidance of the MC. Much of this was about the character, content and presentation of the ESRF, as discussed above. Insufficient diversity of the composition of the SC and an apparent lack of encouragement for rigorous, holistic and ongoing debate regarding the ESRF were contributing factors.

The Evaluation Team notes the excellence of many of the staff involved in the program, both existing personnel and new recruits. It is essential that the program creates an environment to retain and mentor key staff, and ensure that they are given the necessary space and incentives to contribute in an effective manner to WLE.

The Evaluation Team detected the prominent role of IWMI in WLE (which is to be expected considering the nature of the program) and believes that providing more opportunity for other centers to

participate in the strategic direction and decision-making of WLE would be a very positive development. Closer ties with other CRPs, especially the crop CRPs, would be highly desirable, especially given the complementary and integrative nature of WLE's research.

8.3.6 Is the research for development character of the program coherently developed, with an appropriate balance between high level research and responsiveness to real world issues as identified by key stakeholders in the different areas where the program is working?

WLE's comparative advantage lies in its character as a research for development program directly linked to goals associated with development outcomes, as provided by its predecessor, the CFWF program. However, a more active adoption of action research approaches, different types of stakeholder-led learning approaches, and analysis of the relationship between research and development are needed if this advantage is to be fully realized. The scope of issues examined, combining water, land and ecosystems in a global R4D program, is unique in many respects, as is the scope and strength of the partnerships and the range of field sites are impressive. There are again excellent examples of effective relationships between knowledge generation and development implementation at the project and, to an extent, cluster levels, in particular in many projects that receive significant levels of bilateral funding. The structured articulation of the R4D character of WLE is also likely to be advantageous in attracting bilateral funds, something that is essential for the development of a sustainable funding basis for the program.

The examples of research for development work found throughout the program, in many cases build on initiatives that predate WLE, creating a continuity of interaction with uptake partners that is a key feature of WLE. This would be greatly strengthened by more robust syntheses, better internal learning mechanisms and a clearer approach to the theory of change. The overall performance in this area would also be strengthened by the more consistent use of research for development methodologies such as learning platforms, action research and participatory iterative and adaptive approaches across the program. This would enable WLE to produce broadly applicable conclusions on the development relevance of research outputs as global public goods.

There are areas where WLE has established excellent convening power that can bring science and development together, in particular engaging with diverse stakeholders to build mutual understanding and agreement on the potential of different options to manage landscapes and improve agriculture. This is an important aspect of the change processes that WLE can catalyse, and again needs to be actively nurtured, by reaching out to other organizations that are also working on developing and piloting ecosystem approaches, although they may not be partners and/or they may hold different views or perspectives on matters of common interest.