



RESEARCH  
PROGRAM ON  
Water, Land and  
Ecosystems

A new integrated watershed rainwater  
management paradigm for Ethiopia

Key messages from the Nile Basin  
Development Challenge, 2009–2013



# A new integrated watershed rainwater management paradigm for Ethiopia

## Key messages from the Nile Basin Development Challenge, 2009–2013

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The author acknowledges contributions from many colleagues in the NBDC

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## Summary

This document synthesizes eight key messages which together constitute what we call a “**new integrated watershed rainwater management paradigm.**” These messages are based on the outputs and outcomes of a trans-disciplinary scientific research for development program that combines detailed local field research and engagement with local stakeholders, development and testing of practical learning, communication and planning tools, assessment of opportunities and likely outcomes from scaling out improved rainwater management, and engagement with Ethiopian policy makers and senior officials – all with a foundation in scientific excellence. It explains the messages and the evidence supporting them, and offers suggestions on how to use them to achieve the ambitious conservation and livelihood goals of Ethiopian land and water management investment programs. Implementing this new paradigm will bring lasting and equitable benefits to the rural poor and therefore help achieve Ethiopia’s development goals. It will also generate important downstream benefits in the Abay and other river basins. This document shares our major findings and proposes some next steps.

## Explanation

After a consultative planning period, implementation of the NBDC program began in 2010. It aims to improve the resilience of rural livelihoods in the Ethiopian highlands through a “landscape” or broad integrated watershed approach to rainwater management (RWM). We define RWM as including “sustainable land management” (SLM), “soil and water conservation” (SWC) and water management in an integrated natural resources management model. It includes understanding, mapping, storing, managing and efficiently using water and nutrients at landscape scales for multiple purposes. In the Ethiopian Highlands, RWM at landscape or watershed level includes crops, livestock, fisheries, trees, and most critical -- people. Better management of these resources will also improve the quality and availability of water for domestic use, and have significant downstream benefits. The goal is to enable poor small holders to sustainably and equitably improve their food security, livelihoods and incomes and increase the stream of ecosystem services, while conserving the natural resource base.

Implemented by a consortium of international and national partners<sup>1</sup> as part of the CGIAR Challenge Program on Water and Food (CPWF), this Research for Development (R4D) program combines analysis of past and current experiences with sustainable land and water management, local participatory field research including action research with community members (women as well as men), and modeling and application of spatial analysis to assess how improved practices and strategies can be scaled out and what the larger impacts would be. There is a strong emphasis on collaboration and engagement with stakeholders, inclusive reflection and learning, scientific excellence, communicating and sharing emerging research results during the research process, and strengthening both institutional and human resource capacities. The program will be completed at the end of 2013.

As part of the process of maximizing the quality of outputs and outcomes of the program, in early 2013 NBDC researchers contributed to identifying an initial set of “key messages” emerging from the research. More than 40 suggestions were made. We initially synthesized these into six key messages, which we proposed are the elements of a larger vision for a “new integrated watershed rainwater management paradigm.”

The draft messages were presented and discussed in detail at the 4th National Land and Water Management Platform meeting on 20-21 February 2013 (<http://nilebdc.org/news/>). The 40 or so participants spent nearly two days discussing the messages and the details and evidence behind them. The participants broadly endorsed the key messages and overall vision, but offered very important suggestions for refining and improving them. We are grateful to the participants for their hard work and commitment shown at the workshop. In March 2013 we circulated a document reflecting revisions made based on the workshop discussions and research results to that date. The revised document presented an over-arching vision and revised and improved key messages. This was widely shared and seems to have been generally accepted.

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<sup>1</sup> International Livestock Research Institute, International Water Management Institute, World Agroforestry Centre, Overseas Development Institute, Nile Basin Initiative, Stockholm Environment Institute, Ethiopian Economic Policy Research Institute, Catholic Relief Services – Ethiopia, Oromia Regional Research Institute, Amhara Agricultural Research Institute, Bahir Dar University, Ambo University, Nekemte University, the Ministry of Agriculture and Rural Development and the Ministry of Water Resources.

More recently, we have strengthened the evidence base for the messages and further revised them based on the stronger evidence base. On 9-10 July 2013, NBDC held a “Science Workshop” where about 30 papers and posters were presented and discussed. Its proceedings are being finalized for wider circulation (Mekuria, ed. 2013). The workshop presentations have provided additional evidence to support the original six key messages, and to propose two additional messages.

The revised final version of the key messages was shared at the NBDC Regional Stakeholders’ Dialogue on 23-24 July 2013 in Bahir Dar. At that meeting the messages were widely endorsed and were used as a basis for developing a concept note for the next phase of work. This concept note was prepared by a Task force led by Ethiopian researchers.

This revised document briefly explains the rationale behind each of the eight revised messages, the strength of the evidence, the references (sources), and what the NBDC team proposes as the next steps. The NBDC team believes that the findings from its work can be used to further strengthen the implementation of the Ethiopian government’s SLM program and more broadly, contribute to achieving its agricultural development and poverty reduction goals. The document therefore offers initial suggestions on possible future activities as a basis for a proposal for a collaborative future program linking applied and action research, targeted capacity building, and the use of new tools and models to directly support strengthening implementation of the Ethiopian SLM Program. Ethiopian leadership would be a central element of the proposed future program. We will continue to engage actively with Ethiopian policy makers and their partners to support the adoption and integration of our findings into investment programs.

## An overarching vision

Ethiopia's policies and programs on sustainable land and water management have evolved over several decades and have had important positive impacts on land management and livelihoods. We believe they are now on the cusp of being transformed and integrated into a new paradigm. However, further strengthening of the implementation of the SLM program is urgently needed to achieve its full promise and to maximize the benefits from the large investments currently being implemented or planned. We are not proposing radical changes in policy; the SLM program includes many elements of the new paradigm. Our contribution will be to improve program implementation and its outcomes by strengthening the scientific foundations, improving learning and sharing lessons from experience, enhancing the capacity of local officials and rural people to plan and implement integrated watershed-level investments, and using new participatory planning tools at local level as well as new modeling and spatial analysis tools at higher levels.

Implementation of the eight core elements of this emerging New Integrated Watershed Rainwater Management Paradigm will greatly improve the long-term benefits of the SLM Program at both local levels – enabling rural women and men to improve their incomes and livelihoods – and at national level – raising the rate of agricultural growth while conserving precious natural resources.

The eight core elements are highly integrated – success is more likely if all the elements are included. A landscape or watershed perspective is central to the new RWM paradigm. We believe that the critical innovations justifying our use of the term “new” emerging from NBDC are:

- The shape and integration of the core elements at watershed and landscape levels;
- The strong value placed on all participants learning and sharing lessons which we summarize as a “Research for Development” process -- essentially “learn by doing and sharing”;
- A strong scientific foundation, including innovative tools and methodologies for effective planning, learning and implementation emerging from NBDC.

Success is most likely if all the elements of the messages are included. A landscape or watershed perspective is central to the new paradigm.

The eight core elements of the New Integrated Watershed Rainwater Management Paradigm are:

- Empower local communities and develop their leadership capacities to achieve long-term benefits and sustainable outcomes.
- Integrate and share scientific and local knowledge and encourage innovation through ‘learning by doing’. Development partnerships are more likely to lead to sustainable outcomes than either local practices alone or promoting purely scientific technologies from outside the community.
- Strengthen and transform institutional and human capacities among all stakeholders to achieve the potential benefits of sustainable land management. This should include a special focus on supporting Development Agents as front-line champions of the new paradigm.

- Create, align and implement incentives for all parties to successfully implement sustainable innovative programs at scale.
- Adapt new models, learning and planning tools and improved learning processes to increase the effectiveness of planning, implementation, and capacity building.
- Integrate multiple rainwater management interventions at watershed and basin scales to benefit rainwater management programs.
- Attend to downstream and off-site benefits of rainwater management as well as upstream or on-farm benefits and costs.
- Improve markets, value chains and multi-stakeholder institutions to enhance the benefits and sustainability of rainwater management investments.

The primary audience for these core messages is all the partners working on SLM, including various levels of the Ethiopian government, national and regional research institutions and universities, NGOs and civil society organizations, rural communities and development partners. At the highest government level, we include the political leadership which sets the overall goals and policy framework, such as Ethiopia's Agricultural Growth Program (AGP) Agricultural Transformation Agency (ATA), and the Ethiopian Strategic Investment Framework for Sustainable Land Management (ESIF/SLM). In addition, the senior leadership of the SLM Program and its constituent projects in the Ministry of Agriculture is critical, as are the agricultural and water management leaders at Regional State level and government implementing agencies at woreda and kabele levels. Universities and research institutions have critical roles to play in capacity building, applied research, and promoting learning and sharing of lessons. NGOs and civil society organizations are important actors in implementation at field level, as are rural communities. Ethiopia's development partners provide substantial support for the SLM Program and therefore need to understand and support implementation of the new paradigm. In addition we believe international and regional institutions, governments and others working on water and land management in the Nile Basin and indeed Sub-Saharan Africa will be interested in these messages.

## NBDC science

Underlying the eight core messages is the critical importance of excellent science. “Research for Development” in no way implies sacrificing the quality of science; rather, it is an approach that uses excellent science to contribute to achieving positive changes. The July 2013 NBDC Science Workshop demonstrated that the program is indeed producing excellent scientific results which provide a firm evidence-based foundation for the New Integrated Watershed Rainwater Management Paradigm and the eight core messages (see the Proceedings, Mekuria, ed. 2013). A few indicative examples are:

- A new approach to reducing the damage done by termites in degraded semi-arid lands that is based on increasing bio-mass, thus increasing productivity while reducing termite damage (Peden et al. 2013; Legasse et al. 2013);
- New insights into the importance of livestock in mixed livestock-cropping systems and recommended strategies to increase their productivity, thus achieving higher water productivity at system level (Peden et al. 2011; Ergano et al. 2013);
- Evidence-based strategies to increase productivity and incomes from vertisol soils (Erkossa et al. 2013);
- A generic methodology for out-scaling and prioritizing rainwater management practices in agricultural systems in the Ethiopian Highlands (Notenbaert et al. 2013; Pfeiffer et al. 2012c); and
- New field-validated participatory planning tools at local watershed level that enable all stakeholders, including women and men, local officials, local traders, etc. whose use can enhance the quality and sustainability of RWM interventions (e.g., Pfeiffer et al. 2012a; Cullen et al. 2013).

## Key messages, evidence and proposals for the future

This section uses a table to present the vision and its eight core elements or key messages. The table contains four columns: messages, explanatory notes, strength and source of evidence, and next steps. The evidence column states whether the evidence is strong, moderate, or weak, and provides at least one supporting reference.

No.	Message	Explanatory Notes	Evidence: Strength & References <sup>2</sup>	Proposed Next Steps
	<i>Full implementation of the new integrated watershed rainwater management paradigm will increase the scale and sustainability of livelihood, income and agricultural growth objectives of the Sustainable land management in Ethiopia.</i>	<p>Broadly endorsed by February 2013 workshop participants. Sustainable land and water management (SLM, RWM) is a critical prerequisite for long term agricultural development of Ethiopia. Since the 1980s, Ethiopia has been learning important lessons from both implementation and research, and has modified its policies and implementation based on these lessons.</p> <p>The core elements of the new paradigm are based on recent research and implementation experience in Ethiopia and elsewhere, building on several decades of lessons learned; confirmed and enhanced by NBDC research to date.</p> <p>Much is known about the performance of specific RWM technologies, but too little attention has been paid to the synergies <i>among</i> interventions. There has been a growing recognition and policy shift towards more local participation, emphasize on livelihoods as well as conservation goals, integration of diverse interventions, and adoption of a watershed perspective. However, some of these changes have not yet reached their full potential in terms of outcomes.</p> <p>Recent NBDC work has developed tools and insights that make it possible to consolidate all these lessons into a new paradigm for future policy and implementation at the landscape scale.</p> <p>Potential scale of impact is substantial.</p>	<p>For point 1 in the Explanatory Notes column, strong evidence, synthesized in Merrey &amp; Gebreselassie 2011 and NBDC subsequent research referred to below; for international evidence see also Critchley &amp; Gowing, eds. 2012</p> <p>For point 2, strong evidence: Desta et al., eds. 2005; synthesis and references in Merrey &amp; Gebreselassie 2011</p> <p>For point 3, evidence is now strong; see references for specific messages below</p> <p>Strong evidence; see for example FAO 2009; Ethiopian SLM Secretariat 2008; Awulachew et al. 2010.</p>	<p>Further refine and develop the paradigm based on continuing research and engagement with stakeholders, especially the SLM national platform; this will involve open discussion on how best to use our recommendations</p> <p>If there is support, develop a <i>proposal for a future collaborative program</i> to scale up and out, monitoring and evaluation, and action research</p> <p>Obtain formal endorsement of collaborative program proposal from Ethiopia and submit to WLE program and other sources of support</p> <p>Consider making the Ethiopia collaborative program on RWM a part of a Nile Basin program</p>

<sup>2</sup> Numbering of this column on 'evidence' is keyed to the numbering in the 'explanatory notes' column.

No.	Message	Explanatory Notes	Evidence: Strength & References <sup>3</sup>	Proposed Next Steps
	<p><u>Communities</u> Empower local communities and develop their leadership capacities to achieve long-term benefits and sustainable outcomes.</p> <p>The role of government is to promote bottom-up planning, facilitate strengthening existing and new local institutions, manage conflict among different groups with competing views and priorities, support achieving equity (poverty, gender, age), and provide technical and financial support, capacity building, and an enabling environment</p>	<p>Strongly endorsed and strengthened by February 2013 workshop participants. The draft new <i>Agricultural Extension Strategy</i> describes “farmer-focused, innovation-led and sustainable service delivery” as its central vision.</p> <p>NBDC and other research supports this vision and shows that: “Communities” are highly diverse, with unequal power relations and often competing interests. Many residents of rural communities currently do not feel fully involved in prioritizing RWM interventions and therefore do not fully “buy in” and take responsibility and ownership of the interventions proposed</p> <p>Local institutional capacities, especially for managing conflicting views and agreeing on priorities for collective management at watershed level, need strengthening</p> <p>As a result of the previous points, RWM interventions have often not been sufficiently maintained and do not lead to the planned benefits</p> <p>There is a perception that depending on communities’ initiative will result in “slowing” implementation of vital RWM interventions. Continuous facilitation and dialogue are needed but these skills are in short supply</p> <p>A program driven by members of local communities may be slow initially as measured by physical infrastructure targets in the short term, but over a decade or more will achieve faster and longer-lasting sustainable outcomes</p> <p>Kebeles/woredas may be reluctant to relinquish control; devolving responsibilities to farmers may cause officials to lose power. Therefore, strong linkages to local governments is critical, but local government needs to be fully representative</p> <p>Insufficient focus on gender equity and inclusiveness is reducing potential RWM benefits. Conversely, a strong focus on inclusion of women and as well men in SLM and other programs usually produce very high returns.</p>	<p>The evidence is very strong overall for this message, from NBDC and also other research studies<sup>4</sup>. <i>The numbers refer to those in the Explanatory Notes:</i></p> <p>Strong evidence: Ludi et al. 2013a</p> <p>Strong evidence: Ludi et al. 2013a; Merrey &amp; Gebreselassie 2011 and references therein</p> <p>Strong evidence from past experiences and research summarized in Merrey &amp; Gebreselassie 2011</p> <p>Workshop participants</p> <p>Case study evidence from other countries, e.g. from RWM harvesting programs in Burkina Faso, and reforestation-SLM in China: Kabore-Sawadogo et al. 2012; World Bank 2007a,b</p> <p>Workshop participants</p> <p>Strong evidence from past experiences and research in Merrey &amp; Gebreselassie 2011; Farnworth 2013; Farnworth &amp; Gutema 2010; papers in German et al., eds 2012</p>	<p>Continue documenting and analyzing community and local watershed priorities and interests</p> <p>Develop guidelines as part of overall collaborative program proposal mentioned above, and integrate these into SLM Program</p> <p>Develop a clear strategy for a gender-equitable program</p> <p>Engage with kebele and worda level colleagues, and with NGOs/ CBOs having experience in this area on how this could be achieved</p>

<sup>3</sup> Numbering of this column on ‘evidence’ is keyed to the numbering in the ‘explanatory notes’ column.

<sup>4</sup> Globally, developing countries have tended to use top-down approaches. There is very strong evidence such approaches rarely achieve large-scale sustainable outcomes. There are no definitive studies demonstrating the efficacy of a fully community-driven approach, but there are a growing number of case studies offering good evidence.

No.	Message	Explanatory Notes	Evidence: Strength & References <sup>5</sup>	Proposed Next Steps
	<p><b>Partnerships</b>  <i>Integrate and share scientific and local knowledge and encourage innovation through 'learning by doing'. Development partnerships are more likely to lead to sustainable outcomes than either local practices alone or promoting purely scientific technologies from outside the community.</i>            Learning processes, including multi-stakeholder “Innovation Platforms” (IPs) at multiple levels (e.g. national, regional, river basin, woreda, watershed), can facilitate vertical and horizontal learning and sharing processes and decision-making to enhance the positive outcomes of investments in RWM/SLM. External facilitation and modest seed funds to encourage innovation and enhance the effectiveness of innovation platforms (especially at local levels) is highly recommended. Effective support and facilitation to achieve gender equity is critical and highly recommended. Enabling a culture of learning from experience and sharing knowledge, founded in excellent science, is critical to success.</p>	<p>February 2013 workshop participants strongly supported this message but were not comfortable with an earlier formulation distinguishing between “local” and “scientific” knowledge. The July 2013 Science Workshop documented some of the scientific foundation for NBDC findings.</p> <p>Neither local nor “science-based” introduced practices and technologies alone are sufficient</p> <p>Farmers have a wealth of fine-tuned detailed knowledge of their local agro-ecology and have continued to adapt RWM practices over time; many of these have proven very effective</p> <p>Some technologies from research and other sources are effective when introduced appropriately, but others have been shown to have negative outcomes</p> <p>Improved RWM involves social, economic and technical factors. Supporting local innovation processes for RWM can lead to very positive and sustainable outcomes</p> <p>Nevertheless, farmers often struggle to adapt to rapidly changing conditions and need alternative tested options</p> <p>It is time to move away from blueprints and quotas from above—these have proven to be counter-productive; instead, modify quotas to be outcome-based, tailored to local needs as identified jointly by the community and extension workers (see message 4)</p> <p>The approach should be pragmatic and needs-based, adapting interventions to local conditions and priorities. Ethiopian watershed management programs have been moving from a physical conservation focus to income-generating activities and improved upstream-downstream community interactions, which has improved results</p> <p>Better validation of outcomes through good trans-disciplinary scientific research is needed for both currently recommended and traditional RWM practices <i>in a landscape perspective</i>. R4D offers a promising model for building scientific research and learning processes into SLM implementation programs</p> <p>Benefits of improved RWM are not limited to production impacts; there are often benefits to the larger ecological system not easily quantified (see message 7)</p>	<p>The evidence is strong overall for this message, from NBDC, Volta and Limpopo BDCs, and other research studies. <i>The numbers refer to those in the Explanatory Notes:</i></p> <p>NBDC and other research, e.g. Merrey &amp; Gebreselassie 2011; Critchley &amp; Gowing, eds. 2012</p> <p>Strong evidence from NBDC and other research, e.g. Magersa 2011; Pagella et al. 2013; examples in Merrey &amp; Gebreselassie 2013; Critchley &amp; Gowing, eds. 2012;</p> <p>Strong evidence: several examples in Merrey &amp; Gebreselassie 2011 and references therein</p> <p>Strong evidence from other experiences, e.g. Jonfa &amp; Waters-Bayer 2005; GebreMichael &amp; Waters-Bayer 2007; Prolinnova-Ethiopia 2009; Abay &amp; Gebregiorgis 2009; Waters-Bayer &amp; Bayer 2009; emerging evidence from NBDC IPs (<a href="http://nilebdc.org/?s=innovation+platforms">http://nilebdc.org/?s=innovation+platforms</a>)</p> <p>February 2013 workshop participants; an example from NBDC is the experience with “Integrated Termite Management” (ITM) as a practical science-based strategy to reduce damage from termites (Peden et al. 2013; Legasse et al. 2013)</p> <p>Good evidence, e.g. Ludi et al 2013a; Merrey &amp; Gebreselassie 2011 and references therein</p> <p>February 2013 workshop participants; Merrey &amp; Gebreselassie 2011 and references therein on MERET program; Liu et al. 2008 for Amhara (AMAREW) case.</p> <p>February 2013 workshop participants; Merrey &amp; Gebreselassie 2011; Merrey 2013; Merrey et al. 2013; Sayer et al. 2013.</p> <p>February 2013 workshop participants; case studies from other countries, e.g. experiences with Payment for Ecosystem Services – see</p>	<p>Document examples of integration of local and other practices, efficacy of local practices</p> <p>Consult NGOs and others with experience in facilitating farmer innovation to learn best practices, and establish partnerships where feasible (e.g. with Prolinnova)</p> <p>Work with MoA to develop an implementation strategy</p> <p>Work with MoA to identify alternative ways of objectively measuring program performance (see incentives message 4)</p> <p>Include a strong component of multi-disciplinary research led by Ethiopian research institutions for validating outcomes as part of larger collaborative program proposal (above)</p> <p>Scan international literature for additional cases of use of IPs or equivalents, especially over long term</p> <p>Commission an assessment of IP experience from stakeholders’ [including</p>

<sup>5</sup> Numbering of this column on ‘evidence’ is keyed to the numbering in the ‘explanatory notes’ column.

Integration of multiple sources of knowledge and partnerships are included in the proposed Agricultural Extension Strategy but could be more clearly articulated

Seed funds can be successfully used to stimulate local innovation

On IPs, February 2013 workshop participants endorsed this concept but agreed the evidence is still “emerging”. They referred to other examples, for example “RiPPLE”, and a participatory forest management project, but noted there is no long-term evidence for sustainability and impacts

NBDC has pilot-tested IPs in 3 woredas. Results are promising and indicative according to reports on the NBDC website.

Other terms include “Learning and Practice Alliances” (RiPPLE), ‘Learning Catchments,’ and “Learning Alliances” (Multiple Use Water Services [MUS] project) and “Engagement Platforms” (CPWF). The MUS project was international including Ethiopia

Indicative positive results on IPs are emerging from other CPWF basins (Limpopo, Volta) as well as other cases in SSA

Value chain approach and innovation systems are the conceptual basis for IPs

The critical issue is how to scale up IPs while maintaining a reasonable amount of effectiveness (move from “learning to be effective” to “learning to be efficient” to “expansion”)

February 2013 workshop participants suggested focusing on kebele level (in part as a way to pressure for change upstream), and integrating the IP concept into existing groups or initiatives, e.g. Development Groups at local level, and at national level, the Agricultural Growth Program (AGP), and national SLM platform

Bennett et al. 2013, and references under message 7

NBDC team comments & recommendations on draft Agricultural Extension Strategy

African BDC evidence is indicative, based on experience from NBDC & other BDCs in Africa; CPWF 2013a;

(<http://www.slideshare.net/ILRI/nbdc-local-innovation-platforms-progress-so-far>); Stronger evidence from Prolinnova (Prolinnova-Ethiopia 2009; Prolinnova 2012)

Workshop participants. Indicative evidence for shorter term, but no strong evidence for long term outcomes

Evidence is from experiences posted on NBDC website: <http://nilebdc.org/tag/innovation-platforms/>. See also Cullen et al. 2013. No reports are available on the effectiveness at national level, but Most Significant Change (MSC) stories are positive.

[www.rippleethiopia.org](http://www.rippleethiopia.org); Tucker et al. 2013; [www.mus.net](http://www.mus.net); Smits et al., eds. 2007 ;

<http://waterandfood.org/page/2/?s=innovation+platforms>.; Clayton 2013

(<http://wle.cgiar.org/blogs/2013/07/11/>); Tenywa et al. 2011 for SSA Challenge Program. Results are indicative, no formal assessment available.

Spielman 2005, Spielman et al. 2008 on innovation systems; Merrey & Gebreselassie 2011

How to scale up innovation platforms is an issue that needs more work to ‘learn to be efficient’ and then expand nationally; Korten 1980 offers a useful conceptual model for designing further testing.

Integration into existing initiatives seems to be a practical approach, needs to be tested and validated; some concern expressed by researchers that important stakeholders may not be included, and IPs would lose clarity of focus. See CPWF 2013b. See Clayton 2013

women’s] perspectives including advice for the future

Assess how to integrate IP concept into existing or planned programs and platforms

Develop a plan for wider testing and scaling up as part of larger collaborative program proposal

No.	Message	Explanatory Notes	Evidence: Strength & References <sup>6</sup>	Proposed Next Steps
	<p><u>Capacities</u> <i>Strengthen and transform institutional and human capacities among all stakeholders to achieve the potential benefits of sustainable land management. This should include a special focus on supporting Development Agents as front-line champions of the new paradigm.</i></p> <p><u>Human resources</u> <i>Implementers: Improve the formal training curriculum (e.g. TVET, as planned), complemented by continuous in-service training, e.g. in problem-solving, communication and facilitation skills, and explicit attention to gender</i> <i>Implementers, farmers: Supplement formal training with informal hands-on training for farmers and other stakeholders (including special arrangements for women), e.g. through farmer field days, farmer-to-farmer exchanges</i> <i>Farmers: Make greater use of learning tools such as games, including those developed and tested under NBDC</i> <i>Researchers: Long and short term training, facilitate access to resources for example on-line material</i></p>	<p>February 2013 workshop participants considered this a very high priority message, but proposed two distinctions: between developing human resources and institutional capacities; and between research and implementation (both extension workers and farmers) capacities. They also strongly recommended implementing a Training Needs Assessment (TNA) (see below).</p> <p><u>Human resources</u> Improving training is central to the draft Agricultural Extension Strategy Informal hands-on training is also discussed in draft Agricultural Extension Strategy Learning tools discussed under message 5 February 2013 workshop participants from research institutions felt that research should have a higher priority, as Ethiopia moves to “knowledge-based development”, and that the previous emphasis on ‘massification’ of education should now shift to a greater focus on quality; this shift to quality should emphasize trans-disciplinarity and effective collaboration with research consumers Well-supervised post-graduate students can play important roles in obtaining feedback on intervention programs as well as contributing to their capacity building DAs are the front-line personnel for promoting improved RWM and the potential “champions” for the new integrated RWM paradigm. They need to be better trained, with new skills, strong technical support, and better incentives</p> <p><u>Institutional capacity</u> February 2013 workshop participants emphasized the need to improve the quality of facilities for both researchers and development agents February 2013 workshop participants also emphasized the need to improve the incentives for researchers and extension staff, especially regarding facilities for families, etc. The February 2013 workshop participants strongly recommended carrying out a national “Training Needs Assessment” (TNA) for promoting improved RWM. This should be broad-based, examining institutional capacities, incentive structures, actual skills and knowledge needed, targeting training, etc. They proposed developing a terms of reference,</p>	<p>The remarkable progress made in Ethiopia as a result of its investments in human resources and strengthening institutional capacities is strong evidence in favor of these investments. <i>The numbers refer to those in the Explanatory Notes:</i></p> <p><u>Human resources</u> Draft Agricultural Extension strategy Draft Agricultural Extension Strategy; experience gained in Ethiopia and elsewhere with farmer-farmer training, farmer field schools, etc. See message 5. February 2013 workshop participants’ experiences. NBDC and other CGIAR experience—NBDC project reports. See 16 January 2013 posting on <a href="http://nilebdc.org/">http://nilebdc.org/</a> on student capacity building. <u>Institutional capacity</u> Strong evidence: Ludi et al. 2013b; building on evidence in Ludi et al. 2013a. Consistent with draft Agricultural Extension strategy. See message 4 on incentives. February 2013 workshop participants’ experiences. February 2013 workshop participants’ experiences. February 2013 workshop participants’ recommendation. Professionally implemented based on a carefully prepared TOR, TNAs can be a very important tool for planning future strategies and investments; methodologies and samples are available.</p>	<p>Engage further with MoA on the draft Agricultural Extension Strategy (NBDC has submitted comments) Collaborate with MoA and others in strengthening TVET and other RWM training curriculum and training methods The first two points could be part of the proposal for the larger future collaborative program Offer to collaborate with research institution partners to help them develop the case for improving facilities and incentives for researchers Take the lead in developing a short concept note on implementation of a TNA and remain in touch with its implementation as peer reviewers</p>

<sup>6</sup> Numbering of this column on ‘evidence’ is keyed to the numbering in the ‘explanatory notes’ column.

Support use of well-supervised post-graduate students to obtain independent feedback on RWM programs and innovations

Institutional capacity

Improve quality of facilities, e.g. internet access

Improve incentive structure (e.g. benefits like housing, schooling) for researchers, especially those posted in Regions

Training Needs Assessment recommended by February 2013 workshop participants

seeking resources from the Ministry of Agriculture, and outsourcing to consultants. A consultative workshop should be used to get feedback on the proposed work plan and methodology, and workshops to share and get feedback on draft report.

No.	Message	Explanatory Notes	Evidence: Strength & References <sup>7</sup>	Proposed Next Steps
	<p><u>Incentives</u> Create, align and implement incentives for all parties to successfully implement sustainable innovative programs at scale.</p> <p>There are several dimensions:</p> <p><u>For service-providers</u> Extension workers should be rewarded for good performance, based on customer satisfaction and sustainable outcomes. Incentives do not need to be monetary – other kinds of positive encouragement also work</p> <p>Incentives for innovation are important – rewarding good efforts which fail (but are a source of lessons), complemented by managing risks to protect vulnerable farmers</p> <p><u>For farmers and investors</u> Distinguish private and public benefits and costs (see message 7) Use market incentives where possible (see message 8). “Smart” subsidies or other incentives can be used to ensure equity, for example provision of opportunities to women and youth (see message 1)</p>	<p>This message was endorsed by the February 2013 workshop participants but with important adjustments in terms of targeting, use of informal as well as formal rewards, and emphasis on encouraging innovation</p> <p><u>For service providers</u> Current incentive system for extension workers is based on physical targets, often leading to inappropriate interventions “Incentives” should be understood in a broad sense, to include formal and informal rewards, e.g. public recognition, social networks, opportunities for training, encouragement, etc.; and to also include risk management mechanisms as poor farmers are very vulnerable in case an innovation fails Incentives for innovation are very important, but more difficult to design – further thinking and pilot testing would be needed. “Seed funds” made available to local IPs is an example of incentives for innovation that NBDC has found effective</p> <p><u>For farmers, communities and investors</u> Evidence on need to get incentives right for RWM interventions emerges strongly from NBDC and other research, and positive examples from other countries, e.g. China, USA, Latin America. Growing body of evidence from “Payment for Ecosystem Services” (PES) and similar systems internationally Work with NGOs and other organizations to learn from experiences and harmonize approaches Evidence from other African countries suggesting targeted benefits or subsidies can be effective in promoting adoption of new practices and innovation by poor women and men</p>	<p>Overall, there is good evidence for the need to make changes, but mixed evidence on the efficacy of specific solutions. <i>The numbers refer to those in the Explanatory Notes:</i></p> <p>Strong evidence: Ludi et al. 2013a document problems with current incentive system for DAs as does the new draft Agricultural Extension Strategy and references therein; evidence is strong that changes are needed. February 2013 workshop participants. February 2013 workshop participants emphasized the need for incentives for innovation; NBDC emerging evidence on IPs’ use of seed funds is suggestive (see above, message 2). How to encourage innovation while retaining an effective incentive structure for thousands of extension workers needs more thought and testing; perhaps NGOs and CBOs could be useful partners. Most spectacular case: China ‘Gain for Green’ program (Loess Watershed Rehabilitation Project), World Bank 2007a, b; also USA soil and water conservation: Zobeck &amp; Schillinger, eds. 2010. Porras et al. 2008 provide an overview of global experiences including factors affecting success. Evidence is strong for developed countries, mixed but growing for developing countries with weaker institutions, e.g. Bennett et al. 2013. February 2013 workshop participants Strong evidence, e.g. Denning et al. 2009 on Malawi input subsidy program; Mangisoni et al. 2007; Shiferaw &amp; Holden 2000 for Ethiopian Highlands; and many other references available on targeted benefits.</p>	<p><u>Service-providers</u> Scan international literature on incentive systems and on encouraging testing and innovation Identify Ethiopian cases of use of non-monetary incentives</p> <p><u>Farmers and investors</u> Working with MoA and other stakeholders, develop clear guidelines on cost- and benefit-sharing on watersheds, optimizing overall benefit stream, and how the concept of ‘smart subsidies’ can be tested in Ethiopia (see message 7) Design an action research program on watershed RWM incentive systems as part of larger collaborative program proposal</p>

<sup>7</sup> Numbering of this column on ‘evidence’ is keyed to the numbering in the ‘explanatory notes’ column.

No.	Message	Explanatory Notes	Evidence: Strength & References <sup>8</sup>	Proposed Next Steps
5.	<p><b>Learning tools</b></p> <p><i>Adapt new models, learning and planning tools and improved learning processes to increase the effectiveness of planning, implementation, and capacity building.</i></p> <p>These include:</p> <p>Integrated hydrologic, water resource, and economic models for planning, scaling out, and impact assessments</p> <p>User-friendly tools to facilitate local level learning, training, and identifying appropriate interventions</p> <p>A centralized database for geographical and other data could enhance the efficiency of planning, implementation, learning, and evaluation processes</p>	<p>February 2013 workshop participants supported this message and suggested some refinements. The July 2013 Science Workshop demonstrated further progress.</p> <p>NBDC and other projects in Ethiopia and elsewhere have developed excellent models and tools that are useable for practical purposes and user-friendly.</p> <p>Need to simplify the tools, make them more user-friendly, and validate their actual usefulness and impact.</p> <p>Integrated modeling and spatial analysis at basin scale can inform policy and planning processes. February 2013 workshop participants: a full suite of tools customized for different users will constitute a useful decision support system (DSS)</p> <p>Combine local and external knowledge and in an iterative process share with local communities in a user-friendly format</p> <p>Combining the suite of tools with recommendations on process appears critical to success</p> <p>Need to invest in necessary infrastructure as well (e.g. computers, internet access)</p> <p>Currently obtaining data is difficult and time-consuming, reducing efficiency of research and planning.</p>	<p>Overall, there is good evidence for the potential usefulness of models and learning and planning tools but more work is needed. <i>The numbers refer to those in the Explanatory Notes:</i></p> <p>Good evidence; examples are WAT-A-GAME, participatory videos, digital stories, Happy Strategies game, Nile Goblet Tool, application of SWAT, etc. Pfeifer et al. 2012a, b, c; <a href="http://www.watagame.info/">http://www.watagame.info/</a>; <a href="http://nilebdc.org/">http://nilebdc.org/</a> &amp; <a href="http://www.watagame.info/">http://www.watagame.info/</a>; <a href="#">Notenbaert et al. 2013</a> ; <a href="#">McCartney et al. 2010</a> ; <a href="#">Zemadim et al. 2013</a> ; <a href="#">Schmidt &amp; Zemadim 2013</a> ; <a href="#">Assagahegn &amp; Zemadim 2013, etc.</a></p> <p>February 2013 workshop participants; the process of making them more user-friendly is currently being done to some extent under NBDC but more must be done; an effective monitoring system is needed to assess usefulness.</p> <p>Good evidence at pilot scale; examples are Nile Goblet tool, basic user-friendly GPS &amp; GIS, and use of WEAP, SWAT, spatial analysis <a href="http://nilebdc.org/?s=nile+goblet+tool">http://nilebdc.org/?s=nile+goblet+tool</a>; <a href="#">Example: recent work in Abay Basin of modeling and spatial analysis identified erosion “hot spots”</a>.</p> <p>February 2013 workshop participants; “Happy Strategies” game and WAT-A-GAME are examples.</p> <p>Tools alone are not enough; they need to be used in a learning-oriented process. Needs further validation (February 2013 workshop participants).</p> <p>February 2013 workshop participants</p> <p>Experience of many researchers and others expressed by NBDC team</p>	<p>Work on further simplifying and field testing learning tools developed under NBDC</p> <p>Prioritize completing development and integration of modeling and spatial analysis tools for use as a DSS</p> <p>Prepare a plan for scaling the use of such tools out, and promoting a learning process, as part of the proposed larger collaborative program</p>

<sup>8</sup> Numbering of this column on ‘evidence’ is keyed to the numbering in the ‘explanatory notes’ column.

No.	Message	Explanatory Notes	Evidence: Strength & References <sup>9</sup>	Proposed Next Steps
6.	<p data-bbox="141 231 425 406"><i>Integrate multiple rainwater management interventions at watershed and basin scales to benefit rainwater management programs.</i></p> <p data-bbox="141 422 459 598">Promoting single interventions at a mass scale often leads to sub-optimum outcomes, and often to implementing inappropriate technologies</p> <p data-bbox="141 614 459 853">Integrated planning and implementation at watershed and basin scales will produce synergies that result in significant positive impacts on both people's livelihoods and natural resource conservation</p> <p data-bbox="141 869 459 1021">Careful identification of private on-site costs and benefits from downstream or off-site costs and benefits is critical (see message 7)</p>	<p data-bbox="488 231 1265 383">This message was briefly discussed at the February 2013 but was not identified as a key message. The researchers later realized that integration and synergies among multiple RWM interventions is in fact critical. This also emerged from papers presented at the July 2013 Science Workshop as well as other sources.</p> <p data-bbox="488 399 1265 486">Ethiopia has a long history of promoting single interventions, for example stone terraces, bunds, and below-ground tanks, but there is strong evidence these often do not produce good results</p> <p data-bbox="488 502 1265 558">We observed this practice continues even today, for example at the NBDC research sites</p> <p data-bbox="488 574 1265 662">Far greater benefits over a longer period will accrue if an integrated approach at watershed level is used, identifying an appropriate mix of interventions for different zones</p> <p data-bbox="488 678 1265 734">NBDC experience with participatory planning tools has shown that this multiple intervention strategy is feasible</p> <p data-bbox="488 750 1265 861">Private on-site benefits by themselves may not provide sufficient incentive for farmers to invest in RWM interventions; where the benefits accrue elsewhere, an appropriate incentive strategy is critical, to align benefits and costs (see message 7)</p>	<p data-bbox="1294 231 1825 383">Overall, there is very good evidence for the advantages of integration of multiple RWM interventions in different parts of watersheds and basins, depending on local conditions. <i>The numbers refer to those in the Explanatory Notes:</i></p> <p data-bbox="1294 399 1825 486">Very strong evidence, much of it summarized in Merrey &amp; Gebreselassie 2011 and references therein.</p> <p data-bbox="1294 502 1825 558">Very strong evidence from personal observation of researchers; Ludi et al. 2013a.</p> <p data-bbox="1294 574 1825 662">Strong evidence, e.g. Legasse et al. 2013; Peden et al. 2013; Getnet &amp; Macallister 2012; Gebregziabher et al. 2013.</p> <p data-bbox="1294 678 1825 734">Indicative but good evidence. See message 5 references above.</p> <p data-bbox="1294 750 1825 861">Strong evidence; see references for message 7. Too many studies focus only on on-farm benefits and costs, which under-state the potential benefits and opportunities for cost-sharing.</p>	<p data-bbox="1854 231 2128 486">As a component of a future collaborative program, further refine models and participatory planning tools as a basis for integrated RWM planning, implement, and monitor outcomes.</p> <p data-bbox="1854 502 2128 646">Scale out use of validated tools and analytical framework for planning and implementation at multiple scales.</p>

<sup>9</sup> Numbering of this column on 'evidence' is keyed to the numbering in the 'explanatory notes' column.

No.	Message	Explanatory Notes	Evidence: Strength & References <sup>10</sup>	Proposed Next Steps
7.	<p><b>Benefits and costs</b></p> <p><i>Attend to downstream and off-site benefits of rainwater management as well as upstream or on-farm benefits and costs.</i></p> <p>Where the benefits of RWM investments accrue as a broad public good, or to other stakeholders such as those downstream, or only after considerable delay, appropriate incentives need to be available to private investors (e.g. farmers adopting RWM) (see message 4)</p>	<p>This message was previously embedded in the message on incentives (message 4), but during the Science Workshop in July 2013, and based on critical review of other studies, NBDC team members realized that its importance justifies a separate message.</p> <p>Too many economic analyses of SLM, SWC (RWM) interventions focus entirely on the on-site benefits and conclude such investments have poor benefit-cost ratios. If all costs are attributed to on-site benefits, there is often insufficient incentive to invest</p> <p>More studies are needed that carefully separate the on-site and off-site (upstream, downstream) benefits as a means to allocate costs</p> <p>Where substantial benefits accrue downstream (off-site), funding mechanisms are needed to encourage benefit and cost sharing, including upstream investments; Payment for Ecosystem Services (PES) is one approach being introduced in many places globally</p> <p>Successful implementation of Ethiopia's SLM Program will most likely generate substantial downstream benefits which need to be identified and recognized by policy makers</p>	<p>Overall, there is good and increasing evidence that a full understanding of the benefits and costs of RWM interventions must be analyzed in a broader basin perspective. However, this issue is not adequately studied in the Blue Nile or other basins in Ethiopia. <i>The numbers refer to those in the Explanatory Notes:</i></p> <p>Multiple examples including some NBDC studies, e.g. Getnet 2013; cases summarized in Merrey &amp; Gebreselassie 2011; see Hagos et al. 2006, 2007; Kassie et al. 2008. Shiferaw &amp; Holden 2000 discuss alternative policies to support SLM in Ethiopia.</p> <p>Strong evidence of likely importance of such studies, based on reviewing past studies. See also Awulachew et al., compilers, 2009 and several papers in this Proceeding, e.g. Bashar &amp; Khalifa 2009; Tenaw &amp; Awulachew 2009; Gebreselassie et al. 2009; Tafesse 2009; and Steenhuis et al. 2012, 2013.</p> <p>Minimal evidence from Blue Nile (e.g. Alemayehu et al. 2009); moderate to strong evidence from Latin America, USA, &amp; elsewhere. See China 'Gain for Green' program (Loess Watershed Rehabilitation Project), World Bank 2007a,b; USA soil and water conservation: Zobeck &amp; Schillinger, eds. 2010; Porras et al. 2008 and Bennett et al. 2013 review global experiences.</p> <p>Indicative evidence, e.g. some references in Awulachew et al., compilers 2009; Steenhuis et al. 2013.</p>	<p>As a component of the proposed follow-up collaborative program, design a research and consultation program to develop a robust analytical framework, clearly specify the range of stakeholders, and quantify benefits and costs of improved RWM at watershed and basin level. This program should be done in collaboration with NBI, ENTRO and research institutions in member countries.</p> <p>Working with MoA and other stakeholders, develop clear guidelines on cost- and benefit-sharing on watersheds, optimizing overall benefit stream, and how the concept of 'smart subsidies' can be tested in Ethiopia as proposed above in message 4.</p>

<sup>10</sup> Numbering of this column on 'evidence' is keyed to the numbering in the 'explanatory notes' column.

No.	Message	Explanatory Notes	Evidence: Strength & References <sup>11</sup>	Proposed Next Steps
8.	<p><b>Value chains</b>  <i>Improve markets, value chains and multi-stakeholder institutions to enhance the benefits and sustainability of rainwater management investments.</i></p> <p>A market-driven (value-chain) approach, identifying how to optimize fairly the benefits for all stakeholders while reducing transaction costs and sharing costs equitably, will increase the likelihood of success (see message 4)</p> <p>Strong value chains in which producers receive a fair share of benefits through appropriate institutions will lead to higher incomes and sustainability of RWM interventions</p>	<p>This message was also previously embedded in the message on incentives (message 4). During the July 2013 Science Workshop and additional analysis has helped us realize that this message is extremely important and needs more emphasis.</p> <p>Strengthening markets and agricultural value chains is a central focus of the Ethiopian AGP</p> <p>Enhancing the value of agricultural produce and ensuring a fair share of the added value to rural producers will improve livelihoods and promote agricultural growth</p> <p>Stronger multi-stakeholder rural institutions can enhance rural women's and men's share of agricultural profits and is consistent with government policy</p> <p>Effective markets and empowered producers offer additional capacity and incentives to invest in good management of natural resources</p>	<p>Very strong evidence overall. <i>The numbers refer to those in the Explanatory Notes:</i></p> <p>See the Ethiopia Agricultural Growth Program (AGP) documentation.</p> <p>Very strong evidence; see for example Dorosh &amp; Thurlow 2009; Mellor &amp; Dorosh 2010.</p> <p>Moderately strong evidence for the need, though weaker on application. See for example Tamir et al. 2013;</p> <p>Good evidence; see for example studies referenced in Merrey &amp; Gebreselassie 2011; Oumer et al 2013 and references therein.</p>	<p>Integrate into proposed future collaborative program a strong focus on action research to identify effective institutional arrangements and strategies to enable rural women and men to benefit from market opportunities.</p> <p>Integrate future RWM work with other programs that already include an emphasis on value chains, markets and strengthening institutions.</p>

<sup>11</sup> Numbering of this column on 'evidence' is keyed to the numbering in the 'explanatory notes' column.

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