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Rhetoric versus Realities

A diagnosis of rainwater management development processes in the Blue Nile Basin of Ethiopia

Eva Ludi, Alemayehu Belay, Alan Duncan, Katherine Snyder, Josephine Tucker, Beth Cullen, Mathewos Belissa, Temesgen Oljira, Asefa Teferi, Zerihun Nigussie, Andenet Deresse, Mulu Debela, Yazie Chanie, Dagnachew Lule, Dawit Samuel, Zelalem Lema, Abeje Berhanu, Douglas J. Merrey

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Cover photo: NBDC researchers conduct Focus Group discussions with community members in Diga

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Project information

The "Integrated rainwater management strategies – technologies, institutions and policies" is part of the Nile Basin Development Challenge (NBDC). The overall NBDC challenge is to strengthen rural livelihoods and their resilience through a landscape approach to rainwater management. This Project examines the extent to which new technologies can combine with policy changes and institutional strengthening and reform to spur widespread innovation. It seeks to optimize the roles and contributions of micro-credit, land tenure, collective action in communities, and formal and informal institutions to integrated rainwater management strategies.

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IFAD Enabling poor rural people to overcome poverty

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The paper has taken more time to reach publication than we had anticipated, but we believe this has allowed us to improve its quality and usefulness.

Authors
January 2013

Acronyms

ARDPLAC	Agriculture and Rural Development Partners Linkage Advisory Council
CPWF	Challenge Program on Water and Food
DAs	Development Agents
FREGs	Farmer-Research-Extension Groups
GTP	Growth and Transformation Plan
ILRI	International Livestock Research Institute
IPMS	Improving Productivity and Market Success of Ethiopian Farmers
IWMI	International Water Management Institute
MERET	Managing Environmental Resources to Enable Transitions to More Sustainable Livelihoods (a WFP-supported Food Security Project)
MoARD	Ministry of Agriculture and Rural Development
NGOs	Nongovernmental organizations
NBDC	Nile Basin Development Challenge
NRM	Natural Resources Management
ODI	Overseas Development Institute
OWR	Office for Water Resources
PASDEP	Plan for Accelerated and Sustained Development to End
RWM	Rainwater Management
RELC	Research-Extension Liaison Committee
REFLAC	Research-Extension-Farmers Linkage Advisory Council
SWC	Soil and Water Conservation Interventions
SMSG	Subject Matter Specialist Groups
WFP	World Food Programme

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Crop residue storage after harvesting in Fogera

Executive summary

Smallholder rainfed farming is the backbone of the Ethiopian agriculture sector, the dominant contributor to national GDP, and at the heart of the country's current national economic growth strategy. Considerable potential exists for enhancing food production and rural livelihoods through better rainwater management (RWM). "Rainwater management" refers to interventions which enable smallholder farmers to increase agricultural production – focusing on livestock, trees, fish as well as crops – by making better use of available rainwater while sustaining the natural resource base (water and soils) in rainfed farming systems. Ethiopia has invested extensively in RWM interventions, in particular soil and water conservation and afforestation, over the last 40 years, but often with disappointing impact, for multiple reasons. Given this limited success in natural resource conservation, a new approach is clearly needed, but what should it be? This question is at the centre of the Nile Basin Development Challenge (NBDC) programme, part of the larger "Challenge Programme on Water and Food". The two key elements of the NBDC approach are (1) viewing RWM as a landscape-scale issue, whereby watersheds are conceived as socio-agro-ecological systems with social, economic and institutional networks that may cross-cut hydrological boundaries; and (2) recognising that improving RWM successfully, and on a sustainable basis, requires a focus on institutions as well as technologies, and a new approach to planning, implementation and monitoring of interventions.

The NBDC program is implemented through five related projects. The Nile 2 project (N2), "*On integrated RWM strategies – technologies, institutions and policies*", is centred on field research in three pilot learning sites. The starting point for research in N2 is that integrated RWM strategies need to combine technologies/practices, policies and institutions, and need to be developed through innovative approaches that bring together different stakeholders. Because policies and institutions can foster or discourage the adoption of productivity-increasing, resource-conserving strategies by farmers, the project also examines the extent to which policy change and institutional strengthening and reform could be combined with new technologies to spur widespread innovation.

A central mechanism for stimulating innovation within the NBDC is the use of "innovation platforms" at district and national level. The diagnosis reported here was in part designed to inform the development of innovation platforms by providing a baseline understanding of existing RWM strategies and institutional arrangements at local level. There are various elements to this. First, we were interested in how RWM interventions are planned and implemented at local level, and how different actors are involved in this process. Second, as planning and implementation processes are heavily influenced by government at all levels, we were interested in what this dominance means for local "innovation capacity". Finally we wanted to understand the diversity of local livelihood strategies and how these might intersect with formal and informal approaches to RWM in our study sites.

Three *woredas* (districts) in the Blue Nile (Abay) Basin of Ethiopia were selected for intensive study as part of the larger project. These are Jeldu and Diga in Oromiya Regional State and Fogera in Amhara Regional State.

Ethiopia is often cited as an example of severe natural resource degradation. As a country reliant on an agricultural sector dominated by smallholder farming, land degradation presents a major challenge in terms of agricultural productivity, food security and rural livelihoods. Various land and water management programs have been implemented on farms and community lands over the past four decades, undertaken by government agencies in collaboration with national and international organizations. However, success to date has been limited. A short review of past interventions, policy and politics is presented in order to gain an understanding of the current policy situation.

The rationale for focusing on planning and implementation of RWM was based on the recognition that a number of national and regional policies and strategies in relation to RWM exist. These include very detailed guidelines, for example for participatory community watershed management. However, planners, in particular at lower administrative levels, do not have sufficient tools and skills available to engage at a landscape level for effective integrated and multi-sectoral planning and implementation of RWM. In sum, a major hypothesis guiding this research was that there is a gap between available policy and guidelines and specific implementation. The baseline study also assessed the effectiveness of RWM planning in terms of its being evidence-based, tailored to social and ecological niches, cross-sectoral, and participatory. Opportunities and barriers to strengthen RWM processes were then identified.

Two different levels of planning and implementation of RWM interventions have to be distinguished. First are those interventions being carried out by farmers themselves on their own land, for which no kebele-wide plans exist but which farmers do on their own initiative as part of their normal cropping practices. Second are those RWM interventions at larger scale such as watershed protection, for which collective action is needed and for which more planning and coordination is required. Regarding these latter plans, farmers feel that the practice and theory of planning are quite different, the planning process seems dominated by a top-down approach and local realities are not well reflected. This is largely the result of the use of targets defined at national level for the period 2011 to 2015 as part of the Growth and Transformation Plan. Several issues were identified that need to be addressed if improving RWM is to become an integral part of sustainable agricultural development. These relate to the discrepancy between policy and practice, the notion of participation, the role of and incentives for Development Agents (DAs), weaknesses in anticipating conflicting interests, and missed opportunities to tap into local knowledge that could enhance sustainability of interventions. Overall our research has identified a critical dilemma in relation to planning that needs to be resolved if RWM interventions are to be owned by farmers, be sustainable, and make a meaningful contribution to improved environmental management and better livelihoods: reconciling national plans, output targets and a generally top-down planning process, and devolution, decentralisation and participation of planning and co-development of innovations at the lowest possible level.

As in the case of planning, many actors are involved in implementing RWM practices. Our research focused primarily on those community-wide interventions which require larger investments, coordination across a watershed, and more technical know-how, and which are implemented by farmers in the form of NRM (natural resources management) campaigns under close supervision of DAs and with technical inputs from woreda experts. A key issue mentioned was that many of the RWM and NRM implementation activities are carried out as one-off campaigns to achieve targets without due attention to the future maintenance and sustainability of interventions.

Many RWM interventions have a long tradition in the study sites, particularly those implemented by farmers on their own land, alongside normal cropping and farm management practices and involving little or no cost. Other more labour and cost-intensive interventions need coordination across several farms or a watershed and are much less likely to be sustainable. There are several reasons for the poor sustainability of these interventions. These include: lack of relevance to local priorities; weakness in technical design; lack of voluntary collective action; lack of clear governance arrangements for interventions on communal land; poor follow-up and monitoring; and a focus on isolated technical interventions.

Despite several decades of intensive investments in RWM and natural resource management across Ethiopia, the impact on livelihoods and natural resources quality and quantity in many areas is rather disappointing. This should not distract, however, from the numerous sites across the Ethiopian Highlands where RWM and NRM has been more successful and is reported to have led to increasing household wellbeing, increasing community resilience and improved availability of a variety of natural resources. Many land and water management technologies and approaches are not achieving their full impact, mainly because of low levels of ownership and sustainability, but also because where degradation of natural resources is less

advanced, the benefits of natural resource conservation are more difficult to detect. Approaches to NRM and RWM have historically been technology-oriented and top-down in approach with insufficient regard for the needs, aspirations, constraints and livelihood realities faced by farming communities. In addition, many RWM investments were seen as an end in themselves rather than a means to achieve improved household wellbeing and increased community resilience – as has been recognised by some programs such as "MERET". It is of critical importance that RWM strategies adopt a people-centred approach which takes into account local livelihood strategies and constraints, cultural, social and institutional dynamics as well as power relations and gender issues. It is essential to gain an understanding of these aspects because they feed into development planning for sustainable land use and livelihoods. Farmers' livelihood strategies shape their ability and desire to adopt different land-use practices. Therefore, an adequate understanding of these strategies is critical for appropriate targeting of interventions.

Our research has highlighted various livelihood issues that need to be considered if RWM activities are to be successful. Key among these is active involvement of community members in the process of RWM activities right from the start. Development agendas and interventions introduced by outsiders may conflict with local knowledge and priorities. Better understanding of current knowledge and practices, coping mechanisms, capacity for innovation and mechanisms for community mobilisation, as well as understanding the reasons for resistance to certain interventions, could lead to a much better understand of how, where and what to promote when it comes to RWM. There are potentially exciting opportunities for co-development of plans and interventions which incorporate local perspectives as well as develop farmers' capacity to innovate. Care must be taken not to idealise indigenous knowledge, but multi-stakeholder participatory processes involving external agents and community members can be used to assist local communities to organise and assess their own knowledge and resources whilst also identifying and integrating appropriate outsider knowledge and technologies. It will be important to develop mechanisms for collaboration between various stakeholders that enable different knowledge and perspectives to be exchanged, shared and translated into action.

The study concludes with six recommendations, which are largely for Ethiopian policy makers and implementing agencies. They are also currently being tested and demonstrated through an action research process in the three research sites under the NBDC program, and the results are being shared through various consultative platforms at local, regional and national levels. The six recommendations are developed in the paper, and explained in detail in Chapter 7. Together they represent an approach to improving the NRM/RWM planning and implementation processes in rural Ethiopia such that impact, sustainability and local ownership of interventions are prioritised, and strategies are based upon meaningful participation of farmers and other stakeholders, a growing base of evidence about what works and why, and increasing opportunity for true innovation at all levels. Although such processes are not always straightforward, and this does represent a major shift away from current practice, some of the foundations of this approach are in fact already present in existing policies and implementation guidelines. The six main recommendations are:

1. Shift the focus of targets from outputs to outcomes;
2. Enhance monitoring and evidence collection on RWM with a focus on impact and sustainability;
3. Revitalise and capitalise on the DA system;
4. Strengthen local institutions' roles in NRM;
5. Move towards more meaningful participation;
6. Open lines of communication to foster innovation capacity.

By the completion of the NBDC, we hope to have provided evidence that adoption of these recommendations can contribute significantly to achieving the long term goals of sustainable highly productive agriculture and natural resource conservation in the Ethiopian Highlands; they can be implemented at a large scale; and their implementation will result in positive benefits at landscape and watershed as well as community and farm levels.

Local Development Agent (DA) coordinates government initiated SWC work with community members in Jeldu

Introduction

Background

Smallholder farming is the backbone of the Ethiopian agriculture sector, the dominant contributor to national GDP and the core of the country's current national growth strategy (Federal Democratic Republic of Ethiopia, 2010). Smallholder agriculture is predominantly rain fed, with small pockets of irrigation, both small-scale and large-scale. Yields are far below potential; yields of staple cereals have remained stubbornly static over the last 30 years and increases in food volumes have been achieved mainly through expansion of the arable land area (Eberhardt, 2008). Considerable potential exists, however, for enhancing food production through better rainwater management (RWM; see Box 1). Studies from elsewhere in the world demonstrate that even small improvements in RWM can have dramatic effects on food production (Rockström et al., 2007). Ethiopia has invested extensively in RWM interventions, in particular soil and water conservation and afforestation over the last 40 years, but in many areas with disappointing impact, for multiple reasons – misguided policy, authoritarian and top-down approaches guided by targets and coercion to mobilise labour, blanket approaches across vastly different agro-ecological and socio-economic contexts, or inappropriate technologies, just to name a few – which have been well articulated in previous reports (e.g. Merrey & Gebreselassie, 2011. Given limited success with previous approaches towards natural resource conservation, a new approach is obviously needed, but what should it be? This question is at the centre of the Nile Basin Development Challenge (NBDC)[1] project, part of a larger Challenge Programme on Water and Food, funded by CGIAR and working in six river basins (Nile, Volta, Limpopo, Ganges, Mekong, Andes)[2]. Two key elements of the NBDC approach are (1) viewing RWM as a landscape-scale issue, and (2) recognising that improving RWM successfully, and on a sustainable basis, requires a focus on institutions as well as technologies, and a new approach to planning, implementation and monitoring of interventions.

The NBDC aims to improve the resilience of rural livelihoods in the Ethiopian highlands through a landscape approach to RWM. From a landscape perspective, watersheds are conceived as socio-agro-ecological systems with social, economic and institutional networks that may cross-cut hydrological boundaries. The objective of NBDC research is therefore to 'optimize the range of services provided by the watershed resource system in a manner that is sustainable and beneficial to a broad range of stakeholders' (Merrey & Gebreselassie, 2011: 1). It comprises five linked projects examining: (1) Learning from the past; (2) Developing integrated RWM strategies; (3) Targeting and scaling out of RWM innovations; (4) Assessing and anticipating the consequences of innovation in RWM systems; and (5) Catalysing platforms for learning, communication and coordination across the projects.

Box 1: Rainwater Management

Rainwater management refers to interventions which enable smallholder farmers to increase agricultural production – focusing on livestock, trees, fish as well as crops – by making better use of available rainwater while sustaining the natural resource base (water and soils) in rainfed farming systems. These interventions may be at plot, farm, community, district or watershed level. Rainwater management includes soil and water conservation, in situ and ex situ rainwater harvesting, conservation agriculture and small-scale irrigation. While the term 'rainwater management' places the emphasis on water rather than land management, in fact most of the technologies and practices are the same as those used for sustainable land management. A rainwater management system (RWMS) therefore includes technologies and practices for managing water for production, and the policy, institutional and social dynamics and support systems necessary to optimize the benefits of such technologies and practices.

(Source: Merrey & Gebreselassie, 2011)

1 http://waterandfood.org/basins/nile/ 2 http://waterandfood.org

The Nile 2 project, "*On integrated RWM strategies – technologies, institutions and policies*", is the largest of the five projects and is centred on field research in three pilot learning sites (described below). The starting point for research in N2 is that integrated RWM strategies need to combine technologies/practices, policies and institutions, and need to be developed through innovative approaches, which bring together different stakeholders. Research in this project aims to integrate land and water management, crop component technology, crop management, crop-livestock systems, pastoral systems and even agroforestry systems, with the goal of raising productivity and incomes while slowing land degradation and generating downstream benefits such as reduced siltation. Because policies and institutions can foster or discourage the adoption of productivity-increasing, resource-conserving strategies by farmers, the project also examines the extent to which policy change and institutional strengthening and reform could be combined with new technologies to spur widespread innovation.

A central mechanism for stimulating innovation within the NBDC is the use of *innovation platforms* at site level (district) and national level. An innovation platform is a network of different stakeholders who come together to exchange knowledge and develop joint action to bring about change. The current diagnosis was in part designed to inform the development of innovation platforms by providing a baseline understanding of existing RWM strategies and institutional arrangements at local level. There are various elements to this. First, we were interested in how RWM interventions are planned and implemented at local level, and how different actors are involved in this process. Second, as planning and implementation processes are heavily influenced by government at all levels, we were interested in what this dominance means for local "innovation capacity". Finally we wanted to understand the diversity of local livelihood strategies and how these might intersect with formal and informal approaches to RWM in our study sites.

Description of the study sites

Three woredas in the Nile Basin of Ethiopia were selected for intensive study as part of the larger project. These are Jeldu and Diga in Oromiya Regional State and Fogera in Amhara Regional State (see Table 1 and Figure 1).

Jeldu is located 115km west of Addis Ababa in West Shewa Zone of Oromiya Regional State. It is characterised by a mixed crop-livestock system. Production of potato and barley are major livelihood strategies, especially in the highland[3] part of the woreda. Some of the current drivers of change in Jeldu include land degradation in the form of soil erosion, seasonal migration of youth to towns, and market constraints.

Diga, a woreda in the East Wollega Zone of Oromiya Region, is located 343km west of Addis Ababa. It features a mixed crop-livestock farming system with a lowland-dominated agroecology. In comparison with the other research sites, natural vegetation cover is still comparatively widespread, although deforestation is increasingly prevalent. In-migration from other areas of the country and movement within the area from the highlands to the lowlands in order to access fertile farm land are important driving forces. The main crops include maize, sorghum, coffee and a variety of vegetables, with production of mango and sesame in the lowlands. There are a few cases of diversion irrigation in the woreda, and wetland areas close to rivers are cultivated in the dry season.

Fogera is located in South Gondar Zone of Amhara regional state, 625km north-west of Addis Ababa. Similar to Jeldu and Diga, Fogera is also characterized by a mixed crop-livestock farming system. Rice production is an important strategy for market integration in Fogera, accounting for more than 20% of the arable land. Expansion of rice production, enhanced markets, and conflict over grazing land are some of the many drivers of change in the woreda.

3 The terms 'highland' and 'lowland' are relative (and relative to each other) and do not denote specific altitudinal zones.

Table 1: Characteristics of the study sites

Description	Jeldu	Diga	Fogera
Elevation range (m asl)	2500-3200	1110-2300	1774-2400
Agro-ecological zone (see Annex 1 for more details)	Dega and Wurch (cool highlands, sufficient rainfall)	Kolla and Weyna Dega (temperate midlands and warm lowlands, usually sufficient rainfall)	(temperate midlands, usually sufficient rainfall)
Mean annual rainfall (mm)	900-1350	1376-2037	974-1516
Rainfall pattern	Bimodal but with recent fluctuations	Unimodal	Unimodal
Major crops grown	Potato, barley, wheat (highland)	Teff, Niger seed, coffee, maize, barley and faba bean in the midlands; maize, sorghum, sesame, fruit trees in the lowlands	Rice in the plains; maize, millet, teff, barley, Niger seed in the uplands
Major sources of cash	Potato, eucalyptus	Sesame, mango	Rice, vegetables
Total area coverage	139,389 ha (out of which 43.4% is arable land)	40,789 ha (out of which 67.8% is arable land)	102,807 ha (out of which 67.8% is arable land)
Landholding size per household (min-max range in ha)	0-4	0-4	0-3
Average number of people per household	7	7	8
Market infrastructure	Mainly unsurfaced road within the woreda and this constrains the potential dairy market	Good road access to zonal town (Nekemte)	Good road access to woreda and regional town (Woreta and Bahir Dar)

(Source: Baseline survey and data provided by Woreda Offices of Agriculture and Rural Development)

Methods

This baseline research aimed at establishing a broad understanding of key issues relevant to the Nile Basin Development Challenge (NBDC). The NBDC aims to develop integrated RWM strategies and policies appropriate to the varying conditions in the Nile Basin; and identifying relevant actors involved in RWM at different levels as well as the critical issues relevant to Innovation Platforms. Most of the data collection, analysis and write-up of site reports was carried out between November 2010 and December 2011, following a training attended by all researchers in Addis Ababa in early November 2010. The final analysis and writing has been done during 2012 and has been influenced and informed by subsequent research in the three sites. However, the findings presented are relevant to the specific data collection period, i.e., 2011.

In each of the three study woredas, five *kebeles* (the smallest administrative unit in the Ethiopian system; there is no agreed English term) were identified for in-depth primary data collection. Kebeles were sampled purposively to capture a range of agro-ecologies (highland/midland/lowland), presence/absence of RWM interventions, and high/low levels of natural resource degradation. As far as possible, kebeles were selected from within the catchments that have been instrumented for hydrological analysis; at least one kebele from each woreda was required to be from this catchment.

Figure 1: Ethiopia and the selected study site woredas

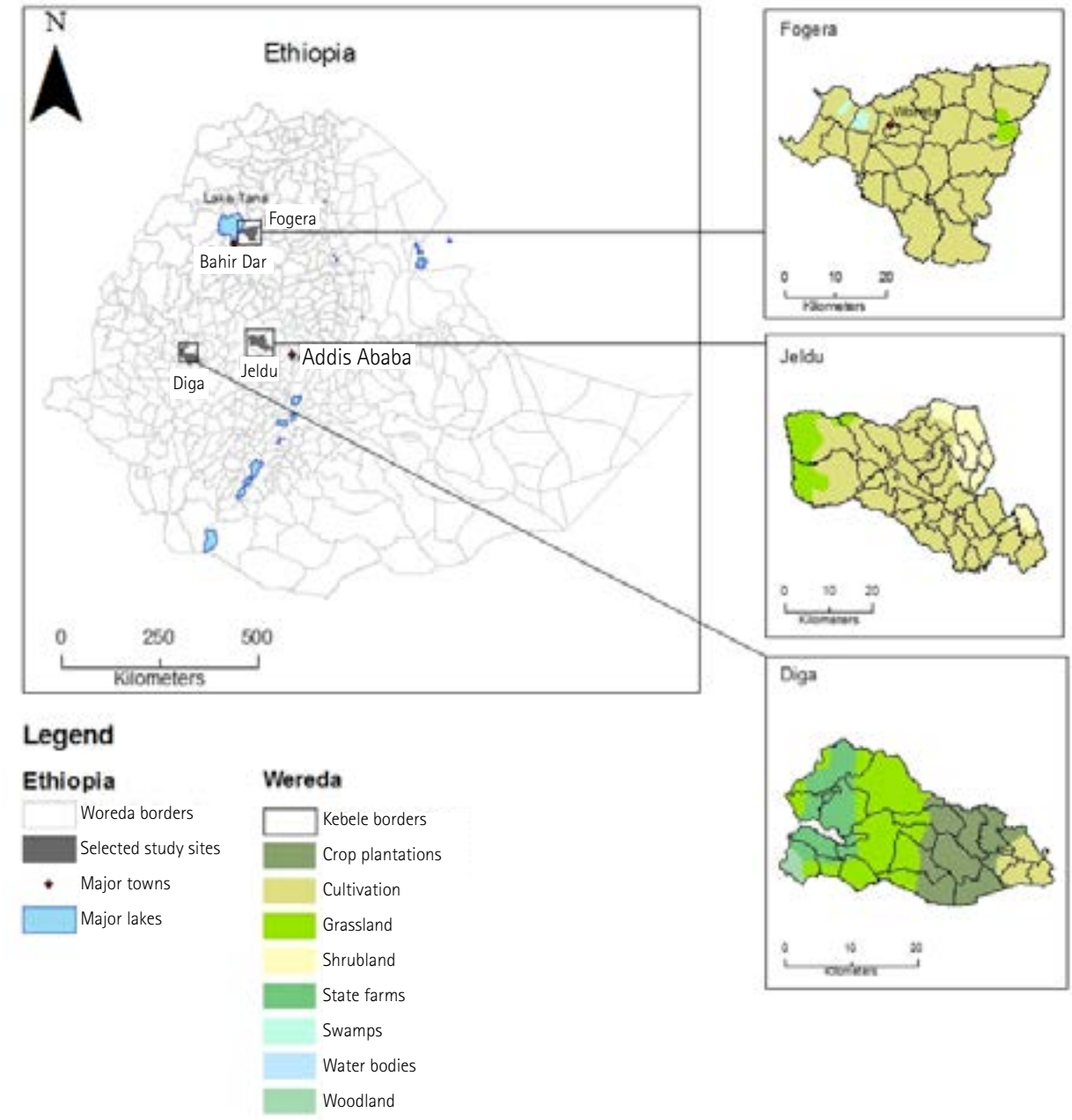


Table 2: Selected kebeles for the baseline research

Woreda	Kebele				
Fogera	Kokit	Wej-Arba Amba	Diba-Sifatira	Shaga	Alem Ber
Diga	Gudisa	Bikila	Arjo Kote Bula	Lalisa Dimtu	Adugna
Jeldu	Chilanko	Seriti	Kolugelan	Goro	Shukute

A broad suite of methods and tools for data collection was used, including:

- Community resource mapping and participatory timelines
- Three focus group discussions in each kebele (male and female groups separately for livelihoods analysis, and a mixed group focusing on innovation capacity; each group captured a range of ages and wealth status)
- Key informant interviews to capture the diversity of points of view with farmers, including model farmers (both men and women);
    - Development Agents (DAs) covering crops, livestock and natural resource management (NRM);
    - kebele and woreda experts and heads from various line ministries (including Agriculture, Land Administration and Environmental Protection, Finance and Economic Development, Water Resources, Cooperatives, and Credit and Saving Association);
    - kebele and woreda administrators;
    - staff of nearby agricultural research centres and universities;
    - NGOs; and
    - private sector actors
- Secondary data collection from kebele and woreda offices.

Semi-structured interview guides covering the main areas of innovation, planning and implementation of RWM and livelihoods were developed in advance of the field work and introduced, discussed and amended in a methodology workshop in Addis Ababa in November 2010.

At each site, a team consisting of researchers from a nearby Agricultural Research Centre (Adet Research Centre for Fogera, Bako Research Centre for Diga and Holetta Research Centre for Jeldu) and a regional University (Bahir Dar University for Fogera, Wellega University for Diga and Ambo University for Jeldu) were responsible for carrying out data collection, analysis and write-up of site reports. The research teams were supported by researchers from ILRI, IWMI, ODI and Addis Ababa University, who also developed question guides and tools for data collection and analysis, provided feedback on site reports and wrote the present synthesis.

Caveats

The small number of sites visited represents the most important limitation of this study. The Ethiopian Highlands are very heterogeneous, in terms of both bio-physical and socio-economic contexts. Therefore, distilling lessons that have the potential to be valid at a more general level, as opposed to those messages that are very situation-specific, is by nature limited and needs careful attention. The information for this baseline study has been collected in three research sites only. The authors are fully aware that based on such a small sample, statements made with respect to planning and implementation of natural resource management in general and rainwater management interventions in particular, are problematic. This is even further accentuated by the fact that study sites cover only two regions. Sites selection for the NBDC included a range of criteria, not least whether or not there is a potential to contribute to improving the effectiveness of RWM and NRM planning and implementation. Areas in the Ethiopia Highlands where NRM seems to be successfully implemented, such as many parts of Tigray or northern parts of Wello, are not represented in this study. As such we are fully cognizant of the bias related to the site selection characterising this baseline study and its findings. Nevertheless, since the three sites represent typical variations in the Ethiopian Highlands, we believe valuable lessons can still be learned from this research.

The research and data collection were carried out in a relatively short time. At no point, therefore, could this study have attempted to rigorously assess planning and implementation procedures in the required depth to assess their impacts on the likelihood of sustainability of interventions.

Communal grazing land showing expansion of eucalyptus cash crops in Jeldu

Although as many stakeholders as possible were included from village, woreda and regional levels, the findings nevertheless rely on a limited number of people having had the chance to share their experience and perceptions on planning, implementation and innovation processes of rainwater management interventions.

Organization of this paper

The chapter 'Past interventions, politics and policy in relation to RWM' briefly discusses lessons from past RWM interventions and policies. 'Planning of RWM' discusses the RWM programme planning process and its effectiveness, while 'Implementation of RWM' assesses their implementation: who is involved, and what are the issues that emerged. Both chapters offer specific conclusions and recommendations for improving the planning and implementation process. 'NRM and livelihoods' provides data on the livelihood strategies in the three research sites, and their implications for RWM and NRM interventions. 'Innovation' analyses the capacities and potential for RWM innovations. 'Conclusions', finally, presents the main conclusions and recommendations emerging from this study.

Past interventions, politics and policy in relation to RWM

Ethiopia faces a critical challenge of severe natural resource degradation (e.g. World Bank, 2006; 2010; UNDP, 2011). As a country reliant on an agricultural sector dominated by smallholder farming, land degradation presents a major challenge in terms of agricultural productivity, food security and rural livelihoods. The Ethiopian government and donors have emphasised enhancing production through better land and water management with extensive investment particularly in soil and water conservation and afforestation initiatives. Various programs have been implemented by government agencies in collaboration with national and international organizations on farms and community lands over the past four decades. However, success to date has been limited, as has been documented by many studies (e.g. Keeley and Scoones, 2000; Merrey and Gebreselassie, 2011). A review of past interventions, policy and politics is thus useful in order to gain an understanding of the current policy situation.

It is widely documented that rainwater management interventions in Ethiopia have historically been implemented in top-down fashion. Keeley and Scoones (2000: 94) comment that 'a number of characteristics of the Ethiopian state have remained remarkably persistent over time: these include a tendency towards authoritarianism, hierarchy, centralized rule and lack of transparency'. In order to understand why top-down approaches have been so prevalent, it is important to bear in mind that 'all adult Ethiopians will have lived with at least one extremely coercive government, either the communist military rule of the Derg or both this and the imperial regime of Haile Selassie' (Harrison, 2002: 599). It is likely that this authoritarian history has had a significant influence on the interpretation and development of policy and the mind-sets of officials and farmers alike.

Historically, Ethiopian agriculture was organised essentially as a feudal land tenure system until the end of the imperial regime of Haile Selassie. Land ownership was a complex combination of communal, church ownership, and private and state holdings which varied throughout the country. State or government holdings tended to be most prevalent in the less densely populated and pastoral areas of the lowlands; communal ownership, locally referred to as "Rist", and church holdings characterised the northern highlands; and private holdings were a feature of the South (Yirga, 2008: 127). Campbell (1991) writes that under the imperial regime attempts to improve land, agricultural practices and rural technologies were hindered by the effects of this complex system which was dominated by absentee landlords, local administrators and church estates. Concentration of land in the hands of elites and an exploitative tendency resulted in a widespread sense of insecurity among cultivators that meant farmers were unwilling to invest in long-term conservation measures (Ludi, 2004).

In 1974, the Derg overthrew the Haile Selassie regime and established a Marxist military government led by Mengistu Haile Mariam. This government carried out radical land reform with the aim of ending the landlordism associated with the imperial system. The regime implemented a range of policies intended to promote the collectivisation of agriculture, including large-scale resettlement and 'villagisation' schemes[4]. Land was nationalized through the 'land to the tiller' program, which aimed to equalise land holdings and made private ownership of land impossible. As part of the attempt to equalise holdings, there was periodic redistribution of land. The resulting uncertainty of tenure is often used to explain farmers' reluctance to invest in water and land management over the long-term.

Projects addressing soil degradation and improved NRM accelerated from the late 1970s. This was partly due to the introduction of new forms of rural political organisation called Peasant Associations (PAs). PAs were administrative and geographic units organised to undertake a range of political, agricultural and administrative tasks under the direction of the central government. They became the 'the basic social,

4 Government relocation program. The objectives were to group scattered farming communities into village clusters to promote rational land use and natural resources conservation, access to social services and security

economic and developmental unit in the rural highlands and in practice the administrative and law and order units in their specified areas' (Merrey & Gebreselassie, 2011: 37, quoting an FAO report). PAs became the primary mechanism for mobilising rural people and made it possible to effectively organise rural development work[5]. Shifting global dynamics also played a role in the development of such policies. Pankhurst (2003: 65) writes that 'The Derg's interventionism in natural resource management stemmed from an allegiance to socialist policies advocated by the Eastern Bloc' and at the same time the famines of the 1970s and 1980s led to large increases in food aid. Prevalent views among donors about linkages between drought and deforestation were shared by government and led to the establishment of an 'environmental rehabilitation discourse' which prompted massive government initiatives, supported by donors and NGOs, and utilising food-for-work as payment for labour (Keeley & Scoones, 2000).

The national soil conservation and afforestation efforts that took place during the late 1970s and 1980s have subsequently been criticised for a number of reasons, including: top-down planning and implementation; standardised intervention packages based on inadequate scientific and technical knowledge; the use of quota systems; lack of an integrated or systematic watershed approach; limited consideration of variations in agro-ecological conditions; coerced participation with little regard for the views of the people (Merrey and Gebreselassie, 2011: 54). These programs were therefore widely perceived as government-imposed activities. As Keeley and Scoones (2000: 103) note, terraces became a 'clear symbol of the presence and authority of the state in rural areas... ostensibly technical interventions reordering rural social space and livelihoods'. Farmers often did not see the benefits, particularly as interventions were organised through a highly centralized system which reinforced state power and undermined community management. Although participating farmers received food rations in return for their work, the structures created often served no positive purpose and at the end of the Derg government, a large proportion of these were either deliberately destroyed or abandoned (Merrey & Gebreselassie, 2011: 54).

The Derg was toppled in 1991 and the Ethiopian Peoples' Revolutionary Democratic Front (EPRDF) came to power following a period of transitional government. The new government committed itself to a decentralised political system and a new Constitution. Since the current government took over there has been a gradual shift towards more participatory community-driven approaches. According to Keeley and Scoones (2000: 107), the noticeable softening of approach and increased emphasis on 'awareness raising', consultation and building projects from the 'bottom-up' was prompted largely by reactions to the previous policy under the Derg, which was perceived to be top-down and inappropriate. Added to this was growing talk of 'sustainability', 'integrated natural resource management' and a commitment to involve farmers in agricultural development activities, including an appreciation of their knowledge and technology (ibid., 108).

Current RWM programs are now taking a more systematic approach with an emphasis on consultation and planning on a watershed basis. Attempts have been made to address the issue of land tenure through programs, implemented across all the major regions, promoting the mapping and certification of land use rights. This appears to have had a positive impact, although there are concerns that land certification might be used as a political tool (Adenew and Abdi, 2005). There is also more of a focus of government SLM programmes on enhancing farmers' incomes and food security. As Merrey and Gebreselasie (2011: 55) assert, 'Improved water and land management should be a means to improving peoples' lives, not an end in itself'. However 'top-down blueprint approaches remain pervasive with agricultural extension largely focused on technology transfer' (ibid., 41). Programs remain quota driven and focused on the promotion of 'best practice' packages, some of which are inappropriate. There is also considerable evidence that many of the soil and water conservation structures promoted to date have low or negative returns and are often not perceived positively by farmers (Merrey and Gebreselassie, 2011). This is perhaps partly because such approaches are not flexible enough to be able to respond to varied ecologies, ecological problems and diverse forms of livelihoods.

5 Modern '*kebeles*' are based on these PAs

In summary, although there has been a considerable reorientation of policy, this has not necessarily been carried through to implementation, for a variety of reasons. Reviews of Ethiopian NRM policy have highlighted the role that external donors play in the adoption of participatory approaches. Keeley and Scoones (2000:109) observed that increasing emphasis on participation in the international development literature resulted in the need to couch applications to donors in participatory language. If the concern with participation has arisen mainly in response to funding needs then, as Harrison (2002: 593) has noted, 'the content of the participation itself may be questionable'. The adoption of genuinely participatory approaches is reliant on 'attitudinal change in those individuals implementing policy' (ibid., 602) which is often not easy to accomplish and cannot simply be implemented. In their review of rainwater and land management in the Blue Nile Basin, Merrey and Gebreselassie (2011: 5) comment, 'Although guidelines and training programs emphasize "participation" of communities, it will take many years to change the dominant culture of government and indeed communities from an authoritarian to a democratic mindset'. Creating a decentralised demand-driven system will take time. The rest of this paper aims to explore the current policy planning and implementation process in more detail in order to understand the existing gaps and suggest possible ways forward.

Planning of RWM

The rationale for focusing on planning and implementation of RWM was the recognition at the outset of the gap between available policy and guidelines and specific implementation practices. Although a number of national and regional policies and strategies in relation to RWM exist, including very detailed guidelines, for example for participatory community watershed management (Desta et al., 2005), planners, especially at lower administrative levels, did not have sufficient tools and skills available to engage at a landscape level for effective integrated and multi-sectoral planning and implementation of RWM.

Planning process

As well as characterizing the planning process, the baseline assessed its effectiveness in terms of the extent to which RWM planning is (a) evidence-based; (b) tailored to social and ecological niches; (c) cross-sectoral; and (d) participatory.

Opportunities and barriers to strengthen RWM processes were then identified.

Our research findings indicated that planning is usually carried out on an annual basis, corresponding to the budget cycle. Respondents described the theoretical/official planning process in some detail (Box 2). However the reality on the ground is rather different, as described below.

Ideally, the key actors are farmers, DAs, the kebele administration, sector experts and the woreda administration. In each kebele three DAs are stationed, one each with a background in crop science, livestock science and NRM (where irrigation is important, often a DA with a background in irrigation is

Box 2: Theoretical planning process for RWM

Theoretically, plans are formulated at the lowest level and subsequently travel upward through the hierarchical arrangement of administrative structures as follows:

- **Cell** (*Shane* in Oromiya, *And-le Ammist* in Amhara). A cell is a group of 5 to 6 farm households, usually including one model farmer. In theory this is where planning starts.
- **Development team** (*Gare* in Oromiya, *Yelmat budin* in Amhara). A development team is composed of 25 to 30 households. This collective of farmers is critical for problem identification and priority-setting.
- **Sub-kebele.** This comprises between 300 and 500 households (approximately one-third of the population of the kebele), and is led by one of the kebele DAs. At this level, a consolidated list of priorities is agreed and passed on to the kebele.
- **Kebele**. It is here that we find elected officials representing different sectors. It is also at this level that a consolidated plan of development priorities is elaborated.
- **Woreda**. 20 to 30 kebeles make up a woreda, where kebele priorities are consolidated and reconciled with the available budget. The woreda budget is a combination of local revenue and block grants from the central government, which is allocated to the different sectors and which includes both recurrent costs (e.g. salaries) and capital costs (e.g. investments). The woreda cabinet, the executive organ including the heads of all the sector offices and the woreda administrator, who is elected by the woreda council, is responsible for final approval of plans, which are then sent to the next higher administrative level, the Zone.
- **Zone**, and subsequently **Region**. At zonal and regional levels the process of consolidation and reconciliation is repeated and a final regional plan is formulated.

posted too). At woreda level, the Office of Agriculture and Rural Development is the main relevant sector office, with multiple experts representing different disciplines including crop science, livestock science, NRM and small-scale irrigation. The Office of Water Resources mainly deals with provision of water supplies for human consumption, but is also involved in the promotion, design and implementation of small-scale irrigation.

In contrast to the ideal planning process and actors involved described above and in Box 2, our survey of local actors revealed a different perception concerning how planning is actually done and who is involved. Perceptions varied depending on the actors being questioned. Of course, perceptions do not necessarily mean that the actual process is as perceived by that specific group of actors as strategic behaviour can also bias how questions are answered.

Farmers did not consider that planning was done using a bottom-up approach, i.e. that their problems, capacities and priorities were driving the planning process. Rather, they claimed that plans originated with the woreda and were transmitted downward for implementation. They reported that their only involvement was attending meetings organised by the kebele council where plans were presented to them. Farmers did not consider the current system as following the principles of locally-led planning of RWM focusing on local needs, and felt that they had been demoted to mere implementers of plans with no role in developing them. In Fogera, respondents stated that "*Farmers seem to have had little or no role at all, apart from implementing whatsoever plan is brought to them*". In part this might relate to watershed management often not being perceived as in the direct interest of farmers, who would rather see more interventions that benefit them directly, such as investments in small scale irrigation or improved crop varieties.

Development Agents, on the other hand, reported that plans are partially drafted at kebele level in collaboration with farmers and kebele representatives and submitted to the woreda. However, DAs stated that the consolidated plans they receive back from the woreda for implementation are often considerably different to the plans they originally submitted. Plans will have been modified by technical experts, who are only available at woreda level; they may therefore alter plans to correspond to required technical standards. They then have to be approved by the kebele council before being sent back to the woreda, but are said to be developed in a top-down fashion. These plans are sub-divided into plans for the three sub-kebeles and subsequently for development teams and the cells. The plans received from the woreda can theoretically be modified according to the capacity and potential of the kebele; however, DAs mentioned that usually there is not much room to change priorities as plans are shaped to a large extent by implementation quotas assigned to woredas, and subsequently allocated to kebeles. In Fogera, for example, the kebele together with the DA identified a severely degraded watershed in their plan, *Zibura* Watershed, to focus on rehabilitation. When the kebele received the approved plan from the woreda, however, a different watershed (*Gindenur*) had been targeted for rehabilitation. Respondents interpreted this shift as a move by regional authorities to establish a 'regional model watershed' close to the road which would be easily accessible, but which over-ruled the kebele's choice of watershed.

Woreda experts' description of the system was quite similar to the DAs: they receive plans from the region that they adjust to the woreda situation and then send back to the region via the zone. Based on the plans the woreda offices receive from the respective regional bureaux, quotas are assigned to each kebele. Woreda experts mentioned the difficult task they face in reconciling plans with available budgets, government policy and strategic plans/directives whilst also taking account of local issues and priorities as formulated in kebele plans. There seems to be considerable tension at the woreda level as bottom-up planning – focusing on needs and priorities as formulated by kebeles – collides with top-down planning, i.e. implementation plans received from higher levels that reflect regional and national priorities, in the form of quotas that woredas must achieve. This tension is inherent in the planning process: meeting quota targets while taking account of local priorities is a difficult task and the former tends to take precedence.

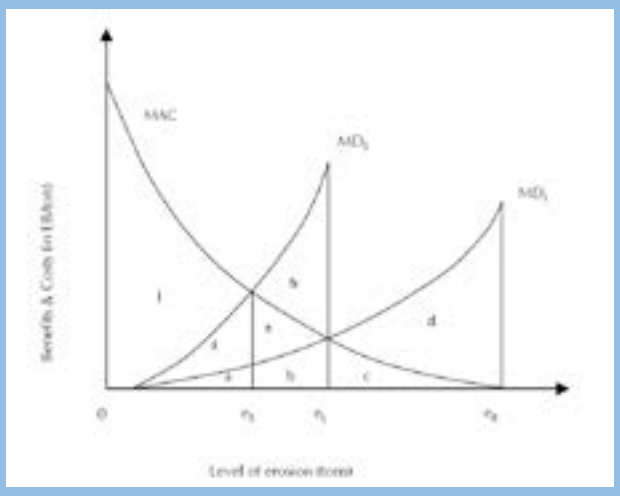
Box 3: Private versus social perspectives on costs and benefits of natural resource management

Individuals and society value investments in natural resource management (NRM) differently – in part because of the long time lag between when investment costs are borne and the time when the investments start to become profitable. Also, society will value external effects, both positive and negative of NRM, such as reduced siltation of water reservoirs, while individuals will not consider such off-site costs when deciding whether or not to invest in NRM. Finally, society might consider it worthwhile to invest scarce resources in a specific area which is of no great value to an individual. An example might be degraded hillsides which are considered as a common pool resource by community members, and therefore no individual assumes responsibility, whereas society – represented by government – considers the health of such areas as a public good and considers investing resources as worthwhile. Private investors, when deciding to embark on an investment project, will have a number of criteria to evaluate whether or not to invest scarce resources. One criterion is that of profitability or whether revenues from an investment exceed the costs over the lifetime of the project. For a society, the question is more complicated. Although society also faces budget restrictions and should invest available funds where there is value for money, other criteria such as inter- and intra-generational equity or equitable distribution of resources among different social groups or regions have also to be respected. Society is also involved in providing public goods where neither private investors are engaged nor do market and prices exist to act as signals to producers and consumers.

The distinction between the individual and the social perspectives can also be explained by asking what farmers will do under certain conditions (positive question) and what society would like farmers to do under the same condition (normative question). Farmers decide how to use their land in the light of their own objectives, production possibilities and constraints. Society, on the other hand, has social goals such as 'sustainable development' or 'avoiding degradation of natural resources' to achieve.

On-site costs of land degradation are mainly borne by the land users in the form of reduced production or increased production costs. Off-site costs of land degradation are transferred to society. Thus, costs of land degradation and benefits of conservation are distinctively different for land users and society. Land users decide how much conservation to undertake, based on weighing the costs and benefits of the degrading practices compared to the conservation practice. This usually only includes on-site, but not off-site costs and benefits. The result would be one where the individual farmer would tolerate a higher level of degradation than would society. The following figure presents marginal damage (MD) and marginal abatement costs (MAC) of land degradation from the two different perspectives.

With increasing land degradation, the marginal damage to the land user increases. If no conservation is undertaken and land degradation reaches e_0, the total damage to the land user would equal the area (a + b + c + d). If the land user considers this total damage to be too high, he/she would invest in NRM. This is shown by the marginal abatement cost (MAC) curve. For each additional unit of land degradation prevented, the costs for conservation rise. The area below this curve indicates the total costs of reducing land degradation from the level e_0 to zero. The optimal level of land degradation from a farmer's point of view would be e_L, where net benefits of reducing degradation are maximised, i.e. where marginal abatement costs (MAC) equal the marginal damage (MDL) to the farmer. Because society considers off-site costs as well, the damage function for society (MDS) is steeper and the optimal level of land degradation would be e_S, which is significantly lower than e_L.



e_S is lower than e_L because the damage of land degradation inflicted to society is bigger than that to individuals, because external costs of land degradation are not included in farmers' decisions. Two solutions are possible: either society provides an incentive equal to the area (g), which equals the amount by which the additional costs exceed the additional benefits to the land user of reducing land degradation from e_0 to e_S. Alternatively, society needs to find ways (through regulations or taxation) to motivate farmers to internalise the external costs of land degradation, with the goal of bringing the two marginal damage curves together.

(Source: Ludi, 2004)

In terms of RWM, two different levels of planning and implementation have to be distinguished. Firstly, those interventions which are being carried out by farmers themselves on their own land, such as drainage ditches, furrows, contour ploughing, crop rotation and fallowing, mulching etc., for which no kebele-wide plans exist but which farmers do out of their own initiative as part of their ongoing cropping practices. Secondly, RWM interventions at larger scale such as watershed protection, community forest management, area closures, gully rehabilitation, grazing land management etc., for which collective action is needed and for which more planning and coordination is required. In these latter plans, local realities are not well reflected as farmers feel the practice and theory of planning are quite different and the planning process seems dominated by a top-down approach. In part this is because responsibilities differ for RWM at different scales. Whereas farmers are responsible for taking decisions about what to do on their own plots in terms of RWM, larger scale RWM interventions at watershed level fall under the responsibility of the woreda. Depending on decisions taken, this might mean that some farmers lose out in the short term for the benefit of longer-term improvements. An example is area closures, which might lead to reduced area where livestock may be grazed in the short term, aiming at creating longer-term benefits of reduced soil erosion, improved vegetation cover and improved water availability. Differing perceptions of the degree of involvement in planning and decision-making can thus be explained in part by different responsibilities of actors for RWM at different scale. Additionally, the priorities of individual farmers compared to those of the larger society or government, are perceived differently (as illustrated in Box 3).

One of our key findings on the planning process for RWM is its highly fragmented and uncoordinated nature. Sector specialists plan for their specific area, e.g. livestock specialists are responsible for delineating grazing land, identifying degraded grazing areas for closure, or integrating forage production with SWC. NRM experts prepare land use maps for watersheds. Irrigation experts identify suitable land for irrigated crop cultivation and select the most appropriate crops. Not only is coordination lacking across sectors within a woreda, but there is little integration across woredas and watersheds. Although some respondents said that downstream implications of interventions are considered, no evidence could be found that plans from one woreda were actually aligned with plans made in neighbouring woredas.

Identification of technologies, beneficiaries and sites was another issue where different views among stakeholders were evident. DAs usually identify areas in kebeles that should be included in RWM plans based on degradation levels, and identify who should benefit from which technology based on an assessment of suitability of a technology for a specific area and the extent to which farmers are assumed to be able to adopt those technologies. Respondents however identified cases where sites identified in kebele plans were later disregarded by plans coming down from the woreda and different sites were chosen for NRM interventions, driven by other considerations such as ease of accessibility.

A key factor that determines the way planning is done at local level relates to the fact that the federal government has defined targets within the five-year period 2011-2015 as set out in the Growth and Transformation Plan (GTP; FDRE, 2010), the overarching development plan for Ethiopia. In terms of Natural Resource Conservation, for example, the GTP seeks to bring 10.21 million hectares of land under rehabilitation by 2015. These national level targets are broken down into targets to be achieved at each administrative level and are translated from targets over the five-year period into annual targets to be achieved by each sector ministry at each administrative level. Concretely this means that the regional BoARD, for example, issues each woreda with a quota of how many hectares of watersheds need to be protected. Woredas then further break down these quotas to kebeles, based on an assessment of each kebele's potential, defined by indicators such as accessibility to markets, agro-ecology, size of active labour force, farmers' likelihood to adopt new technologies, past quota achievements, and repayment status on inputs delivered in the previous year. There is nothing wrong with setting targets to be achieved. However, the lack of flexibility in applying targets and the narrow focus on target achievement (outputs) instead of target outcomes, i.e. the area under rehabilitation rather than the quality and sustainability of the activities implemented as part of the rehabilitation, their

contribution to livelihood needs, and their economic viability, both at household and community level, make them problematic[6]. Respondents said that there is some room for modification of quotas if sector specialists can reasonably defend their plan, but it seems that such adjustments are very limited in practice.

How effective is the planning process at woreda and kebele levels?

The four indicators identified in the initial N2 project proposal for assessing the effectiveness of planning at woreda and kebele levels were whether it was (1) evidence-based, (2) tailored to different social and ecological niches, (3) cross-sectoral, and (4) participatory. Based on our survey of the literature and our own experiences, we considered these four indicators to be necessary for helping us to assess whether RWM practices are sustainable, i.e. environmentally sound, economically viable and socially acceptable; whether they conform to government policy and guidelines; and whether they offer the required incentives for their implementation at household and watershed level. We now use these indicators as a basis for further discussion about planning effectiveness. We recognise there are other potential indicators; but these seemed to us most salient and guided our field research.

Is planning evidence based*?*

A key principle of policy making and of good planning is that it must be based on credible, practical and operationally relevant evidence (Young & Court, 2004). Our research found that while basic information is collected from farm and household level and used to formulate kebele-level plans, priorities formulated at community level were largely lost in the development of final plans for the reasons earlier discussed. This leads to plans that do not sufficiently take into consideration local conditions and capacity, for example in terms of agro-ecology, social structures or available labour force; and kebeles are frequently burdened with quotas of RWM investments which they cannot achieve, or are bound to implement RWM technologies which are not suited to the local agro-ecology.

Is planning tailored to different social and ecological niches*?*

Closely linked to the above point is the issue of whether planning is done taking local realities (social and ecological niches and constraints) into consideration. Respondents alluded to numerous examples where technologies prescribed in the plans did not match local conditions, for example because soil characteristics did not allow certain activities such as rain water collection ponds. In Fogera, for example, farmers reported a case where a water harvesting pond was constructed without due consideration of appropriate siting and soil characteristics, so accumulated water was quickly lost through seepage. On the other hand, technology support requested by farmers, such as for developing low-cost irrigation where it would be feasible, was not provided.

Is planning cross-sectoral*?*

A key shortcoming of the current RWM planning process is that it is done in an uncoordinated and fragmented manner, and synergies between the different sectors – crops, livestock, trees, natural resources, water – are not exploited. There were cases, for example, where the Office for Water Resources was not involved in planning of soil and water conservation interventions (SWC), despite the underlying assumption that SWC will contribute to ground water recharge, which in turn affects availability of water in hand dug wells.

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6 It is interesting to note that in other areas of the Ethiopian Highlands, in particular in Tigray and northern Wello, targets for natural resource conservation seem to be more readily achieved than in our research site and that kebeles are even able to mobilise farmers to allocate time on their own for natural resources conservation. One hypothesis is that because degradation of natural resources and vulnerability of the landscape to low and irregular rainfall is higher than in most of our study sites, investments in natural resource conservation pay off earlier. In contrast to the NBDC research sites, Tigray and parts of Wello are characterised by high levels of degradation of natural resources and low and highly variable rainfall. RWM interventions might therefore contribute more to household wellbeing and community resilience, and investing scarce resources in RWM might be seen as a more viable investment than in less degraded and more rainfall secure areas.

Box 4: Business as usual: The DA 'crisis'

DAs have the most contact with farmers and should play a critical role in supporting implementation of RWM. They are supposed to provide politically neutral technical support. However they face many challenges:

- Training is inadequate.
- They are caught between farmers and government, with the difficult task of reconciling top-down plans and quotas with local concerns and needs. They transmit information down to farmers but struggle to pass ideas and reflections back from farmers to higher levels and do not typically monitor the results of interventions.
- Their voice is not generally heard in the planning process.
- They are often poorly motivated because of poor pay.
- Government often involves DAs in administrative and political matters, affecting the relationship and degree of trust between DAs and farmers.
- There is rapid turnover of DAs.

Is planning participatory*?*

It is assumed that if land users are involved in planning activities related to RWM, ownership of investments and practices will be enhanced and farmers will be more likely to invest labour and cash in maintaining them. It is also assumed that by involving a range of stakeholders in the planning process, potential conflicts of interests can be identified early on and addressed in subsequent planning. Local communities are involved in drafting kebele-level plans through discussions of problems and prioritisation of activities together with kebele executives and DAs. Plans developed by higher authorities and based on quotas rather than local priorities, however, do not sufficiently reflect what was discussed at local level. Communities feel disenfranchised as they perceive their contributions to plans have not been sufficiently recognised, and they therefore do not feel much ownership of the plans they are supposed to implement so that quotas can be met.

DAs emerge as a key actor in the planning process. They are the main interlocutor between government and farmers, and a strong national cadre of DAs with a clear mandate and capacity to support farmers will be vital in achieving more effective RWM. However, a picture emerges of DAs who frequently feel under-supported, demotivated and caught between the demands placed on them by government and the expectations of farmers. This "crisis" of the DA system is summarised in Box 4.

Conclusions in relation to planning

In summary, there are at least five issues with the current planning process that need to be addressed if improving RWM is to become an integral part of sustainable agricultural development:

The discrepancy between policy and practice. While participation is a central plank of policy, and land users are considered to be the main driver of planning and implementation of RWM at local level, in reality plans are guided by quotas supplied by higher-level administrative units.

Notions of participation. There is a very different understanding of the word 'participation' among different actors – in reality, participation in the context of NRM planning and implementation tends to mean mobilising farmers to implement something, rather than providing incentives to engage in voluntary collective action and involving them in decision making (Harrison, 2002). Although at kebele level, planning processes attempt to be participatory and land users are involved in discussing problems and identifying priority RWM interventions, these plans do not necessarily get picked up sufficiently in planning of activities at higher administrative levels.

NBDC researchers conduct participatory resource mapping exercise with male community members in Diga

Incentives for DAs. Although at local level DAs try to reconcile as much as possible plans developed at local level with those plans received from the woreda to take account of local realities, in the end woreda plans with set quotas tend to be approved for implementation because quotas are used for performance monitoring. If DAs do not meet their quotas there are repercussions for their performance rating and their prospects of promotion. In general, DAs could play a more effective role in local planning if they were better connected with higher levels of government in terms of support and two-way communication.

Failure to anticipate conflicts. Because plans are developed without sufficient recognition of local realities, conflicts at local level can arise. Most prominent are examples related to small-scale irrigation where downstream water use was insufficiently recognised, but also conflicts within watersheds when, for example, areas previously used for grazing livestock were closed off for rehabilitation, increasing pressure on existing grazing land.

Missed opportunities for sustainability. Developing plans without sufficient local participation misses opportunities to tap into local cultural practices and institutions which would make it easier to implement RWM and could enhance the sustainability and ownership of interventions.

Overall, our research has identified a key dilemma: national plan, output targets and a generally top-down planning focus, versus devolution, decentralisation and participation in planning and co-development of innovations at the lowest possible level. This needs to be resolved if RWM interventions are to be owned by farmers, be sustainable, and make a meaningful contribution to improved environmental management and better livelihoods.

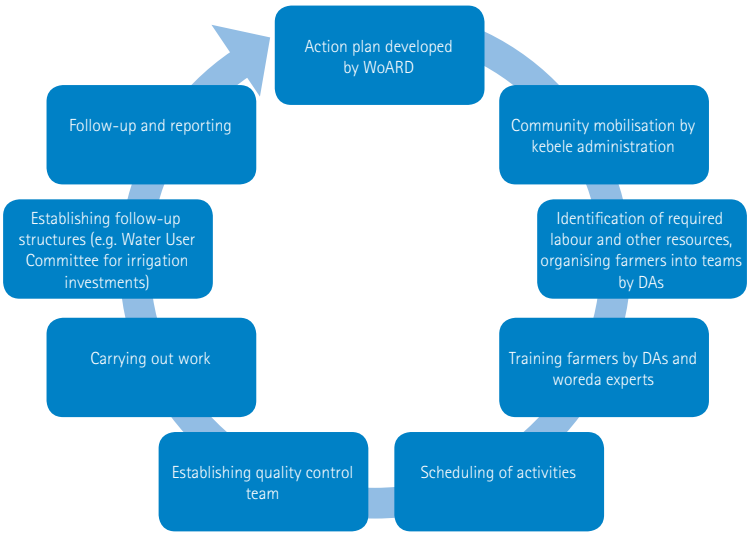
These features of the planning process have direct implications for the way in which RWM is implemented and the effectiveness of interventions on the ground. This is clearly evident in the discussion of findings on implementation which follows below. After this we suggest a number of ways forward to strengthen the planning and implementation of RWM and help solve the above issues.

Implementation of RWM

Actors involved in implementation

As in the case of planning, a range of different actors is involved in implementing RWM practices: farmers, DAs, kebele administration, technical experts from relevant line ministries at different levels (Agriculture, Water, Cooperatives, etc.), agricultural research centres, credit and savings associations, woreda administration, and NGOs. Again, farmers, DAs, kebele administration, woreda NRM and irrigation experts are the key actors. Farmers are key implementers of RWM and receive technical support from DAs. Two types of RWM intervention should be differentiated: 1) those practices farmers implement themselves on their own land (e.g. drainage furrows, mulching, contour ploughing, crop rotation and fallowing) and which are carried out alongside normal farming practices; and 2) those requiring larger investments, collection action, coordination across a watershed and more technical know-how such as the construction of water harvesting ponds, hillside closures, gully rehabilitation or terracing, and which are implemented by farmers in the form of NRM campaigns under close supervision of DAs and with technical inputs from woreda experts. Figure 2 offers a schematized implementation cycle for the second type of RWM interventions.

Figure 2: Schematised implementation cycle of RWM interventions



The implementation process

Farmers are usually organised into small teams which are easy to supervise. Participating in campaigns is compulsory for farmers; non-participation results in fines. Respondents alluded to complaints that farmers had to provide labour on investments which they had not identified as priorities but were imposed on them from higher administrative levels, while areas they had identified as in need of rehabilitation, for example, were not considered (see examples cited above in the discussion of planning processes). In part this can be explained by different points of view whereby farmers tend to prioritise investments on their own land or in their vicinity having short-term benefits, whereas woreda experts might prioritise investments with a longer time horizon and in areas not considered as being of ultimate benefit to farmers (such as the protection of upper parts of a watersheds which yields only long-term benefits and to a group of people less easily identifiable). The basis for these differing perspectives has been illustrated in Box 3.

Another issue mentioned was that many of the RWM and NRM implementation activities are carried out as one-off campaigns to achieve targets without sufficient attention to the future maintenance and sustainability of interventions. In Diga, both farmers and DAs reported that afforestation activities were carried out by mass mobilisation and that thousands of seedlings were planted, but most of these seedlings did not survive for long. The main reason mentioned by respondents was that afforestation areas were

selected by experts without due consultation with farmers. Farmers considered the selected afforestation areas as being important for cropping and grazing and the afforestation program as offering insufficient benefit to compensate for the losses; therefore, they did not carry out the planting with care and, once the trees were planted, did not manage the area to protect the trees, and even continued to graze livestock there.

DAs and kebele officials are responsible for following up on projects where labour has been provided by farmers, monitoring progress and identifying areas where further technical training of farmers might be required. Once the quality committee approves the investment, responsibility is handed over either to the land owner for follow-up maintenance or, in the case of investments on communal land, to the community. As DAs are evaluated on achievement of quotas, i.e. on outputs but not on outcomes, implementation is often of low quality as this does not matter for appraisal of their performance. Also, follow-up maintenance is often neglected for investments being done by campaigns as ownership is limited and longevity of investments is not a criterion for performance appraisal.

DAs report progress on achievements to woreda experts, who are in principle also responsible for ensuring that investments are maintained by farmers. During program implementation campaigns, woreda experts visit kebeles to follow up on progress and assist in technical matters where needed. Such support and follow-up, however, is less frequent during other times of the year. Regular monitoring of investments is thus not happening. This is in part due to the limited number of technical experts at woreda level and their limited budget and facilities to visit kebeles (e.g. cars and motorcycles), but a lack of interest on the part of woreda experts and the absence of incentives for them to visit kebeles and follow-up on RWM activities seem to be equally important. Where monitoring is carried out and successful interventions and sites are identified, these are used for learning among woreda experts and farmer training through site visits.

To some degree, these findings contrast with those reported for a long-standing sustainable land management project supported by the World Food Programme (WFP). This is "MERET" - Managing Environmental Resources to Enable Transitions to More Sustainable Livelihoods, whose results are briefly reported in Box 5.

Conclusions in relation to implementation

There is a long tradition of RWM interventions in the study sites, particularly those implemented by farmers on their own land. Other interventions which are more labour and cost-intensive and need coordination across several farms or a watershed are much less likely to be sustainable. There are at least six reasons for the poor sustainability of these interventions:

Lack of relevance to local priorities. As discussed, plans are not necessarily congruent with local needs assessment.

Weaknesses in technical design. In some cases DAs lack the required technical skills, or do not have access to information about the range of possible technologies or practices,

Lack of voluntary collective action. Compulsory campaigns to implement RWM do not inspire ownership and maintenance after construction.

Lack of clear governance arrangements for interventions on communal land. Although farmers would not necessarily be motivated to sustain interventions on their own land unless they perceived them to have clear value (both direct financial and non-financial), the weak enforcement of rules for management of communal resources (and low penalties for violations) creates a disincentive for individuals to invest in managing these better.

Box 5: Experiences from Tigray – the MERET Project

MERET - Managing Environmental Resources to Enable Transitions to More Sustainable Livelihoods – or "Land" in Amharic, is a government-implemented project funded by WFP that aims at reducing vulnerability and food insecurity in Ethiopia by focusing on enhancing land productivity through natural resources rehabilitation through Food-for-Asset building activities.

Originally established under a different name in 1980, around 1999-2000 WFP and the Natural Resource Department of the Ministry of Agriculture (MoA) moved away from food-for-work approaches to natural resource conservation by including a livelihoods component, thus creating MERET in 2003. MERET adopted a community-based participatory integrated watershed development approach, retained the focus on rehabilitating degraded lands through soil and water conservation and reforestation but added a range of productivity improvement and income-generating activities to better address food security issues, such as horticultural crops, animal fattening with improved forage production, and bee-keeping, which brought significant improvement to beneficiaries' livelihoods and incomes. These livelihood packages were supported by low-cost soil fertility management techniques (e.g. compost making) and small-scale irrigation practices, to increase productivity, as well as rural roads construction to improve connections between villages and to link villages to woreda capitals, and in particular to markets. These newly introduced technologies led to a number of changes: water demand for small-scale irrigation increased which could increasingly be met as catchments were protected and water infiltration enhanced, the production of high-value crops increased household income and improved livelihoods, and awareness was raised between the links of increased upstream natural resources conservation, water harvesting and soil and water conservation and downstream benefits of enhanced water availability. The achievements in terms of livelihood improvement through income generating activities alongside existing natural resource management interventions contributed to a shift in attitudes about Food for Work (FfW) and enabled the shift from food aid to development.

Several factors are thought to have been especially important for the apparent success of MERET:

- It has a distinct geographic concentration on food-insecure communities in Amhara, Tigray, Oromiya, SNNPR, Dire Dawa and Somali Regions;
- It focuses specifically on linkages beyond natural resource management interventions (such as farmland terraces, hillside terraces, seedling planting, check dam construction, small earth dam construction, community pond construction, micro pond construction, spring development, rural road construction, moisture conservation and area closure) to include livelihoods and income-generating activities that consider the community's economic and social needs when planning conservation;
- It focuses on women, their inclusion in planning and management, and the prioritization of interventions that reduce women's work burden while encouraging their empowerment;
- It has a focus on knowledge, technological innovation and learning, to ensure that MERET continues to evolve, remains relevant and disseminates knowledge about the natural resources system to leverage the scale-up of activities; indeed it has exhibited an impressive learning process overtime; and
- It has recently introduced a system of results-based management, moving away from simply monitoring outputs, to include training on measuring results and assessing outcomes for woreda experts and community management teams.

(Sources: Nedessa, 2011, Nedessa & Wickrema, n.a; Merrey & Gebreselassie, 2011)

Poor follow up and monitoring. There is very little follow up by DAs and woreda experts as performance monitoring is based on outputs, i.e. quota achievement, and not on outcomes or sustainability/longevity of interventions.

Focus on isolated technical interventions. There is typically a narrow focus on isolated technical interventions, such as bunds or ponds, and very little attention to supporting needed interventions such as changing patterns of water use or land management.

This research did not assess in detail the performance of particular interventions and practices and their contribution to enhanced crop productivity, water productivity or livelihoods, nor issues around land management and how this could be integrated with the application of specific RWM technologies. These are key issues which need to be better researched and understood in order to develop more effective RWM strategies and implementation approaches. Strengthening monitoring and evidence collection functions of kebele and woreda officials on the impact and effectiveness of RWM interventions would make a huge contribution.

NRM and livelihoods

In many sites across the Ethiopian Highlands, RWM and natural resource management have been successful, leading to increasing household wellbeing, increasing community resilience and improved availability of a variety of natural resources (e.g. Nedessa & Wickrema, n.a.). However, in the larger picture, several decades of intensive investments in RWM and natural resource management across Ethiopia have been disappointing for livelihoods and natural resources quality and quantity in many areas. Many land and water management technologies and approaches are not achieving their full impact. Approaches to NRM and RWM have historically been technology-oriented and top-down in approach without much regard for the needs, aspirations, constraints and livelihood realities faced by farming communities. In addition, many of the NRM and RWM investments were seen as ends in themselves rather than means to achieve improved household wellbeing and increased community resilience (Merrey & Gebreselassie, 201; also see earlier chapters on Planning and Implementation). It is of critical importance that RWM/NRM programmes adopt a people-centred approach which takes into account local livelihood strategies and constraints, cultural, social and institutional dynamics, and power relations and gender issues. It is essential to gain an understanding of these aspects because they feed into development planning for sustainable land use and livelihoods. Farmers' livelihood strategies shape their ability and desire to adopt different land-use practices. Therefore, an adequate understanding of these strategies is critical for appropriate targeting of interventions.

Across the three study sites there are some significant patterns and trends in relation to livelihood issues. In order to better understand how these relate to RWM/NRM issues, this Chapter presents some site-specific examples.

Diga

During the baseline research it was reported that there is a significant problem with termites within Diga Woreda. Problems with termites were first reported in Mana Sibu Woreda (250km west of Nekemte) during the 1960s. Experts report that the infestation is caused by declining soil fertility resulting from deforestation, degradation, overgrazing and other related factors. Due to the severity of these factors, the problem with termites has expanded to neighbouring areas around Nekemte, including Nedjo (woreda next to Mana Sibu), Gimbi, Diga, Guto Wayu, and recently Sibu Sire. The aggressive expansion of termites has serious repercussions for local livelihoods, including lack of suitable grass for livestock, nectar for beekeeping, reduced crop yields, and declining productivity of land. There are reports that termites are even posing a threat to newly built infrastructure; for example house damage was cited by farmers as a big problem and termites have damaged a health station in Bikila Kebele.

During focus group discussions, participants voiced concerns and wanted help to solve the termite problem. There have been subsequent discussions within the NBDC team on how to contribute to research on these issues, perhaps building on recent research experience from Uganda (e.g. Peden et al. 2011). On the surface, this may not immediately seem relevant to RWM/NRM issues but incidents of termite infestation in other African countries suggest that the problem may be an indicator of wider NR imbalances (Sileshi et al. 2009). In many places termites form an integral and beneficial part of the agro-ecosystem; however, as humans encroach into bush land, conflict between humans and termites is increasing. NRM therefore potentially holds the key to the management of termites. There is also evidence to suggest that local knowledge can play a role in termite management. In Uganda, night corralling of cattle is practiced; however this does not seem to address the termite problem in Diga. There is a need for more research assessing corralling for soil fertility management and whether it can contribute to termite control. Detailed investigation of the termite problem in Diga is required, including how termites impact on natural resources and livelihoods. There is potential for developing a balanced management approach which acknowledges the role of termites in the local ecosystem through combining the skills and indigenous technical knowledge of farmers with scientific knowledge. There is also scope for testing whether experience from other African countries is relevant and can be utilized effectively.

NBDC researcher conduct participatory resource mapping exercise with female community members in Diga

The lack of official attention to the termite problem illustrates the weakness in the official top-down planning processes. We are not aware of whether the local community has ever proposed this problem in the local planning meetings, but clearly it has not entered into the official implementation plans.

There are also forest management issues in Diga Woreda, particularly in areas where there are remnant forests such as in Bikila Kebele. In these areas farmers report conflicting information about the extent of forest coverage and deforestation; some say that the forest is expanding but in other areas forest clearance is reported. There are also a variety of perceptions about the value of trees among farmers in this area. There is evidence that forests are being cleared to reduce the habitat of baboons that are a significant threat to both crops and livestock. However, the clearing of forests could be actually exacerbating the baboon problem. Other farmers regard specific trees as being essential for coffee production, because of the shade they provide. Traditional religious beliefs also seem to play a role in forest conservation. At the moment only anecdotal evidence has been collected on these issues; more in-depth investigation is required. However, these examples illustrate how different experiences and perceptions influence human-environmental interactions and hold significance for forest-related policy development.

Land scarcity and landlessness are a key issue in Diga as found by the baseline research. Respondents suggested that the majority of households in the district do not have enough cultivable farmland, often as a result of declining land productivity. These problems seem to be worse in the highland kebeles. Low productivity of land is mainly due to soil degradation, including nutrient mining and erosion, termite problems, and declining fertility due to continuous farming. Landlessness represents a significant problem among the youth which in turn triggers alternative livelihood arrangements such as land renting, migrating to the lowlands for paid labour (i.e. sand mining) or to the lowlands to clear forest land for farming. Low productivity in the highlands pushes people to the lowlands in search of fertile soils. Establishment of farms in lowland areas has a negative impact on the natural forest as farmers clear trees and bushes for cultivation. The increasing population in the lowlands has serious implications for the long-term natural resource base of the area. It will be important to have a more in-depth understanding of land ownership within the woreda, as well as migration patterns and population dynamics and how this will influence planning and implementation strategies for RWM/NRM.

Fogera

Rice production was introduced to Fogera during the Derg regime as a livelihood opportunity, but this has impacted on human-environment interactions. In the past, the area was known for cattle production (the Fogera cattle breed is widely known in Ethiopia for its high quality and milk production). Crop production was limited. Local communities led a semi-nomadic life with transhumance grazing patterns from uplands to the plains during the dry season and from the plains to the uplands during the rainy season. The introduction of rice led to a change in livelihood strategies, which has reportedly been beneficial in terms of income. Now there are now up to three cropping seasons with cash crops being produced during the dry season, but there are potential issues in terms of sustainability. Rice production is possible in Fogera due to the seasonal flooding of plain lands; initially flooding was considered to be beneficial due to the transfer of fertile topsoil, but in recent years, as a result of ongoing land degradation in the uplands increasingly exposing sandy sub-soils, the floodwaters bring more sand and less fertile sediment that damages crop production. This suggests wider issues of natural resource degradation/mismanagement and has implications for NRM strategies. Farmers compete for fertile land in the plains/wetland for rice cultivation, which leads to conflicts among farmers as farm boundaries are virtually invisible after months of flooding. There are also conservation issues with the wetland ecology being threatened as farmers compete to obtain land as the floodwaters retreat.

The baseline research has shown that in terms of increasing household income, the expansion of rice production is largely positive, but there have also been significant changes in livestock production as well as their movement. Further analysis is required in finding a balance between expansion of rice production and livestock rearing. Although people have continued to keep livestock, previous patterns of livestock movement have been curtailed due to changing land use patterns. As a result, there is stress on existing grazing land and conflicts are common. Unrestricted grazing is frequently cited as a problem in Fogera but this requires more investigation, as the situation may have been exacerbated by outside interventions. For example, an IPMS (Improving Productivity and Market Success of Ethiopian Farmers) project tested area enclosures in Kuhar Mikael Kebele, but this resulted in conflict between farmers over access to the enclosures.

Female community member involved in onion cash crop production in Fogera

Children herding livestock in Fogera

There are likely to be very different perceptions about grazing issues between community members and development agents, including local government, but also among community members, depending on how much they depend on communal grazing land. Understanding these issues is important for successful interventions in this area. The conflict in Fogera over both grazing land and access to wetlands for rice production between local communities has significant implications for local level decision making about NRM and RWM activities, particularly those requiring collective action. Approaches need to be found which enhance the sense of ownership among community members over communal resources to ensure sustainable management. Because livestock, cropping and natural resource management issues are at stake here, there is also a need to talk about planning beyond individual government line departments.

These dynamics could also represent opportunities in terms of RWM/NRM. There may be potential for mutually beneficial arrangements between those farmers in the uplands and those with land in the wetlands, taking into account upstream/downstream relationships and act as an incentive for farmers to undertake RWM activities. Fogera has a high potential for dairy production, but according to woreda agricultural experts, due to the feed shortage, farmers from highland kebeles move indiscriminate breeds to the plains during the dry season, which has resulted in the dilution of the better yielding Fogera breed in the plains. Forage development interventions in the highland areas could potentially be used to slow down runoff, increase water infiltration and help to stabilize gullies on grazing lands. This in turn would reduce the amount of sandy and infertile soils being transported to the wetlands. In the wetlands there is potential for improving crop residue use. At the moment farmers in Fogera bring rice to Woreta town to be processed (shelled) (there are 22 processors in Woreta town) but they do not have access to the residue once rice is processed. Producers sell the crop residue as livestock feed, but farmers get no benefit. This seems an area where further research and policy support might be required on how best to share benefits and compensate farmers for the value of fodder. Farmers could be supported to establish cooperatives which could process rice and keep crop residues for their own use. All these potential interventions need to be assessed in terms of their ecological impacts, but also in terms of implications on labour for different households (in terms of wealth, size of household, location, etc.) or competition over land for alternative enterprises.

Paddy rice production in Fogera

Community members engaged in government initiated SWC work in Jeldu

Jeldu

Eucalyptus is a significant contributor to livelihoods in Jeldu as it represents a major source of income for a variety of people. Because income from eucalyptus can be up to 20 times higher than from staple crop (maize) production (Tilahun Amede, personal communication, 2010), eucalyptus plantations are expanding fast in the research site. But land conflicts and water shortage issues are emerging. In particular, eucalyptus production is leading to conflicts over land ownership. Some people rent land and plant eucalyptus as a way of securing access to land; they refuse to return land to the owner unless compensation is paid to them for the accumulated value of trees. In addition there are issues with absentee landholders (people who no

longer live in the community but still own land) who plant eucalyptus on land that they rent or contract to local farmers. Problems are caused because they plant eucalyptus on productive farmland which affects neighbouring farmers who complain about negative effects in terms of ground water, shading of crops, and impacts on production. Farmers are also planting eucalyptus at the bottom of valleys where there are springs, but there are widespread complaints that this contributes to the drying of springs which are important local water sources. While locally agreed to prohibit this practice, this needs to be discussed and agreed among local communities who also have to develop by-laws that regulate planting of trees near to streams. This could be an entry point for community led collective action and innovation.

The issue of eucalyptus is complex and there is often a polarisation of views among experts, particularly in terms of the impact eucalyptus has on land and water resources. Some of these views trickle down to farmers and are often combined with local perceptions and agendas. Farmers in the area seem to see eucalyptus as both a threat and an opportunity. It is obviously an important source of income for those who rent their land; it is a valuable cash crop and provides income for landless young people who assist with harvesting, loading and unloading logs. However, a major issue seems to be the fact that there are no laws or regulations governing the planting of eucalyptus. In Jeldu, local conflicts over this issue have been taken to the regional government because the woreda cannot control the situation. In general, there is a need for further analysis and evidence-based research which looks into the different perceptions revolving around eucalyptus from both livelihood and land management perspectives.

Soil erosion is a significant problem in Jeldu area, particularly due to high rainfall at the beginning of the cropping season when soils are bare and exposed to rainfall impacts and run-off, especially in the upper parts of the woreda. This leads to a decrease in the amount of productive land available for farming. Farmers in the area used to practice fallowing, but this is decreasing because of scarcity of productive land. This corresponds to other changes taking place, for example there is significant out migration mainly by the young people towards the eastern part of Ethiopia (Adama, Arsi, etc.) in search of seasonal labour. More in-depth investigation of historical trends in migration and whether it has increased in recent years as well as in-depth assessment of push and pull factors would be useful.

Climatic changes also emerged as a major finding in the baseline research. Farmers reported changes in weather patterns as well as extreme seasonal fluctuations, i.e. flooding and drought. In 2010, outbreaks of crop diseases became frequent, for example potato blight and yellow rust in wheat that are attributed to changing weather patterns. Disease outbreaks led to low crop yields and food insecurity with major impacts for many areas within Jeldu that are already food insecure. 20 kebeles out of 38 were classified as food insecure in 2010 and received food aid. Increasing vulnerability and food insecurity is likely to influence decisions about livelihood strategies, particularly out-migration. It will be important to gain a more in-depth understanding of seasonal patterns and how this affects households. These issues will also be significant for planning NRM/RWM strategies because vulnerable households will be counted on for participation in food for work schemes, etc., but their availability may be affected by migration patterns. Considering the problems with soil erosion and degradation in Jeldu, and the importance of tree planting for local livelihoods, trees could be an important focus for RWM/NRM activities. Bishaw (2001) argues that tree planting through agroforestry and social forestry should be an integral part of rural development programs and the physical recovery of degraded land in the Ethiopian highlands. This is relevant for the NDBC as the program had adopted a broad definition of RWM (Box 1). Integrating eucalyptus with other multi-purpose and locally suitable tree species could address a number of issues from soil conservation and fertility to water retention as well as cash crops and income generation (see Dessie & Erkossa, 2011). However, farmers have so far been unreceptive towards government-initiated tree planting activities due to lack of consultation and involvement (i.e. regarding location, species etc.). Local participation in NRM planning will be critical for any future efforts.

Implications for RWM/NRM practices

Historically, top-down policy and planning practices have proven ineffective in dealing with questions relating to location-specific environmental conditions and sustainability of the livelihoods of local communities. Mequanent (1998) argues that degradation of environmental resources is most likely to happen when local communities are marginalised by top-down oriented development initiatives. This is supported by evidence from historical NRM approaches in Ethiopia, which have excluded communities from decision making processes, deprived them of a sense of ownership and made them prone to environmental neglect. Examples from the different sites highlight the importance of site specific contexts and the need to take seriously issues which communities view as significant, and to involve them in the process.

Evidence from the baseline research suggests the majority of local level NRM practices are currently farmer initiated at community/household level. A range of indigenous practices for land and water management is mentioned in the site reports. These include: side ploughing, establishment of soil and stone bunds, planting, use of organic fertiliser such as animal manure, intercropping and crop rotations, and fallowing. There is also evidence across the sites of indigenous irrigation systems. These practices suggest that rural communities have much to contribute to RWM/NRM processes in terms of knowledge and innovation. It is increasingly recognised that indigenous knowledge comes from the cultural context of the people and that it evolves in response to specific environmental conditions. Rural communities therefore have much to contribute to innovation processes. At the same time, on their own, often local NRM practices are no longer able to deal with accelerated levels of land and resource degradation and therefore need to be combined with more scientifically-based approaches, practices and technologies. Farmers are often experimenting with a variety of choices and negotiating between old and new ways of doing things, rejecting or selecting newly emerging options and incorporating them into daily life. "Farmer experimentation is the main means by which adaptations are made to the farming environment and ultimately the main mechanism through which indigenous natural resource management strategies remain sustainable in the face of change" states Dixon (2001: 53).

From the research sites there are a number of examples of community-to-community knowledge sharing and innovation. For example, in Diga, Harar re-settlers have introduced soil conservation practices like leaving maize and sorghum stalks on the field to avoid soil erosion during the dry season. Strip planting of vetiver grass has also been implemented at farm level in some areas, and has been used to delineate degraded areas for enclosure. These seem to be practiced by specific individuals in specific places. There needs to be more investigation about how these practices have been introduced and by whom and what farmers hope to achieve by adopting them. Local coping mechanisms have been developed including cultivating early maturing crop varieties in order to cope with unpredictable weather patterns. It seems that farmers are open to diversifying their crops and are adopting new varieties from research centres and neighbouring areas; this could be explored further. It would also be interesting to explore local coping strategies further because these are a form of local innovation, some of which may be currently unacknowledged or under-reported. Farmer-led innovation could play a role in improving traditional practices; however, fear of failure is often a major reason for lack of innovation as the consequences of failure are fully borne by the farmer. It will therefore be important to take potential risks and farmer fear of failure into account when considering new interventions.

Despite their knowledge and experience, farmers' role in the research and NRM programme planning process is minimal and their views are often overlooked. Lack of farmer awareness is something that is regularly mentioned by a range of stakeholders, particularly higher level technical stakeholders. Such widespread attitudes are not conducive to farmer participation or capacity building. Farmers often have good reasons for resisting certain interventions/strategies. For example, in Diga fallowing is common in the lowlands as mono-cropping and application of a range of chemicals by the state farms has increased acidity of the soil. Hence, farmers in the lowlands commonly practise fallowing to improve productivity

of the soil. However, fallowing is not common in the midlands, partly because of land scarcity, but also influenced by the perception that the local administration may consider any farmer with fallow land as lazy, from whom land can be taken for redistribution. This is an example of why it is important to communicate local livelihood strategies to development planners – or even better to involve them in the analysis of livelihood strategies in the first place.

There is also some evidence about resistance to fertilizers: evidence from Diga suggests that certain areas are no longer responsive to the application of chemical fertilizer. A male participant said 'we are not in a position to take chemical fertilizers because even after harvest, crop output cannot cover the costs of the fertilizer as land productivity has diminished'. The fact that land productivity is decreasing despite the use of chemical fertilizers is significant for RWM/NRM activities. Further research needs to be done to develop site-specific fertilizer recommendations combining organic and chemical inputs. Such site-specific approaches would also have to take into account markets and the often-observed discrepancy between the income generated from the sale of crops in contrast to excessively high costs of fertilisers. An integrated approach is required whereby land and water management are key ingredients for addressing land productivity in the longer term, while short term inputs, which often are not sustainable over the longer term and do not give good returns, and therefore potentially putting a strain on limited resources, are used only during the transition period of moving towards a more sustainable land and water management system.

A range of community institutions and organizations were identified during the research, including livestock lending mechanisms, reciprocal labour institutions, socio-cultural/traditional institutions such as *Idir* and *Equb*, church groups such as *Mahiber*, women's groups, and co-operatives. Other important traditional institutions include *Gada* (a generation-grading system) which exists in varying degrees in Oromo areas and traditional resource management representatives such as *Abba Laga* (meaning Father of the River[s], which was mentioned in Diga). The existence of community institutions demonstrates that an alternative form of collective action is possible if initiated by community members themselves. These institutions are often popular and well respected within the community and already play a role in social organisation, resource mobilization and resource management; therefore they could be significant for RWM/NRM activities. 'Institutions which command respect and support from the community are potentially important for natural resource management and should be supported and encouraged' (Dixon, 2001: 27-28). Traditional religious beliefs, such as *Waaqefatta* (Oromo religion) and the Orthodox Church, have also been shown to play a role in natural resource management (cf. Keblessa, 2005; Alemayehu, 2007).

Local institutions provide important communication channels for spreading information among local actors. Use of these mechanisms in RWM/NRM activities presents a potential opportunity for innovation. However, there needs to be further analysis of what local institutions exist in a given area, if they could be linked to NRM, including planning, implementation and evaluation of RWM/NRM interventions and land use planning, and how they engage with NRM issues. There is, however, a need for in-depth and critical examination of the roles played by these organisations, as in some cases, traditional and cultural values may prevent women and other social groups in society from participating. But it is necessary to unpack the concept of 'community' since no community is a monolithic or undifferentiated entity but comprises categories of people distinguished by age, sex, interests and varying degrees of influence and power. Nor do they exist in a political or economic vacuum; they are linked in various ways with the larger society that surrounds them (Murphree, 1994: 403).

There are also broader issues which need to be taken into account. For example, it has been observed that one of the hurdles to community action on NRM issues in Ethiopia is that there is no clear legal base for determining ownership of common pool resources (Bishaw, 2001). There are instances of conflict across the

study sites, along ethnic lines, between local communities, and within communities among groups applying different livelihood strategies. These conflicts often materialise over natural resources, particularly common pool resources. For example, there is conflict over waterways and irrigation in Jeldu, conflict over grazing and access to wetlands for rice production in Fogera, and conflict over waterways between ethnic groups in Diga. This is significant for RWM/NRM activities and for managing group interactions.

Key conclusions on livelihoods

Our research has highlighted many specific livelihood issues and several underlying institutional processes which need to be considered if RWM/NRM activities are to be successful. Key among these is active involvement of community members in the process of RWM/NRM activities right from the start. Commentators highlight that lack of interest in development activities on the part of community members can be a form of resistance to the imposition of external values and concepts by outsiders with a limited understanding of local realities (Cavalcanti, 2007). Development agendas and interventions introduced by outsiders may conflict with local knowledge and priorities which address specific needs and circumstances. Community perspectives should therefore be integrated with plans of action for long term sustainability. Better understanding of current knowledge and practices, coping mechanisms, capacity for innovation and mechanisms for community mobilisation, as well as understanding the reasons for resistance to certain interventions, could lead to a much better understanding of how, where and what to promote when it comes to NRM.

There are potentially exciting opportunities for co-development of plans and interventions which incorporate local perspectives as well as develop farmers' capacity to innovate. Care must be taken not to idealize indigenous knowledge, but multi-stakeholder participatory processes involving external agents and community members can be used to assist local communities to organise and assess their own knowledge and resources whilst also identifying and integrating appropriate outsider knowledge and technologies. Further, it is "not narrow disciplinary research [that] is necessary for addressing land degradation and its impacts, but interdisciplinary communication and transdisciplinary collaboration (Ludi 2004:387). This includes multi-disciplinary research, research partnerships between researchers and research organisations from Ethiopia and from abroad, and genuine collaboration of researchers and the concerned society. Not focusing on either participatory approaches or scientific methods alone, but combining the two knowledge systems equitably will be the key to finding options for sustainable land management and sustainable livelihoods'.

However, it is also important to bear in mind that not everyone may want to share their knowledge. Many rural people, particularly in countries where political sensitivities are pervasive, rely on information flow based on secrecy, evasion and restraint (Davidson, 2010: 213). People may have good reasons for not wanting to make their perspectives and knowledge known or widely available. People in rural areas work long and exhausting hours and have little time to carry out project tasks, particularly if they cannot see tangible benefits. If farmers already have to do compulsory work on resource conservation activities such as watershed protection or tree planting, as well as being required to attend political meetings, 'sensitization' sessions and trainings, they may not be willing to participate in additional planning events. This is particularly relevant if their experiences of 'participation' are already negative.

Therefore, it will be important to develop mechanisms for collaboration between various stakeholders which enable different knowledge and perspectives to be exchanged, shared and translated into action. As Teshale et al. (2001) highlight, "While devolving the responsibility for resource planning and management to local communities may be a necessary condition for meeting the objective of sustainable development, it is important – particularly in the case of developing countries – that this is complemented with capacity building initiatives at local and national levels in an integrated framework" (2001: 34).

Community members involved in onion cash crop production in Fogera

Innovation

Our findings on planning and implementation processes have confirmed that a strongly linear development paradigm still dominates Ethiopian state development thinking about NRM. Most often, the relevant sector specialists and experts identify problems, which are then researched by Research Centres and Universities, who are responsible for developing solutions. Enhancement of NRM is viewed as being achievable through introduction of research-generated technologies at kebele level. Participatory approaches to rural development that emphasize community members' empowerment, as advocated by Robert Chambers (1983) and others, do not appear to have significantly influenced the actual implementation of NRM policy in Ethiopia, despite favourable policy pronouncements. Furthermore, recent proposals on the application of innovation systems thinking to NRM development appear to be relatively new ideas in Ethiopia. In this section we consider recent ideas on how change happens in rural settings, drawing on innovation systems thinking. We also make some suggestions on how these ideas could be implemented to improve RWM approaches in Ethiopia.

Definitions

There are many different understandings of innovation, innovation systems and innovation capacity and it will help our diagnosis of planning and implementation of NRM/RWM – particularly as we advocate for a much stronger recognition of farmer innovation and the need to foster innovation instead of technology dissemination in this field – to present our own understanding of what these terms mean:

Innovation for our purposes is defined as the "process of producing, accessing, diffusing and, most importantly, putting into use knowledge in socio-economically useful ways" (after Hall, Sulaiman and Bezkorowajnyi, 2008, p. 12). Innovations may be technological, organisational, institutional, managerial, related to service delivery or to policy. Knowledge or technology does not become an innovation unless it is used. The term innovation is often used interchangeably with "technical intervention" but mistakenly so in our understanding. Innovation is about much more than technologies. Indeed those innovations that lead to changes in rural livelihoods are often organizational in nature; things like sorting out input supply arrangements for crop production, or improving connections between small-holders and markets for their produce.

An innovation system is the cluster of individuals and organisations involved in knowledge generation, diffusion and use (researchers, farmers, private sector firms, universities, extension agents, technical experts from line ministries, and so on) together with the processes required to turn knowledge into useful economic or social benefits (including trading arrangements, credit supply systems, input supply, processing and others). Conventionally, consideration of an agricultural innovation system has tended to focus on a specific value chain and the actors and processes involved in bringing products from production to consumer. In the context of RWM/NRM, the value chain emphasis may be less useful. Here, innovations are focused on long-term collective livelihood and environmental benefits and the role of the market as an incentive for change is by itself insufficient. Incentives for innovation in collective NRM/RWM are likely to be less market-driven, less individualistic and more difficult to achieve than when considering a value chain-based innovation system.

A related concept is innovation capacity. This is essentially the capacity of an innovation system to bring about beneficial change. Just what this means in practice is difficult to pin down, but the four-element framework for conceptualising innovation systems proposed by the World Bank is useful (World Bank, 2006). The first element is the actors involved: who is present and who is missing? Is there a diversity of actors? Is the private sector or civil society strong or weak? Are the actors aware that the current situation needs to be changed? Are actors in a position to change the situation, i.e. do they have the agency to initiate innovation and change?

Secondly, what is the nature of the linkages between actors? Are different types of actors well connected to allow joint action and a free flow of knowledge?

Thirdly, how do actors behave? Are there entrenched ways of working for particular actors that inhibit interaction or the possibility of innovation?

Finally, is the enabling environment conducive to innovation? Are there policies or infrastructural issues which make innovation difficult? Each of these elements contributes to a healthy and well-functioning innovation system. We would argue that in general, systems which favour innovation are those where there is a diversity of actors who are well linked, are not hampered by cumbersome institutions or bureaucratic hurdles, and who operate in an environment that encourages change. Those in which innovation is less likely to happen are characterised by dominance of the actor landscape by one sector, a lack of a networking culture, entrenched habits and practices that do not allow change, and an external environment that makes change difficult (e.g. unforeseen effects of existing policy).

Innovation capacity and RWM

In this section, we draw evidence from researchers' reports from each of our research sites to characterize local innovation capacity and what might be done to enhance it.

First, we consider actors and linkages. Public sector dominance is a core characteristic of rural innovation systems in Ethiopia (Spielman et al., 2011) and this came through strongly in the research findings. Responses to questions about the key actors involved in RWM almost exclusively cited woreda officials, development agents and farmers as the core actors. Civil society actors were hardly mentioned and even research actors did not feature except perhaps in Fogera. The private sector was completely absent. To some extent this lack of diversity among actors may reflect the NRM focus of the study. We would not expect private sector actors to be engaged in NRM at this stage of development, as NRM is considered to be basically a public good. In a more commercially–oriented system we could expect input suppliers for irrigation or water harvesting equipment, seed suppliers for forages for bunds and so on. The lack of civil society actors contrasts with other situations, for example, in India, where numerous indigenous NGOs are involved in promoting environmental issues and where the *panchayat* (local community institution) would have featured strongly.

Turning to actor linkages, researchers asked questions about which existing networks are present at local level. Fogera stood out in this respect and a number of local networks were mentioned. These included Farmer-Research-Extension Groups (FREGs), Agriculture and Rural Development Partners Linkage Advisory Council (ARDPLAC) and Subject Matter Specialist Groups. Taking FREGs as an example, this form of network seems to have been reasonably active in Amhara Region; 33 FREGs were established in 4 zones of the Region. However, the groups are led by the Amhara Regional Agricultural Research Institute and therefore could be viewed as a technology dissemination mechanism rather than a forum for joint identification of issues, co-development of solutions and creating the capacity among farmers to choose from a range of options, as originally envisaged. Indeed, each FREG seems to be focused on a particular technology which may well be determined by researchers rather than emerging from dialogue among researchers, extension agents and farmers. The linear development paradigm mentioned earlier as being characteristic of Ethiopian state thinking, and underlying FREGs also seems prominent in the ARDPLAC, although some evolution in thinking is apparent. ARDPLAC is the most recent incarnation of a series of government-initiated networks. Prior to ARDPLAC there were two other small-scale platforms that led to the emergence of the current region-level platform. The Research-Extension Liaison Committee (RELC) was established in 1986, and was replaced in the late 1990s by the Research-Extension-Farmers Linkage Advisory Council (REFLAC) with the inclusion of farmers as members (Demekech et al., 2010). REFLAC was organised at national, regional and research centre levels, and functioned for approximately 10 years before it was replaced by ARDPLAC in 2008. The evolution in naming and

change in the composition of stakeholders of these networks does seem to indicate an acknowledgement that innovation requires more than dialogue between researchers, extension workers and farmers.

Currently, ARDPLAC members are drawn from agricultural extension service providers, researchers, administrators, universities, seed enterprises, mass media consumers, cooperatives, farmers, non-governmental organizations, credit and saving institutions, input suppliers, credit suppliers, and private companies (Demekech et al., 2010). This broadening of membership composition is a welcome move. However, none of the respondents in Fogera were aware of the existence of ARDPLAC, indicating that although the structures for dialogue are in place, impact at grassroots level still has some way to go.

As well as the formal networks established to enhance knowledge flow at local level, our research identified development agents as key nodes with a potential for connecting farmers to other important actors within the local innovation system. Development agents act as potential bridges between farmers and other actors but we identified some key problems with the way in which DAs currently operate (see Box 4). One constraint mentioned repeatedly was the uni-directional nature of influence of DAs. DAs are expected to take knowledge from experts and other higher level technical officials and transfer this to farmers. A frequent complaint was the information and knowledge flow in the other direction, i.e. from farmers to woreda officials, rarely happened. Farmers seemed disillusioned that their views never found their way into higher level discussions. DAs also felt that they were not listened to in the planning process and this led to their demotivation, a response shared by many farmers.

DAs occupy a critical position in the local innovation system and some attention to empowering them and giving them a stronger role in communicating farmer views at higher level could pay dividends. A further issue related to DAs was their inadequate training which undermines their influence with farmers. In most cases DAs are young, have undergone a very technical TVET training with limited practical experience, and have not had opportunities for continuing professional development or exposure to other sites and experiences. This led to some farmer respondents describing them as "farmers' labourers", indicating a lack of credibility regarding their advisory role. DA performance is largely measured in achievement of quotas they have to fulfil at kebele level and which are passed down from woreda level, so the emphasis of their work is on achieving these quotas and much less on supporting farmers in learning and innovation or in carrying out tasks so that they are sustainable over the longer term.

The DAs' role, in theory, is principally one of supporting farmers to improve their livelihoods through improving agricultural and NRM practices. In reality, however, as was reported by a number of respondents in our research, DAs are increasingly used for administrative purposes. This is undermining their credibility as providers of impartial and non-partisan information and knowledge. The role of DAs needs some serious thought. Their role is partly defined by the predominant "technology dissemination" paradigm based on deeply entrenched and strict hierarchies and clear sector boundaries prevailing in rural development thinking in Ethiopia. A rethink of their role could involve redefining their role to one of "rural facilitators". The term "development agent" is rooted in the modernising paradigm prevalent in Ethiopian development thinking. There are alternative models, whereby rural extension workers are seen much more as facilitators; in some francophone countries, extension agents are referred to as "*animateurs*" and this would seem to us to be a more useful function.

A third contributor to innovation capacity is what we term "institutions". In this context we define institutions as the habits and practices of actors and the rules and norms by which they operate. This was a difficult concept even for researchers to internalise. Their interpretation of "institutions" related to traditional community organisations and the responses to these questions were of limited value. However, from responses to other questions and lines of enquiry we can identify a number of institutions which may be hindering innovation in the study sites and in Ethiopia generally.

Male community members discussing SWC work in Jeldu

Foremost is the system of quotas handed down from Regional and Zonal level for NRM interventions (see the planning and implementation Chapters, above). Quotas arise from the very top level through national plans such the current 5-year development plan – the Growth and Transformation Plan. National targets for NRM are spread across woredas and officials are responsible for meeting their quotas. The need to fulfil quotas for specific interventions removes decision making about NRM strategies from farming communities, erodes ownership of implemented interventions, and thus undermines their usefulness and sustainability. The quota system is open to abuse and fabrication and breeds mistrust and disillusionment among those involved in its working. It is furthermore focusing on outputs rather than outcomes or impacts. All this tends to inhibit innovation.

A related institutional barrier to innovation relates to the top-down nature of the NRM implementation process. For example, in Diga, as respondents stated: "Farmers are often told to rehabilitate a degraded hillside or gully through campaigns that are supervised and overseen by government bodies". Despite the rhetoric of participation, the power balance favours officialdom and very little decision-making power is left in the hands of communities.

Other institutions limiting innovation mentioned in the reports were the lack of women's involvement in planning and implementation processes; the numerous religious holidays were seen as limiting the efficiency of any planned interventions. Perceived "lack of farmer capacity" in relation to NRM interventions was also a recurring theme in responses from officials. This attitude of officials towards farmers has long been present; for example, kebeles used to be referred to as "peasant associations". This view of farmers as peasants – backward, uneducated and unaware of problems and possible solutions and thus requiring someone who tells them what to do – has undermined self-confidence among farmers to deal with their own problems and this must represent a major institutional barrier to innovation.

Farmers often mentioned this, and have incorporated this narrative, that "they lacked awareness about the seriousness of resource degradation".

The final element of innovation capacity is the enabling environment. In other words, are there policy or other external factors that make change unlikely? The predominant response to questions about external factors limiting innovation concerned limited resources. Many respondents, in particular DAs and woreda experts, indicated that lack of transport, office facilities, finance and so on were major impediments to carrying out their roles effectively. Road infrastructure was also mentioned as a key constraint. For example, in Fogera, respondents said that, "There are fewer roads to link one kebele from another and the WoARD does not have vehicles to transport people and goods from place to place. These are factors that limit NRM activities in the district". Other factors mentioned were the quota system and inadequate budget allocation for NRM activities. Conflicts over NRM issues were also apparent in our research findings. For example, in Fogera, conflicts over grazing rights have created tension within farming communities and these issues would need to be resolved for any effective collective action to occur (see chapter on livelihoods).

Conclusions on innovation processes

It is clear that there are some fairly entrenched issues limiting innovation at local level. Chief among these is the system of quotas for NRM/RWM activities and the top-down approach inherent in planning and implementing NRM activities to meet quota targets. There have certainly been moves to introduce more participatory approaches to NRM in recent years but "old habits die hard" and the evidence from our survey suggests that participatory planning and implementation of NRM interventions at local levels is often participatory more in name than reality. Addressing this core issue could do much to free up communities and supporting actors to engage in more effective and sustainable NRM.

An equally important issue concerns the prevailing understanding of how innovation happens. Evidence from our research suggests that a strongly linear paradigm still dominates thinking on rural innovation in Ethiopia. As mentioned earlier, sector specialists and experts identify problems that are then researched by Research Centres and Universities tasked with developing solutions. These solutions are then disseminated to farmers for adoption via the extension system. Innovation networks that have been established are based largely on the premise that the key constraint to innovation is poor knowledge dissemination and therefore if knowledge on technologies can be effectively passed from research through extension to farmers, then beneficial change will happen. We argue that more recent thinking on innovation networks acknowledging the need for a wider array of actors and more opportunity for multi-directional feedback and experimentation to enhance innovation capacity at the local level.

In practical terms this could mean experimenting with the use of local innovation platforms to provide a space for relevant actors to jointly identify constraints and solutions to NRM issues at the local level (Nederlof et al, 2012). The use of innovation platforms has more recently been applied to development of commodity value chains but there is scope for their application in dealing with NRM issues[7].

7 Since this report was written, innovation platforms are being tested in these research sites.

Conclusions

This baseline study has identified a number of reasons why current RWM strategies are not as effective as they could be. National targets for improved RWM indicate that priority is attached to reducing natural resource degradation and its damaging effects on livelihoods and food security by government. This could be a force to help drive local action. However, targets are currently allocated down to kebeles with little attention to the suitability of each strategy for local agro-ecological conditions or their relevance to local livelihoods. This results in a lack of ownership both by farmers, who are ultimately responsible for implementing plans, and DAs who feel they have no influence over plans in spite of their local knowledge and despite being responsible for a notional bottom-up planning process.

There are reasons why experts from the Ministry of Agriculture decide that specific RWM or NRM interventions are necessary, reasons which might not be immediately apparent to farmers, such as avoiding off-site costs or investing in 'preventive' measures rather than just 'curative' ones. Insufficient communication and provision of explanations for such decisions contribute to a lack of buy-in and acceptance by farmers. It is therefore common for NRM interventions to be poorly implemented and maintained, or even destroyed, and for them to contribute little to improving local livelihoods. This lack of sustainability is also related to the way in which DA performance targets are set, i.e. as implementation targets, not outcomes or longevity of interventions, and to the absence of effective governance arrangements for managing NRM on common lands.

As well as resulting in poor progress in terms of tackling natural resource degradation and improving land and water productivity, the current approach misses opportunities to support, and build on, local capacity for innovation. The entrenched mindset is that farmers lack awareness, have little knowledge to contribute, and must receive expert technical instruction from above. There is, of course, a place for external technical expertise, and research into new technologies by, for example, agricultural research centres. However these need to be married with farmer knowledge and experience in a freer, and more equal, exchange of ideas if real innovations are to emerge which can solve problems at local level. It has been shown how current institutional arrangements and incentives constrain such innovation, so any strategy must include the opening up of some space to tackle institutional constraints.

Community mobilization for SWC work in Jeldu

There could also be opportunities to capitalize on existing local institutions that currently have little role in RWM. To ensure RWM is effective at a landscape scale, local strategies need to be integrated at higher levels to take account of downstream impacts. At its simplest this means that neighbouring kebeles and woredas need to come together to ensure that plans are complementary; such a process would need to be guided and supported by the zone or region, with the involvement of river basin organisations where these exist; and some rules would need to be agreed for resolution of any conflicts between plans. Finally, existing sectoral barriers need to be overcome to make most of RWM interventions.

Ways forward

This section is framed as recommendations largely for Ethiopian policy makers and implementing agencies. But many of these are also being tested and demonstrated through an action research process in the three research sites under the NBDC program. The recommendations represent an approach to improving the NRM/RWM planning and implementation processes in rural Ethiopia such that impact, sustainability and local ownership of interventions are prioritised, and strategies are based upon meaningful participation of farmers and other stakeholders. They also present a growing base of evidence about what works and why, and increasing opportunity for true innovation at all levels.

Although such processes are not always straightforward, and this does represent a major shift away from current practice, some of the foundations of this approach are in fact already present on paper, for example in existing policies and implementation guidelines such as the emphasis on participation in planning as described in the MoARD's Guidelines for Community-based Participatory Watershed Development (Desta et al., 2005). These provide some basis to take action.

Shift targets from outputs to outcomes

Having national targets that help guide the development process in itself is not necessarily problematic, but the way in which targets are applied at local level is currently a major constraint to more effective RWM. Simply dividing a national target up among the different administrative units at lower level does not provide enough space to take account of social and ecological contexts, upstream-downstream effects, or the synergies which occur across sectors. A more nuanced approach is required, with targets serving as guidelines to formulate outcomes that woredas and kebeles wish to achieve, and promoting consideration of inter-kebele and inter-woreda effects.

This implies that a shift in focus is required away from an over-emphasis on physical outputs e.g. how many hectares of land are rehabilitated or treated with SWC to include outcomes e.g. the role these NRM/RWM investments play in achieving higher-level goals such as enhancing land and water productivity, improving food security or reversing environmental degradation. It is interesting to note that in some of the highly degraded areas of the Ethiopian Highlands, in particular in Tigray and northern Wello, achieving targets for natural resource conservation in the past has been less problematic than it seems to be in our research sites. One reason could be that the contribution to household wellbeing and community resilience of RWM interventions in these areas is more favourable than in our research sites. One could hypothesise, for example, that rainwater management investments in an area with low and highly variable rainfall as characteristic for Tigray and Wello, is economically more viable than in high-rainfall areas such as Diga, Jeldu or Fogera.

There are good reasons for government to provide guidance for investments in specific areas that might not be prioritised and identified in needs assessments by farmers, particularly those concerning common pool resources. An example is the conservation of degraded hillsides used as communal grazing land, where NRM can be considered a public good. In such situations it is of paramount importance that government representatives and experts explain to farming communities why NRM interventions are required and help identify benefits that could be generated from such areas that could compensate at

least partially for the investment costs or foregone benefits. Increasingly, the government should, in collaboration with development partners, investigate opportunities for Payment for Ecosystem Services (PES) to compensate farmers for investments where benefits accrue to society at large or even to future generations but not to those who have to bear the costs of the investments.

Enhance monitoring and evidence collection on RWM with a focus on impact and sustainability

Currently, insufficient attention is paid to monitoring the effectiveness of RWM interventions and practices, both in terms of their contribution to reducing natural resource degradation and enhancing productivity, as well as their use and sustainability. Without such basic learning about what works and what does not, there is very little opportunity to improve the effectiveness of RWM investments. Better monitoring information should be collected and used both to inform local planning and implementation and fed up to higher levels in a learning process. This would also require that the performance assessment of DAs as well as kebele and woreda officials be modified to encourage such data collection, and efforts would be needed to raise awareness about the importance of learning and evidence. Agricultural research centres and universities could also be engaged in these research and learning processes.

Revitalise and capitalise on the DA system

DAs are crucial interlocutors between farmers and sector specialists at woreda level. The presence of dedicated DAs at local level across the country represents a significant opportunity for implementing new approaches to RWM based on a combined approach of scientific knowledge and farmer participation and local innovation. However, the effectiveness of the DA system is currently limited by low technical capacity and personal motivation of many DAs, the instrumental use of the system for one-way transmission of information with little opportunity for upward learning, the output-based performance assessment system, and the diversion of DAs into administrative and even political activities. These constraints can be addressed through: (a) provision of more practical training and experience-sharing opportunities for DAs; (b) clear definition of the roles and responsibilities of DAs to focus on technical support and facilitation of collective action rather than political mobilisation of farmers; (c) revision of the performance assessment system; and (d) adequate remuneration, housing and other benefits to ensure adequate motivation[8].

Strengthen local institutions' roles in NRM

It is vital that those involved in trying to strengthen NRM/RWM recognise that this is not simply a technical issue but that institutions play a key role in defining whether or not RWM interventions are sustainable and effective. Paying greater attention to institutions will also enhance the chance of ownership of investments. DAs and other officials should facilitate and support local institutions to take responsibility for collective management of natural resources while also influencing them to be more inclusive and equitable. For example, an area of common conflict relates to changes to grazing land management. From conservation perspectives, closing off degraded hillsides and preventing grazing might well be justified. But if not embedded in local institutions, which can design means by which to compensate for the loss of grazing area, the chances of the rules being followed are limited. If, however, an agreement can be reached on how to use such areas, and by whom, there is an increased likelihood that grazing restrictions will be respected. As discussed previously, there are many other local institutions, rules and regulations which could be encouraged to support the implementation of RWM.

Move towards more meaningful participation

A paradigm shift is required in terms of participation and how local people are perceived and treated. Development actors will have to learn to trust people in new ways, to see their role as supporting people's own life 'projects' and innovative capacity rather than trying to determine how people should use the assets, information and opportunities they have. Currently, "participation" is often seen as nothing more

8 See Merrey & Gebreselassie 2011 for further discussion and references.

than organising a village meeting to hear the 'community's' priorities and thereafter to mobilise community labour to carry out pre-defined activities. A number of assumptions are being made that need revisiting: that a 'community' as such exists with a single voice; that all people are able to express themselves at such events in spite of local power dynamics; and that people taking part are voicing their real concerns rather than what they know experts are expecting them to say; and finally that real understanding of people's values, needs and struggles can be understood through such a limited process. Truly understanding the constraints different people face, and in particular why they may or may not choose to invest in RWM, requires much more intensive engagement.

Open lines of communication to foster innovation capacity

As well as opening up planning processes to more meaningful engagement of farmers, there is a need to diversify lines of communication and knowledge sharing in order to capitalise on the knowledge of all stakeholders and identify innovations to strengthen RWM. The current linear model where experts in research organisations or government generate knowledge that is disseminated to farmers is not sufficient to foster innovative locally appropriate solutions that take into account local conditions, institutions and incentives. These institutions will no doubt continue to play an important role – a role that could be greatly enhanced if they change their mode of working with local communities – but other sources of knowledge and action including farmers, DAs and formal and informal local institutions need to be recognised and incorporated to ensure that RWM strategies will be truly sustainable and address real livelihood needs.
By establishing innovation platforms, these types of knowledge can be brought together and discussed among stakeholders to generate and test innovative new approaches to RWM that respond to specific local problems and needs.

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Annex 1: Traditional agro-ecological zonation system in Ethiopia

Agro-ecological zonation system, based on field observations (Hurni 1986)			
Altitude metres above sea level: More than 3700 m	A - Main crops C - Traditional conservation S - Soils on slopes T - Natural trees		**High Wurch** A - None (frost limited) C - None S - Black soils, little undisturbed T - Mountain grassland
Altitude metres above sea level: 3700-3200 m		**Moist Wurch** A - Only barley, 1 cropping season per year C - Drainage rare S - Black soils, degraded T - Erica, Hypercium	**Wet Wurch** A - Only barley, 2 cropping seasons per year C - Widespread drainage ditches S - Black soils, degraded T - Erica, Hypercium
Altitude metres above sea level: 3200-2300 m		**Moist Dega** A - Barley, wheat and pulses, 1 cropping C - Some traditional terracing S - Brown clay soils T - Juniperus, Hagenia, Podocarpus	**Wet Dega** A - Barley, wheat, nug, pulses, 2 cropping seasons per year C - Widespread drainage ditches S - Dark brown clay soils T - Juniperus, Hagenia, Podocarpus, Bamboo
Altitude metres above sea level: 2300-1500 m	**Dry Weyna Dega** A - Wheat, tef, rarely maize C - Terracing widespread S - Light brown to yellow soils T - Acacia trees	**Moist Weyna Dega** A - Maize, sorghum, tef, enset rare, wheat, nug, barley C - Traditional terracing S - Red, brown soils T - Acacia, Cordia, Ficus	**Wet Weyna Dega** A - Tef, maize, enset in western parts, nug, barley C - Drainage widespread S - Red clay soils, deeply weathered, gullies widespread T - Many varieties, Ficus, Cordia, Acacia, Bamboo
Altitude metres above sea level: 1500-500 m	**Dry Kolla** A - Sorghum rare, tef C - Water retention terraces S - Yellow sandy soils T - Acacia bushes and trees	**Moist Kolla** A - Sorghum, rarely tef, nug, dagussa, groundnut C - Terracing widespread S - Yellow silty soils T - Acacia, Erythrina, Cordia, Ficus	
Altitude metres above sea level: Less than 500 m	**Berha** A - None except irrigation areas C - None S - Yellow sandy soils T - Acacia bushes		
	Less than 900 mm	900-1400 mm	More than 1400 mm
	Annual rainfall (mm)		

R4D 1 Mitigating the effects of hydrologic variability in Ethiopia: an assessment of investments in agricultural and transportation infrastructure, energy and hydroclimatic forecasting.
Paul J. Block, 2008

R4D 2 Use of decision support systems to improve dam planning and dam operation in Africa.
Matthew McCartney and Jackie King, 2011

R4D 3 Fishery productivity and its contribution to overall agricultural production in the Lower Mekong River Basin.
Mohammed Mainuddin, Mac Kirby and Yun Chen, 2011

R4D 4 Evolution of Agricultural Water Management in Rainfed Crop-Livestock Systems of the Volta Basin.
S. Douxchamps, A. Ayantunde and J. Barron, 2012

About CPWF

The Challenge Program on Water and Food was launched in 2002 as a reform initiative of the CGIAR, the Consultative Group on International Agricultural Research. CPWF aims to increase the resilience of social and ecological systems through better water management for food production (crops, fisheries and livestock). CPWF does this through an innovative research and development approach that brings together a broad range of scientists, development specialists, policy makers and communities to address the challenges of food security, poverty and water scarcity. CPWF is currently working in six river basins globally: Andes, Ganges, Limpopo, Mekong, Nile and Volta.

About this R4D Paper

Smallholder rainfed farming is the backbone of the Ethiopian agriculture sector, the dominant contributor to national GDP, and at the heart of the country's current national economic growth strategy. Considerable potential exists for enhancing food production and rural livelihoods through better rainwater management (RWM). This paper discusses planning and implementation modalities of RWM in three Woredas in Ethiopia. The baseline study assessed the effectiveness of RWM planning in terms of its being evidence-based, tailored to social and ecological niches, cross-sectoral, and participatory. Opportunities and barriers to strengthen RWM processes were then discussed that help identifying entry points for effective integrated and multi-sectoral planning and implementation of RWM.

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