

Rainwater management in the Ethiopian highlands: Technologies, institutions and policies

Water scarcity and land degradation strongly affect the livelihoods of millions of households in the Nile basin. Agriculture is predominantly subsistence, low-yielding and rain-fed. To meet the needs of the growing populations and restore the landscapes, we need to reverse the land degradation and improve productivity.

One promising approach to raising productivity and incomes and landscape resilience is to develop and adopt integrated rainwater management systems that mobilize technologies, policies and institutions. This will help to find solutions in land and water management, crop production and research crop-livestock systems, pastoral systems and agro-forestry that will slow land degradation and downstream impacts.

Past research shows that in rain-fed farming systems, dramatic gains in water productivity and crop production can be achieved with small amounts of water while different livestock feeding strategies can increase livestock water productivity. Nevertheless, in the fragile ecosystems such as the Ethiopian Highlands, the approaches to improving water productivity (and livelihood benefits) need to take into account complex linkages between different components of agricultural systems so that integration of various farming systems components (crops, livestock, trees) is important to achieve the best outcomes.

Other experiences show that impact of such interventions on rural livelihoods has been limited by, among other reasons: blanket approaches of policy makers; technology-oriented interventions not supported by effective policies and institutions; inadequate research-development linkages; and a lack of understanding of the inter-linkages (bio-physical and social) among different landscape components.

Uptake and successful implementation of rainwater management systems requires:

- Detailed understanding of how landscapes function (bio-physically and socially) and are inter-connected.
- Integration of bio-physical, technical, institutional and socio-economic aspects.

- Targeted, context-specific interventions that reflect local values, agro-ecologies, production systems and communication channels.
- Engagement of local community (particularly women) and institutional participation in all project phases.

The Project ...

Part of the Nile Basin Development Challenge, this Project will examine 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.



Existing land and water management interventions in the study landscapes (Credit: M. McCartney, IWMI)

Our research approach is based on the premise that successful and sustainable rainwater management systems are underpinned by a set of interlinked mutually supportive landscape components.

It includes the idea that all landscape components perform beneficial natural functions that as far as possible should be protected or enhanced through interventions. It also encompasses the need for a rainwater management system to provide resilient livelihood improvement options, given specific rainfall variability and policy and institutional contexts.

Key aspects of the project design:

Working within the landscapes: We will base our research in specific study landscapes chosen to represent the dominant farming and socio-economic systems in the Ethiopian Highlands. Action research sites have been selected within these study landscapes, providing a nested set of sites for learning and research with various physical and social scales.

Innovative multi-disciplinary research: The project seeks to integrate research from several disciplines, including: 1) hydrometric analyses to provide insight into bio-physical processes, baseline data and water use and WP in different landscape components; 2) Livelihood monitoring and analyses to provide insight into how people benefit or lose from different rainwater management systems, and equity issues; 3) institutional analyses to provide insight into social norms and approaches to rainwater management; and 4) economic analyses to provide insight into the viability of the systems.

Based on inputs from Inception Workshop, consideration of a set of criteria from stakeholders, and seeking to represent the variability in Ethiopian highland landscapes, the following three landscapes/action research sites have been selected:

Study Landscape	Woredas	Predominant farming systems	Mean annual rainfall (mm)
Nekemte	Gimbi and Diga	In the lowland maize & sorghum based agriculture (mono-cropping) with 3-4 year crop rotation is practiced. In the midland, teff, millet & maize are important. <i>"Mixed crop-livestock system"</i>	1,376–2,037
Jeldu	Jeldu	Potato is the dominant crop. Barley and teff are also common. <i>"Mixed crop-livestock system"</i>	900–1,350
Fogera	Fogera and Farta	Rice is the major crop followed by maize, millet & teff and barley. <i>"Mixed crop-livestock system"</i>	974–1,516



Meja River catchment (Jeldu Woreda): The upper catchment – a broad valley



Meja River catchment (Jeldu Woreda): Mid-catchment – deeply incised valley

The Nile Basin Development Challenge (NBDC) is funded by the CGIAR Challenge Program on Water and Food (CPWF). It aims to improve the resilience of rural livelihoods in the Ethiopian highlands through a landscape approach to rainwater management. It comprises five linked projects examining: 1) Learning from the past; 2) developing integrated rainwater management strategies; 3) targeting and scaling out of rainwater management innovations; 4) assessing and anticipating the consequences of innovation in rainwater management systems; and 5) catalyzing platforms for learning, communication and coordination across the projects.

The NBDC is implemented by a consortium comprising the International Livestock Research Institute, International Water Management Institute, World Agroforestry Centre, Overseas Development Institute, Nile Basin Initiative, Stockholm Environment Institute, Ethiopian Economic Policy Research Institute, Catholic Relief Services – Ethiopia, Oromia Regional Research Institute, Amhara Agricultural Research Institute, Bahir Dar University, Ambo University, Wollega University, the Ministry of Agriculture and the Ministry of Water and Energy.

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