CGIAR Challenge Program on WATER & FOOD Nile

Brief 5

Rainwater management for resilient livelihoods September 2010

Rainwater management in the Ethiopian highlands: Assessing and anticipating the consequences of innovation

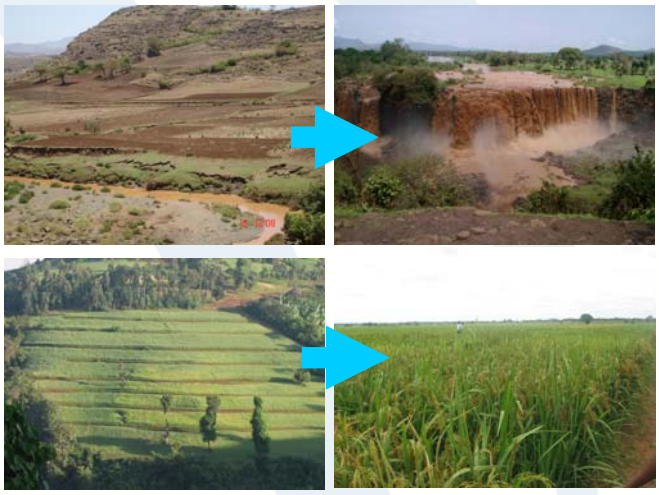
Water scarcity and land degradation strongly affect the livelihoods of millions of households in Sub-Saharan Africa. Water for agriculture - used to grow the food and feed that people and animals need - consumes 70 to 90% of the all water used in the region. To meet the needs of growing populations, we need to reverse land degradation and improve water productivity. We need to produce more food with less water.

One promising approach to raise productivity and incomes and enhance resilience in the Ethiopian highlands – and beyond – is to ensure that the local, national and basin-wide consequences and impacts of any improved rainwater management systems are understood and assessed before and after implementation.

The project …

Part of the Nile Basin Development Challenge, this project will show whether rainwater management systems are effective. It seeks to quantify the consequences of improved rainwater management systems for community livelihoods, resource productivity, land quality, and downstream water quality and siltation. It will specifically measure the downstream, cross-scale consequences of successful innovation in the Ethiopian highlands. To what extent are Sudan and Egypt affected by improved rainwater management systems in Ethiopia?

The project will develop methods to anticipate the likely consequences of introducing improved rainwater management systems. It will develop methods to monitor and measure these consequences ex post. It will also introduce methods for adaptive management, so the rainwater management systems can continue to benefit from lessons already learned. Assessing and anticipating the consequences of improved rainwater management systems will cover a range of variables, among them water allocation, land and water use practices, community infrastructure, water productivity, farm income, livelihoods resilience and ecosystem services.



The project aims to answer three research questions:

1. How can the consequences of improved rainwater management systems be anticipated (ex-ante) and measured (ex-post)? What methods are appropriate under different circumstances?
2. How can the contribution of improved rainwater management systems be assessed relative to the contributions of other factors?
3. How can research on rainwater management systems performance be used to further improve rainwater management systems design? (Adaptive management)

The research approach …

Singling out the impact of rainwater management systems is a big challenge. These complex problems will be addressed through multi-disciplinary research using a broad range of tools and approaches in a way that enables integration of study findings and learning by doing.

The consequences of improved rainwater management systems will be anticipated (ex-ante) and measured (ex-post) employing various approaches including modeling, with and without intervention scenarios, before and after intervention scenarios, analysis of on-site and offsite impacts, upstream and downstream interactions, current and future scenarios etc.

Parameters and problems related to productivity, poverty, degradation, regeneration, socioeconomic gains, policies and institutions including incentive systems, actors and knowledge flows, access to markets and livelihoods will be investigated.

The impact of improved rain water management on production, poverty and livelihood will be evaluated through farm level analysis and consideration of schemes with and without interventions. This farm-level analysis will be supported by institutional analysis, actor and knowledge flow analysis, as well as analysis of incentive systems and how access to markets influences the adoption of rainwater management systems. Livelihood and poverty impact will be analyzed using poverty profiles and by conducting household welfare consumption surveys. These models will be complemented by meso and macro level analysis of institutional arrangements and the enabling environment.

The consequences of rainwater management systems for water availability, access and allocation as well as upstream downstream relationships will be investigated using tools and models such as WEAP and CropWAT. The WEAP model is already configured to address large scale interventions and this can be extended to include the aggregated impact of small scale interventions. The influence of diversity in trans-boundary and upstream-downstream institutional frameworks and policy environments will be assessed and used to anticipate various scenarios.

Particular emphasis will be given to evaluate what additional water will be used or saved under various rainwater management systems interventions. We will base this evaluation on insights gained into the decomposition of the rainfall into rainfall-runoff components; green and blue water; water application and drainage.

The results will help to improve the performance of rainwater management systems interventions and identify the best options under different biophysical/socio-economic conditions.
The consequences of soil erosion and siltation and benefits of interventions will be evaluated using erosion risk mapping and modified SWAT modeling. The downstream offsite impacts, both within watershed and across international boundaries, will be evaluated using ex-ante methods and scenario modeling. Through economic and institutional/policy analyses we will improve understanding of the economics of degradation and conservation and the influence of institutional and policy factors.

We will also address key issues related to rainfall variability and its likely aggravation as a consequence of climate change.

A key component is to address innovation capacity building and dissemination. The project aims to improve innovation capacity (ability to harness knowledge to respond to emerging opportunities and challenges, through enhanced access to relevant knowledge and networks), so that the innovation is continuous. This will include skills building of the local actors to access and utilize relevant knowledge and employ the models and tools that will be developed. In addition, this component will engage young researchers doing their M.Sc. in problem oriented research, through provision of financial support and supervision. The dissemination component seeks to develop effective mechanisms to engage stakeholders.

The project deliverables include:

- Information on the likely cross•scale consequences for water flow, siltation, livelihoods, risk and other factors if improved rainwater management systems were to be adopted over large areas of the Ethiopian highlands;
- An analysis of the best land use systems for different parts of the basin, in terms of water productivity, livelihoods and economic benefits;
- An analysis of water productivity savings that would result if recommended rainwater management systems were adopted across the Nile basin;
- Innovation capacity building for universities, local and regional actors.

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, Oversees 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.

More information: Tilahun Amede (t.amede@cgiar.org)
http://www.nilebdc.org