An open source GIS tool to plan context-specific rainwater management strategies for Ethiopia

The Nile Basin Development Challenge (NBDC) focuses on effective rainwater management (RWM) in the Blue Nile river basin. RWM encompasses any practice related to land and water use that increases water availability or productivity within a watershed, such as soil and water conservation, small scale irrigation, fertility management, or livestock management.

Despite the overwhelming amount of available rainwater management practices, adoption rates are low. This is mainly because they have been promoted in locations where they are not suitable, or have not been combined with other complementary practices into strategies that result in real benefits for farmers.

This brief showcases a GIS (geographic information systems) planning tool – the Nile Goblet tool – which has been developed to help target rainwater management practices and strategies to a specific context defined by its bio-physical, socio-economic and institutional characteristics.

Targeting agro-ecological and socio-economic settings
Ethiopia is endowed with vast land and water resources. However, the productivity and sustainability of these resources is challenged by inappropriate management. Reversing degradation of these resources and ensuring their sustainable productivity requires integrated technological interventions that are tailored to target agro-ecological and socio-economic settings.

Although continued generation of demand driven and problem-solving technologies through research is an important step, without effective transfer of research results to users, their anticipated benefits cannot be realized.

Ethiopia has a large stock of land and water management technologies generated by national and regional agricultural research institutes, higher learning institutes and others. Many of these have been evaluated and sets of characteristics and indicators describing specific recommendation domains and potential impacts have been documented. One notable example is the participatory management guidelines from the government, which includes over one hundred practices.

Community members mapping local landscapes

The NBDC added a number of livestock-based interventions to the list of practices described in the government guidelines. In addition, and responding to knowledge gaps around socio-economic factors influencing the applicability of rainwater management systems, a number of adoption studies were carried out. All this information was collated in a database linked to a spatial database through a user-friendly GIS tool called 'Nile Goblet'.

This brief introduces this open source GIS tool and reports on the outcomes of a December 2012 'learning event' with national partners to present and discuss the tool and its potential to support rainwater management planning in the Blue Nile river basin.

An open source GIS tool
An operational planning tool on RWM practices and strategies needs to know which practices are suitable for which locations. To do this, the NBDC compiled a 'suitability analysis' for the Blue Nile using a 4 step procedure:

1. Select bio-physical suitability criteria;
2. Select geographical layers representing the bio-physical suitability criteria;
3. For each criterion, select locations from the geographical layer where the criterion is met;
4. Select all locations where all criteria are met and create the RWM practice suitability map.

Following this, using economic models, adoption maps were created. These show the percentage of farmers that are predicted to adopt the practices given socio-economic and institutional constraints. When the suitability maps are overlaid with the adoption maps, feasibility maps are created showing how many farmers are expected to adopt a specific technology at different locations. This allows locations with suitable bio-physical and socio-economic conditions to be prioritized for specific technology interventions.

The Nile Goblet GIS tool allows people to make suitability and feasibility maps without prior GIS knowledge. It is a flexible tool that in principle allows any practice to be mapped for any location in the world. It also facilitates combinations of practices. Alongside the tool, a database of all freely available geographical layers for the Nile Basin, as well as the suitability thresholds suggested by the participatory management guidelines from the government is made available.

The maps generated from the tool can be very inaccurate, due to the scale and inaccuracy of the input data. They tend to represent expert knowledge of what communities could do. By combining this expert data with community knowledge generated through participatory approaches like the 'happy strategies game' (http://happystrategies.wikispaces.com), the maps can be ground truthing with communities to improve local targeting and planning.

The learning event
The December 2012 learning event discussed the planning of context-specific RWM strategies by making use of the Nile Goblet tool.

The tool aims to give local partners ways to develop their own suitability and feasibility maps. It connects people to data they themselves collected and validated and, by using practical local examples it generated immediate interest among participants in the event.

Participants appreciated being able to add their own expert knowledge about suitability criteria to the system; they felt that it made the procedure very transparent and thus policy makers and practitioners would understand and trust the resulting maps. It would also lead to a better understanding of why the promotion of RWM interventions should be location-specific and move away from blanket approaches. Indeed, the resulting maps can help elaborate context-specific policies.

The learning event was followed by an informal training to adapt the tool to individual needs. The Land and Water resource center with the Swiss Development Cooperation expressed interest in using the tool in their work.

The event was organized by the NBDC together with the Thematic Working Group on Technological Innovation of the National Platform on Land and Water Management. The working group is intended as a community of practice to share and learn and hold in-depth discussion around technical innovation.