CGIAR Challenge Program on WATER & FOOD Nile

Brief 10

Rainwater management for resilient livelihoods March, 2012

Participatory hydrological monitoring in Ethiopia

The identification of appropriate and sustainable rainwater management strategies requires, among other things, sound understanding of dominant hydrological processes. In the absence of this knowledge, physical rainwater management interventions are likely to operate sub-optimally or even fail. For example, water harvesting ponds may be of the wrong size, badly located or inappropriately managed.

Detailed understanding of hydrological processes can only be obtained through the establishment of monitoring networks (comprising a variety of different instruments) that measure water fluxes at different locations within a catchment. The establishment of such networks is complicated, time consuming and costly. Much of the instrumentation is sophisticated and very expensive.

For this reason, with the exception of South Africa, very few catchments have been 'instrumented' for research purposes in Africa. Furthermore, to avoid interference from people and problems of vandalism and theft, such catchments are typically established in uninhabited areas and, with the exception of the researchers, people are usually excluded. There are few examples of establishing networks in locations where people live.

In Ethiopia, as a contribution to the Soil Conservation Research Program (SCRP), some equipment was installed in four small catchments in the 1980s. More recently, some small catchments, located to the east of Lake Tana, have been partially instrumented as a contribution to the Tana-Beles Integrated Water Resources Development Programme. In both cases the focus of the monitoring was primarily to provide insight into erosion and sediment dynamics and the level of instrumentation was insufficient to gain detailed understanding of hydrological processes.

A key objective of the Nile BDC is to gain insights into hydrological processes (e.g. water budgets and partitioning of rainfall between soil moisture, groundwater and runoff) in order to inform decision-making about different rainwater management options. To do this, we have established hydrological monitoring networks in three research catchments, one in each of the woreda's where the research is being conducted (i.e., Jeldu, Diga and Fogera).

We also decided to engage with relevant stakeholders and communities to establish the instrumentation networks. We hope this participatory approach will:

- instill trust and goodwill amongst the community;
- provide opportunities for local communities to better understand the hydrological regime of their localities;
- help establish a conducive atmosphere for the flow of knowledge between researchers and the communities and *vice-versa*.

The participation process

The process of participation began with consultation of relevant national institutions at the start of the project. This included the National Meteorological Agency (NMA) and the Ministry of Water and Energy (MOWE) to ensure that our proposed monitoring satisfied their requirements. Intense discussions with directors and technical staff from both institutions culminated with the signing of a tri-partite memorandum of understanding in April 2011.

Subsequently, staff from NMA and MOWE assisted with locating and installing instruments. At the end of the project, all equipment will be handed-over to the national meteorological and hydrological monitoring networks. It was also agreed that we will train staff from the NMA and MoWE in the use of the equipment.

The three sites were established in previously unmonitored locations in mid 2011. Participation of the local communities commenced with a reconnaissance survey in the three locations in August 2010. During these visits, we discussed our plans with *woreda* and bureau officials and some community elders and sought their advice on locations for different instruments. We also met with farmers and discussed our plans with them. In these discussions we gathered information (indigenous knowledge) about local climate patterns and flow regimes. We also visited local universities and again discussed plans and sought advice from academics with first-hand knowledge of the areas.

In each catchment the monitoring network comprises gauging structures and instrumentation, much of which is automated, to measure and monitor stream flows, soil moisture profiles, groundwater levels, rainfall and many meteorological variables (humidity, air temperature, wind speed and direction, solar and net radiation , soil temperature and air pressure). Meetings were held with officials and community representatives in the days immediately prior to installation. We could dispel false rumors, for example, that we were working for a flower company or aimed to seize land. Where instruments were installed on farmers' land, the purpose of the equipment was explained to him/her.

The hydrological monitoring already provides tangible benefits. During installation we employed local people to manufacture certain apparatus (e.g. housing boxes for pressure transducer loggers) and fences to protect equipment from livestock. For equipment that needs to be read manually (i.e. rain gauges and stage boards in the rivers) we employed and trained local people as 'observers' to make daily or twice-daily readings. For each site we also employed a 'catchment coordinator' to oversee the network, make some of the more complex measurements (e.g. soil moisture profiles and groundwater levels) and liaise directly with the observers. In each case the person employed was a former student who had previously conducted MSc research in the catchment and was already known to the community.

Although the monitoring networks are just established, we have anecdotal evidence that some of the hoped for benefits are emerging. The observers appear to be happy, they welcome the additional income and are genuinely interested in the research. For example, although we have asked observers to measure river water levels twice a day, one observer in Fogera has taken it upon himself to go out whenever it rains to make additional measurements. One woman observer told us that although the pay was not much it would help to send her children to school. Furthermore, to date none of the equipment has been stolen or vandalized and whenever we are in the field children appear interested in all that we are doing.

We recognize that participatory monitoring is an ongoing process. To build on our early progress, we plan to:

- Provide feedback to communities on the data and results obtained (in forms they easily understand);
- Feed relevant results and findings to the innovation platforms established in each area as well as to relevant national scientific fora;
- Encourage local universities to bring students and conduct field trips to the research catchments;
- Support other researchers (national and international) to utilize the data and add to the experimental work being conducted in each of the research catchments.

Lessons

The three research catchments are almost certainly the most sophisticated hydrological experimental monitoring networks ever established in Ethiopia. As such they should be exploited to the full. If they are to be utilized successfully it is clear that participation from local communities and a range of stakeholders is vital.

This brief is based on a 'most significant change' story prepared for the CPWF in late 2011

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, Nekemte University, the Ministry of Agriculture and the Ministry of Water and Energy.

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