EUROPEAN COMMISSION / European Research Area / Environment

Water Harvesting Technologies Revisited

Project No 266360

WHaTeR

WP5: Livelihood Improvement

At a Glance

Farmer made canals and field bunds to capture spate flows, Konso woreda Ethiopia

The Challenge

The evidence has demonstrated the production benefits of Water Harvesting Technologies (WHTSs) and their potential for reducing food insecurity and improving rural livelihoods. However, uptake has been limited. This work package will investigate in depth those factors that constrain the positive benefits that may accrue to household livelihoods focussing in particular on the gender dimensions of livelihood improvement and the institutional context for the adoption and use of WHTs.

A significant area of institutional analysis surrounds the rights that farmers have over land and water use. Increasing population pressure and the movements of different ethnic groups have complicated the institutional context within which household livelihoods are created and in particular the willingness and ability to invest in land improvement. In some cases, migration and family fragmentation have led to a rise in investment as farmers have sought to intensify production as a result of reducing land availability. In others, ethnic tensions and increased conflict between different groups has reduced the likelihood of investment through insecurity of land tenure.

Objectives

This work package will support, extend and add value to the objectives conducted under the country work packages.

It will contribute to the overall objectives by:

• Delivering understanding of the extent to which the adoption of WHTs has improved livelihoods of rural communities.
• Helping to define criteria for designing WHT innovations and promoting uptake in the context of local and regional economic development

The research will:

a) investigate those factors that inhibit or support the uptake of WHTs,
b) explore the distributional effects of the social costs and benefits on men and women as well as the household as a whole,
c) identify and investigate the institutions that affect the transformation of household assets, including WHTs, to the improvement of sustainable livelihoods.

METHODOLOGY

Scoones' (1998, 2009) sustainable rural livelihoods (SRL) analytical framework informs the approach in this study. The framework defines SRLs in relation to five key indicators: resources, strategies, contextual environment (including policy, climate, demography), institutional and organisational structures and processes, and outcomes. The resource assets, or endowments, are transformed within an institutional context to provide entitlements and subsequent capabilities to the household and the individuals within it. The institutions composing the transforming structures and processes, both in the sense of organisations (government, private businesses etc.) and 'the rules of the game' (laws, policies, culture etc.), are open to investigation and expected to affect women and men differently. The methodology has been developed to capture each individual's perceptions of the endowments and entitlements of the household and their own place in decision making and power over resources.

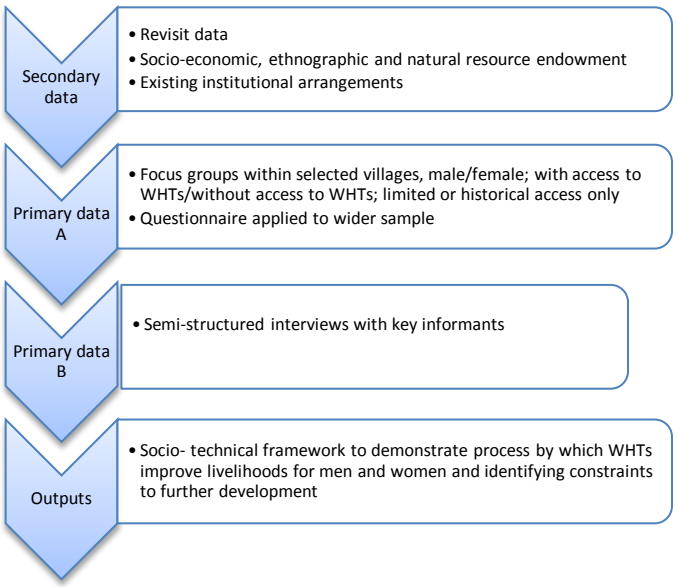
A significant area of institutional analysis surrounds the rights that farmers have over land and water use. Increasing population pressure and the movements of different ethnic groups have complicated the institutional context within which household livelihoods are created and in particular the willingness and ability to invest in land improvement. In some cases, migration and family fragmentation have led to a rise in investment as farmers have sought to intensify production as a result of reducing land availability. In others, ethnic tensions and increased conflict between different groups has reduced the likelihood of investment through insecurity of land tenure. Particularly in the development of spate irrigation, commitment to communal objectives to build and maintain waterways is needed in order that benefits may accrue to the group as a whole.

Gendered access to inputs, such as land, defined by both formal and informal institutions has been shown to have a particularly significant impact on farming outputs in many sub-Saharan countries and gender relations at both the household and community level are an important consideration in assessing the implementation of water harvesting technologies.

Participatory methods will be used to determine local indicators of social costs and benefits accruing from the introduction of water harvesting technologies. These will be explored particularly in relation to the costs and benefits associated with food and water security.

In all the sites to be investigated previous studies indicate that there are potential production benefits, however uptake and spread of WHTs has remained limited. The use of qualitative field methods will complement quantitative measures in order to throw light on the socio-technical factors limiting uptake and the distribution of benefits.

Methodological framework



This study concentrates upon Burkina Faso and Ethiopia. It is proposed that the analytical framework to be developed in Burkina Faso and Ethiopia will be tested in Tanzania later in the project.

Data on the costs and benefits arising from WHTs will be used to support the development of more extensive questionnaire surveys on the uptake and up-scaling of WHTs and will be closely linked with the investigation of technological improvements to WHTs.

Burkina Faso

The sites chosen for examination in the study are in Burkina Faso: Boukou, Malgrétenga and Péni. Boukou and Malgrétenga lie on main roads and are within a half day's travel to Ouagadougou. Peni lies in the south west in a higher rainfall zone, is a cotton growing area, offering more commercial opportunities for agriculture, and has a different ethnic make-up to the Central Plateau. At each site the WOCAT data and existing secondary data from published and grey literature were used to establish the socio-economic, cultural and institutional context of rural agricultural livelihoods.

In Malgrétenga WHTs have previously been introduced to the site and are supported by a Warrantage system for input storage and sale for farmers, this will allow fuller investigation of the institutions to support WHT interventions.

Participatory techniques are used with men and women from selected households to explore in depth the impacts of WHT on livelihoods. The benefits accruing to men and women in relation to the specific technologies, their expectations of the technology and its performance in relation to the expectation are explored. The use of qualitative field methods provides an understanding of process that complements quantitative measures to be used in WP7. These data have been collected in 2012 and in-depth investigation of specific areas is to be continued in the 2013 season through semi-structured interviews with selected householders and key informants.

In 2012, two focus groups were carried out at each site separately with men and women from the village to explore the characteristics of agricultural production, institutional context, knowledge of WHT and perceived nature of costs and benefits from WHT. Following the focus groups, a sample of beneficiary and non-beneficiary households was chosen in each of the study sites in Burkina Faso. In Malgretenga these were supplemented by a third group of those who were non-beneficiaries of the original WHT development projects but who have adopted WHT since, of their own accord, and without further support. Following preliminary analysis of these data further in-depth participatory work will be carried out in the 2013 field season.

Ethiopia

In Ethiopia research on livelihood improvements will be closely linked to the technological improvements in order to investigate the effects of spate irrigation. Spate irrigation is a communal rather than individual WHT activity. Research sites have been identified in Konso woreda in southern Ethiopia.

Evidence from previous research in the Yanda/Segen lowlands of Konso woreda has suggested that communities participating in the development of the spate irrigation system have benefitted and that livelihoods and food security has been improved. However, the Segen is a semi-perennial river and the benefits of a true spate system to the improvement of livelihood security have not yet been fully investigated. The Yanda Faro Segen Sawate Integrated Food Security

Project (YFSSIFSP) continues to work in the area although development of new off-takes on the Yanda and the management of land and maintenance of spate systems are constrained by the complex of interests in the local communities that makes research into institutional constraints particularly valuable.

The Spate Irrigation Network has identified the Yanda-Segen as a 'bright spot' (personal communication) of spate irrigation development. However, these assessments are focussed particularly on the Segen, a semi-perennial river. The Ethiopian Evangelical Church Mekane Yesus (EECMY) is now into the third stage of the YFSSIFSP which will focus on the Yanda catchment and the development of spate irrigation and associated social development. Against this background WP 5 will determine the nature and scale of the costs and benefits to individuals and communities arising directly and indirectly from the development of spate irrigation in the Konso woreda.

Secondary data will be collected from government and non-government sources on the development of spate irrigation in the Yanda-Segen area and beyond.

Qualitative methods are being employed to investigate:

- the nature and scale of livelihood improvements in the Yanda-Segen area
- the distribution impacts within and between households and across wider communities in the woreda
- the institutional factors supporting or constraining the further development of spate irrigation within the Yanda Faro area

Focus groups will be carried out to collect data from:

- Two improved spate irrigation intakes on the Yanda river
- Two improved spate irrigation intakes on the Segen river
- Two unimproved spate irrigation intakes on the Yanda river.

Households send members to the lowlands to manage land on a temporary basis, a journey of eight hours on foot. In each case data will be collected from householders living temporarily on the lowlands and with villagers not resident on lowlands in order to determine both indirect and direct costs and benefits of the irrigation development on the households and communities. Focus groups will be organised with respect to gender; and main source of livelihood and will pay particular attention to differences between farmer, trader and pastoralist households. Following analysis of focus group data, in-depth semi-structured interviews will be held with key informants in the villages and Konso woreda.

The socio-technological framework to be developed will also identify those factors relevant to the up-scaling and extension of WHTs to be investigated in other work packages.

RESULT SO FAR

Burkina Faso: External intervention has been key to initiating the adoption of techniques and the vast majority of households have installed the techniques in their fields with the assistance of an NGO or government-led project. The factors leading to decisions of further or continued adoption are less clear, although the availability of inputs appears to have some influence.

Agricultural inputs (compost, chemical fertiliser and improved seeds) are strategically used by farmers to obtain maximum benefit from WHTs. Farmers target the resources available to them towards the crops that are perceived to be most important for their livelihood. In many cases inputs and WHTs are focussed on staple food crops (such as sorghum and millet), rather than cash crops (such as groundnuts and sesame). This indicates that WHTs are making a positive contribution to household food security. The availability of inputs may also be important for encouraging the expansion of WHTs by farmers after initial adoption, for this reason, as the availability of inputs increases the likelihood of increased benefits.

WHTs have been incorporated into traditional farming strategies. Farmers continue to rotate the cultivation of certain crops using WHTs in order to ensure soils across their land maintain a degree of fertility. This is found even where soil fertility enhancing inputs are not applied.

Credit is generally not used for investment in agriculture, therefore lack of adoption of WHTs due to inadequate resources is unlikely to be remedied by the provision of credit.

Farmers stated the use of WHTs has increased productivity levels and reduced the risk of reduced crop productivity, or crop failure, due to low rainfall. However, the degree of impact obtained from the techniques varies across households, with some farmers stating yields are good with WHTs whatever the rainfall, and others stating WHTs allow for at least a minimum yield with poor rainfall as opposed to no harvest without them.

Although women were found to have control over decisions regarding the crops grown in their own fields, the sale of these crops and the use of the revenue from the sale, men were generally found to control access to inputs (including labour) and the decision to install techniques in the women's fields. The maximum benefits from WHTs are gained when combined with soil-fertility enhancing measures, women's fields are less likely to receive purchased inputs and thus there may be lower potential benefit to women's fields. Furthermore, data indicated that men tend to control the revenue received from sale of crops in family fields, therefore women's' benefits from WHT use in family field will low compared to their husbands.

In the next phase of the field work indirect benefits in association with the adoption of WHTs will be investigated further.

More work will be carried out on the perceptions of techniques and particularly their perceived benefits and costs (or comparative advantage of these techniques), as this has been found to been one of the best predictors of an innovation's rate of adoption. Farmers interviewed were able to provide only a few minor costs associated with the adoption and use of WHTs, yet the rate of expansion of the techniques remains low. Initial observations indicate that costs were perceived to be highest during the installation phase; therefore this is the period that will be focussed on in further investigations.

The significance of the overall contribution of food production to household food security will be investigated in further depth in Burkina Faso. This will include the study of the different portfolios of strategies that households use to improve food security and the role and contribution of WHTs in these strategies.

Ethiopia: Primary data collection has yet to begin.

EXPECTED OUTCOME

Burkina Faso: Research to date suggests:

- A need for a package approach. New techniques need to be implemented as a package with other agricultural inputs in order to maximise livelihood improvements and not just as a stand-alone technology.

- A need for a more nuanced implementation. The suitability of technologies for increasing productivity and reducing risk is likely to vary greatly from household to household and future interventions will have to be focussed on including farmers more fully in the design and implementation progress, via a process of participatory technology development, rather than assuming that one technology will be suitable for all households at an intervention site.
- There is no single solution to achieving increased food security and livelihood security – households have diverse portfolios…..WHTs can provide some assistance for households seeking to improve food and livelihood security, but benefits may be limited as households tend to move increasingly towards strategies of diversification and participation in more non-farm activities as rainfall becomes more unpredictable.

PROJECT PARTNERS IN WORK PACKAGE ...	
School of Agriculture, Food and Rural Development, University of Newcastle upon Tyne	GB
National Institute for Environment and Agricultural Research (INERA)	(Burkina Faso) BF
Arba Minch University (AMU)	(Ethiopia) ET