



Innovations to Promote Growth Among Small Scale Irrigators

Small-scale irrigation is seen as key to improving agricultural productivity, food security and rural incomes in sub-Saharan Africa. However, a complex combination of challenges has often conspired to limit its progress. Climate change now further compounds these challenges. Adopting an ethnographic approach, this research project explores the role of power, politics and institutions in shaping the impacts and responses to environmental (climate) change among small-scale irrigators. This includes questions relating to the relationship between 'local' and 'external' rules and norms for the governance of water.

The research examines how knowledge about innovations that facilitate adaptation is produced, valued, transferred and used within and between 'communities'. This will enable us to assess how lessons about this might be drawn from one setting to another. Through ethnographic research in Malawi, Tanzania and Bangladesh, we hope to obtain an understanding of the factors that influence success and failure in irrigation development

About this briefing note

In Malawi, fieldwork was undertaken in Nsanje District in and around Muona and Chitsukwa irrigation schemes. Ethnographic research during 2013-4 was supplemented with survey and key informant interviews. Preliminary analysis of our data gives rise to a series of headline findings.

The aim of this briefing note is to set these findings out in summary form in order to explore their implications with key stakeholders, from local to national and international levels. Responses to this last phase of fieldwork will help to shape our final conclusions and recommendations.

This research project is funded by DFID-ESRC under its Growth Research Programme.

Your feedback on the issues raised here is most welcome and will be incorporated into final project findings and recommendations.

If you have any comments on the points raised in this brief, please contact Dr Canford Chiroro on c.chiroro@sussex.ac.uk OR Dr Elizabeth Harrison on e.a.harrison@sussex.ac.uk

Headline Findings

The model widely used in support of irrigation is that of ‘schemes’. But such schemes involve a paradox: the need for collective management alongside the reality of individualised and household level interests. This paradox underlies many of the problems in irrigation management in such schemes.

Irrigation schemes do not equate neatly with ‘communities’. For example, the Muona scheme is used by farmers who come from at least 45 surrounding villages. They will have shared interests and a sense of common purpose in different – and not always compatible – spheres; these include their households, lineage groups, villages and the schemes themselves. For example, farmers derive their livelihoods from a combination of cultivation both inside and outside of the schemes and may see it is more important to prioritise dry land cultivation than take part in shared scheme management. Even within the schemes, farmers tend to prioritise their own farming over collective action.

There are significant barriers to irrigation development that exist beyond the level of schemes and reflect a lack of co-ordination of water catchments across districts.

The challenges of siltation in irrigation schemes in Nsanje District are seen by many to be due to unsustainable cutting down of trees for charcoal and stream bank cultivation in higher districts of Thyolo and Mulanje. There is apparently a lack of communication between the upland and downstream district authorities on the matter. Irrigation development, when planned along administrative boundaries, may thus fail to address local problems. A lack of coordination across the catchment following decentralisation has been blamed on a lack of a budget for this.



Siltation of the Tangadzi River contributed to the old head works in Muona falling into disuse.

“The problem lies with our friends in the uplands. Unlike us here at the floor, they are unable to irrigate crops. As a result, they have to depend on charcoal production to make ends meet. Others are using the treadle pump and farming on the stream banks. All these activities affect us here at our scheme, because they bring silt into the river, which becomes a problem (in our scheme)”.

Farmer, Muona Irrigation Scheme .

Investments in physical infrastructure for irrigation have not been accompanied by equivalent efforts to improve clarity of water and land rights

There is considerable contestation around land and water rights that in turn influences management practices. For example, where land is rented, such tenancies tend to be for a short duration, which limits choice to seasonal crops and disrupts longer-term fertility investments. Some farmers, particularly those outside the scheme have diminished rights to water on the basis that they are not paying for water.

These specific problems reflect a wider problem of a mismatch between formal land and water rights policy and its implementation. Despite recent attempts at clarification of national policy, there are competing and overlapping rights. These partially reflect settlement history and customary practice, but this combines with more recent formalisation through the creation of leases.

Building resilience for some through irrigation may have the unintentional effect of increasing vulnerability for others, especially when donors focus only on 'their' scheme.

In Muona, a bund was constructed with donor support to protect Muona scheme from the overflowing Tangadzi River. However, this caused flooding in an adjacent area, Makhapa, leading to loss of homes, crops and food and worsened vulnerability to food insecurity. A different donor was due to be constructing an irrigation scheme in the adjacent area, and farmers were excluded from their fields during the construction process. Delays in the construction of this scheme and the associated exclusion compounded the serious effects of the flooding. We found little evidence of communication between the two donors or their contractors and unclear lines of responsibility.

This scheme (the new Makhapa irrigation scheme) has made us poorer even before it has started working. Farmer, Muona Irrigation Scheme



Flooding in Makhapa, Feb 2014

A different group of farmers in an area called Magreaver, also adjacent to Muona scheme, cannot continue accessing the Tangadzi River with the new bund constructed. They are now growing maize because of the loss of floodwater that enabled rice farming. Ironically Magreaver was the original inspiration behind the establishment of the Muona scheme back in the 1960s.

In Chitsukwa the promotion of irrigation has been at the expense of other livelihoods especially livestock farming. With more people moving into crop growing there has been a problem of irrigators encroaching into pastures, driving conflicts and upsetting social relations that were responsible for the sharing of manure, milk and grain. In this case, building resilience through irrigation has resulted in worsening vulnerability for others.

When schemes have been only partially rehabilitated, these efforts have raised expectations and resulted in disappointment.

Muona scheme has been rehabilitated several times in its nearly 50-year history. The most recent rehabilitation prioritised the construction of a new head works in order to ensure delivery of water into the scheme. A storage reservoir was also constructed along with lining of some canals. The rehabilitation did not address the issue of levelling, which for some substantial sections of the scheme is one of the main determinants of access to water. As a result, some blocks within Muona can only produce maize because of inability to access water. The problem of siltation also continues.

The timing of public works funding for small schemes such as Chitsukwa may influence the effectiveness of canal maintenance. Providing public works programmes in the schemes just prior to the harvesting of the dry land crop helps farmers smooth their consumption, but may lead to shallow excavation of earthen canals and this creates problems in terms of delivering adequate water in late season. Such is the case with the Local Development Fund for canal maintenance in Chitsukwa. In early season the water table is so high so much that the excavation depth that can be achieved using simple hand tools is very shallow.

In Muona, the rehabilitation has been complemented by the promotion of a technique of rice farming, called the System for Rice Intensification (SRI). This technique uses fewer inputs, but its success depends on the use of a weeding device called a cone-weeder. However, the device was unavailable for most farmers in the first season after rehabilitation.

The barriers to irrigation development are intimately connected to wider issues of market access, input supply, and access to knowledge and information. The labour costs are also significant. Supporting irrigation in isolation from attention to these factors will not have a significant impact on poverty.

Extension support for irrigation is limited. For example, only one extension officer currently serves over 2266 plot holders across 426 hectares of land in Muona. Also, inputs are inaccessible due to poor transport links and credit is expensive.

Our findings also raised questions about the productivity of irrigating maize. In line with government agendas of boosting food security in Malawi, most irrigation schemes are engaged in the production of food crops. Yields under irrigation have been substantially higher than those in the dry land. For example, we found that irrigating farmers were harvesting up to ten bags (500kg) from 0.1 hectares, as opposed to a maximum of 6 bags in the dry land. However, the costs associated with producing that extra yield are also significant, especially when labour costs are fully accounted for. In Chitsukwa, it costs about K 59,400 to produce ten bags of maize worth K 45,000 (see table 1). In addition, irrigating farmers suffer from low incomes in years of bumper harvests as a consequence of high volatility in food prices.

Gross Margin Budget for Treadle Pump Irrigation for 0.1ha			
	Price per Unit	Units	Total in Kwacha
OUTPUTS			
10*50kg maize harvested per 0.1ha	4500	10	45000
INPUT COSTS			
Renting land	3500	1	3500
Land preparation (tilling)	5000	1	5000
Land preparation (ridging)	4000	1	4000
Seed (2kg)	700	2	1400
Basal fertiliser 25kg	7000	1	7000
Top dressing fertiliser 25kg	7000	1	7000
Labour planting	2500	1	2500
Labour weeding	5500	1	5500
Treadling (food)	350	10	3500
Treadling (charge)	1500	10	15000
Harvesting	3500	1	3500
Transport (oxcart)	1500	1	1500
Total Input Costs			59400
PROFIT			-14400

Table 1. A typical gross margin budget for a maize farmer operating a 0.1ha plot in Chitsukwa Irrigation Scheme. Source: Field data.

A focus on irrigation is apparently at the cost of livestock development

There are fewer staff within the extension services dedicated to livestock issues than those with responsibility for livestock. Irrigators also appear to be more organised than livestock farmers. The encouragement of mulching has not considered livestock farming needs. Change in land use from livestock to crop production has sparked conflicts among farmers, and farmers have been left to resolve these issues on their own. Ironically, some farmers view livestock farming as their ideal livelihood but are unable to transition from crop production to a predominantly livestock oriented livelihood.

“Crop farmers are lucky, they have the support from agriculture. There is nothing for livestock farmers”. Farmer in Chitsukwa.

In Chitsukwa there are claims that irrigation has encroached into areas previously under livestock grazing. This picture shows cattle grazing right on the fringes of an irrigated maize crop.



The common approach of transferring knowledge via ‘lead farmers’ can result in resistance to take on board their information because it has come via external support.

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Farmers lack extension support and the promoters of irrigation rely on lead farmers as a result. But we identified a strong reluctance to take on board information that came from this source. Some respondents see lead farmers as too ‘local’ to know any more than they do. One lead farmer in Chitsukwa was told, *“Babies like you cannot advise us on anything. We have been farming even before you were born”*.

Yet other farmers believe that those that have received training from government and NGOs have been paid and are not willing to take their advice for this reason. They also believe that the extension services are biased towards NGO funded projects where the officers have an opportunity to claim per diem. Non-project areas are seen as been allocated to lead farmers. Within irrigation schemes, farming knowledge is transferred through participation in *ganyu*, while mobility of tenants spreads knowledge, including skills for canal maintenance.

Farmers can and do innovate with technologies, based on their assessment of costs and benefits. Factors that may be especially important include labour requirements and risk

In Chitsukwa farmers made the treadle pump lighter by removing some rubbers that made working the treadle pump strenuous. One person could operate the lighter treadle pump, significantly reducing labour demand. In the absence of spare parts, farmers innovated with cut-offs from flip-flops to replace some cylinder rubbers required for the treadle pump. The ease with which the treadle pump could be operated encouraged more people to move into irrigation, including fishermen and pastoralists, thereby increasing competition over land and land use.

Some interventions, such as conservation farming, have the potential for increasing yields but a tendency towards rigid design makes it difficult for farmers to innovate, for example, through inclusion of a second crop within an intercrop or sharing crop residues between livestock and mulch.



Farmers' innovation with the treadle pump has centred on making the treadle pump lighter to use and replacing spares by locally and cheaply available alternatives