



**Studying African  
Farmer-led Irrigation**

## **Project Inception Report**

**August 2015**

### **Introduction**

The SAFI research project, funded by the UK Department for International Development and Economic and Social Research Council (DFID-ESRC), brings together an interdisciplinary team of social science researchers and irrigation scientists from Europe and Africa. The project seeks to understand if current investment by farmers in small-scale irrigation can offer a model for broad-based economic growth in rural areas of Africa.

The project responds to a growing body of evidence that farmer-led irrigation development is simultaneously taking place across different African countries, in diverse agro-ecological zones and landscapes, often without (major) external planning by state or development agencies. This has important implications for the current debate about the role of smallholders in African rural development.

The project will undertake research in Tanzania and Mozambique over a period of three years (2015-2017). It aims to work with the relevant departments of governments, and other development agencies to understand the policy context for farmers' initiatives in water management, and will also undertake in-depth case studies of irrigation initiatives by farmers in central Mozambique and in northern Tanzania. It is a primary goal of the research to engage national and local-level agencies in a discussion of the research as it progresses. This note reports on the first step of this engagement, realised through a series of local site visits and workshops with leading figures in policy and programmes concerned with irrigation in both Tanzania and Mozambique between 12 and 23 July 2015.

## Goals

The goals of the inception visits were, firstly, to enable the research team to undertake a series of field visits to establish a shared understanding of the different forms of farmers' initiatives in water management and the extent of engagement with them by private, public and NGO s agencies.

Secondly, the inception visits provided an opportunity for the research team to engage with key policy and research agencies through workshops in both Tanzania and Mozambique. The workshop goals were:

- to understand the perspectives and priorities of decision-makers and advisors in Tanzania and Mozambique concerning irrigation development in general, and irrigation initiatives by small-scale farmers in particular;
- to introduce the project to workshop participants;
- to identify how to make the research more useful to policy-makers and planners;
- to agree further contacts and discussions with specific workshop participants.

## Inception Outcomes/Findings

### National-level workshops

#### Tanzania (14 July 2015)

The 1-day inception workshop was organised at the Nelson Mandela African Institution of Science and Technology (NM-AIST) in Arusha, Tanzania. The workshop brought together key stakeholders to discuss irrigation initiatives by small-scale farmers and irrigation development in Tanzania in general. Participants of the workshop included acting Director-General of National Commission for Tanzania, Pangani Basin Water Office, District Irrigation Engineers, non-governmental organisations and community based organisations. The workshop was structured into two parts. The first part focused on general introduction by participants and presentations of the project and activities of some of the key stakeholders. The second part of the workshop centred on group discussions and plenary presentations on farmers' initiatives in irrigation development and irrigation priorities and challenges in Tanzania.

Three presentations were made by organisations with activities related to irrigation development in Tanzania. The first presentation was by the acting Director-General of the National Irrigation Commission (NIC) which focussed on Tanzanian government strategy to aggregate smallholder farmers into registered irrigation organisations. The process of registration of irrigators association is done at the NIC (through a dedicated division set up to handle this at the NIC). Second, Trias (Belgian NGO) and MVIWATA (Mtandao wa Vikundi vya Wakulima wa Mkoa wa Arusha) presented their modes of engagement and support to farmer-led irrigation initiatives. Support provided to farmers' initiatives include infrastructure improvement and organisation of management arrangements:

surveys, design, development of bills of quantities (material needed for improvement works), tendering, supervision of construction, training and capacity development for irrigation sustainability. The final presentation by the Pangani Basin Water Board highlighted challenges related to water resources management in the basin and the agency's initiatives to organise smallholder farmers into water user associations.

A key outcome from the workshop confirms the relevance of the SAFI research project to policy makers and practitioners dealing with irrigation development in Tanzania. Important typologies of farmer-led irrigation initiatives as recognised by the government of Tanzania were identified during the workshop to include 'traditional not improved', 'traditional improved', rainwater harvesting based (spate), and new irrigation schemes by smallholders/commercial farmers and large commercial farmers. Farmer-led irrigation initiatives were reported to occur in most regions of Tanzania particularly in places with relative easy access to water. The main purpose of irrigation is for household food security and increase in income, while the challenges were identified to include efficient water use. Types of current support included a combination of infrastructure development and institutional development.

### **Mozambique (20 July 2015)**

The inception workshop was held in Maputo on 23 July 2015, attended by members of government departments, NGOs and educational institutions involved in irrigation development and training (see appendix). In his opening address, the Director-General of the National Irrigation Institute (INIR) emphasised the national irrigation campaign begun in 2014 using a dual strategy of organising small-scale irrigators into water users' associations (*associações de regantes*) and leveraging investment through public-private partnerships. New legislation (*Lei de associações de regantes*) has been approved by parliament in June 2015 but remains to be implemented by Ministers. He also identified as a key initiative the World Bank funded PROIRRI programme, which includes both investment to improve small-scale irrigation and monitoring of irrigation efficiency in Mozambique's central region. A presentation by the NGO iDE outlined their activities in Mozambique seeking to build supportive commercial frameworks for small-scale agriculture, including for increasing agricultural water use.

Key points emerging from subsequent workshop discussions are summarised below.

For policy purposes irrigation is categorised as 'small', 'medium' and 'large'. The 'large' category is fairly well defined and recognised as requiring a discrete management organisation in either the public (e.g. HICEP in Chokwé) or private (e.g. Açucareira de Xinavane) sectors. The 'medium' sector is principally used to refer to commercial irrigation at 20-50ha scale run by an individual producer. However, it is also used to refer to irrigation by individual 'small-scale' (0.5 – 5ha) producers organised in *associações de regantes* responsible for areas of several hundred hectares or more. Initiatives from farmers to develop irrigation were identified principally in terms of the topographical or agro-ecological conditions governing water availability: stream diversions into furrow systems in hilly or mountainous regions; small dams and/or small motorised pumps; wetlands (e.g. *machongos*) in valleys and floodplains; shallow wells, streams and re-use of wastewater in peri-urban areas.

Workshop participants noted the positive potential of small-scale irrigation, particularly where supported commercially, as, for example, identified by iDE. Small-scale irrigation is also recognised as improving food security and incomes, fostering collective organisation and creating labour markets. However, there was also a strong view that small-scale irrigation frequently lacks sufficient organisation and technical competence, leading to inefficient water use, infrastructure degradation and conflict. As a consequence, formalisation of small-scale irrigation through the registration of *associações de regantes* is widely regarded as a pre-condition for longer-term success. Other key challenges identified included:

- the relationship of land tenure and water use: the suggestion that *associações de regantes* should be allocated a collective DUAT for the area under their management so that the *associação* would be empowered to remove land users that did not comply with collective rules (payment of water charges, participation in maintenance works, observance of irrigation schedules, etc).
- This is further linked to problems of state investment in collective infrastructure for irrigation which then lacks maintenance by farmers who do not feel 'ownership' or responsibility.
- The extreme scarcity in Mozambique of qualified irrigation engineers, leading to a situation where there is no technical capacity to support irrigation at District level, and barely any at Provincial level.

## Local site visits

### Tanzania (15-17 July)

The team visited a series of sites in Kilimanjaro region including a complex of arrangements in Lower Moshi as well as a variety of furrow-schemes in Same District. In detail this comprised:

#### Complex of schemes in lower Moshi

There are two large farmer-led schemes (Kaloleni and Mandaka Mnono) using abundant spring water which have benefitted from some improvements to the intakes and canals and in which farmers grow large quantities of rice (5-7 tonnes per hectare). The age of these is uncertain, farmers there insist they have been farming for generations. Other accounts suggest that some aspects of the technology (improved varieties of rice) and possibly even the irrigation itself derive from the more formal interventions of the Lower Moshi rice scheme which we also visited and which were constructed in the 1980s. These schemes use a mixture of spring water coming off the Kaloleni and Mandaka Mnono rice fields and river water. They are controversial in part because of the extraordinary expense of their construction (\$30k per hectare) and their diverse imperfections which include not being able to irrigate all the fields which have been constructed, conflict with farmers downstream whose water was diverted by these schemes, and with farmers upstream, whose use of water is alleged to be diminishing supplies to the expensive rice fields.

Within the same area there is also a major canal taking water to the TPC Ltd sugar cane fields, from which numerous farmers extract water using petrol pumps. Another 1000+ ha scheme has recently been constructed which also uses water from the same source. Finally there are a series of shallow wells constructed in farmers' fields from which water is pumped to irrigate individual plots and fields.

### **Bangalala village, Same District, on the south-western side of the South Pare Mountains**

This is a 'ndiva' (night storage) dam and furrow scheme that was first established in 1922 by a livestock herder seeking to bring water for his livestock. It was shortly expanded to provide an additional lower dam (used for livestock) with the original dam providing water for irrigation furrows. A series of interventions since 2000 have seen the original dam improved and strengthened. A 400 metre stretch of ditch below the dam lined with concrete and the intake substantially improved also. This has resulted in more water in recent years for irrigated crops and is applied to supplement rainfed maize and beans in the two rainy seasons (Oct-Dec and Mar-May) as well as to cultivate small fields of vegetables, or maize and beans, in the dry season. The improvements have come from district funding, from University research projects and NGO investments.

Makanya in Same District is below the original site. We visited a spate irrigation scheme improved in recent years by the district engineer and serving around 1000 ha of land to the west of the road. The structure he has built is very solid and will save farmers considerable time every year (as they would normally have to re-construct it). At the same time the scheme suffers from dramatic silting with sand building up in alarming quantities, that threatens if not to overwhelm the structure, but to block the bridges under the road and railway through which the river must pass to reach the newly built structures.

### **Mheza in Same District, on the north-eastern side of the South Pare Mountains**

This village has benefited from an improved intake on a stream which had been severely eroded. Farmers here had constructed their own rough dam (renewed every year) and this had been improved by a concrete structure in the early 1980s built by the district. This washed away in the early 1990s and the village was without irrigation until 2013 when a Kenyan NGO constructed a much improved intake, with other sources providing improvements to the canals. The Kenyan NGO initiative has an interesting provenance – they were distributing food aid and were challenged by an old lady receiving the food not to provide merely food, but to rehabilitate the broken intake to allow them to grow their own. The rehabilitation of the intake has been followed by a substantial investment in canal lining (total Tsh49million) shared between district council, TASA and the village itself.

## Ndungu village rice scheme

There have been a series of investments and alterations to existing irrigation schemes in this village. In colonial times a 'compensatory furrow' was built to provide water to families moved to make way for a dam and reservoir built under British administration. In the late 1980s a major Japanese funded scheme built improved intakes, furrows and fields for 1500 families to grow rice. Interestingly, in the process this scheme also removed the water required for the fields of 1000 families, a loss that was not compensated. There remain traditional schemes from this and neighbouring rivers in the area which have received some support from the Traditional irrigation Project.

## General

The major point to emerge from these visits was how complex the category of 'farmer-led' irrigation actually is. The majority of the systems we visited were farmer-led in the sense that their origin derived entirely from farmers' initiatives. However, none was *purely* farmer-led as each had received investment in various forms from local or central government, from NGOs or from University research schemes. These investments could take the form of hardware (concrete, ditches, sluices etc) and subtler forms of social engineering (forming associations, registration, oversight of constitutions, provision of technical support, new agronomic technology, extension advice etc). At the same time the reasons for these investments had in part derived from farmers' initiatives in seeking out the extra support and in effective lobbying of the decision-making bodies. Furthermore many of the investments undertaken included substantial support in cash, labour or materials (worth millions of shillings) that was leveraged by, or used to leverage, the 'external' investments. Another way of putting this is that farmer-led irrigation is not so much a category of different forms of irrigation, but a process of engagement and negotiation between farmers, NGOs, different state organs.

Thus the 'farmer-led' category of irrigation explodes into a rich spectrum of activities that can include, at the extreme, forms of irrigation which exist entirely separate from direct external modification (although we are yet to see these), to intensively negotiated and highly modified hybrids where the farmers' agency and voice appears muted in comparison to external agents. The different schemes resulting are best studied not as different forms of irrigation (separated by crop grown or technology applied) but as socio-technical hybrids, which combine different forms of physical and social engineering from without, and change from within.

We mention all this in some detail for two reasons. First, because the spectrum of engagements that comprise different forms of farmer-led irrigation has become crucial to the diversity that we wish to capture in this project. Understanding how and in what ways different farmer groups engage with different forms of intervention will be vital for this project and has fundamentally driven our site selection for the next phase. Second because these trips to Tanzania underlined a fundamental difference between this country and Mozambique in the capacity of the local state to respond to irrigation demands. Basically in Tanzania there are numerous engineers at district level and zonal level who have been able to construct different irrigation hardware and engage in other activities such as registration of associations. In Mozambique there is none of this – perhaps one engineer *per province* (!).

## Mozambique (21-22 July)

### Vanduzi

Two “medium size” irrigation systems on the foothills of a mountain range were visited; they consisted in drawing water from small streams for vegetables and maize production. In both instances, the area had been colonial, then state farms dismantled in the early 1990s. Both systems were overseen/managed by water user associations, one of which had been supported by PROIRRI and was officially registered. In the first case, 7 de Abril 2, 10 farmers had originally dug long earthen canals in the early 2000s that allowed them to significantly extend their irrigated area compared to when they used buckets. Diversion structures are fragile and need to be rebuilt several times during the rainy season as floods flush them, leading the farmers to request external assistance for rehabilitation. In the second case, Nhombue, PROIRRI significantly invested in upgrading the system by creating, in parallel with the cement-lined canals, a piped water supply that delivers water from the source in the hills with sufficient pressure (derived by the difference in height) to drive sprinklers, supplied to farmers (3 sprinklers per hectare). Water availability is clearly not a problem in these systems and many farmers tend to ‘individualize’ themselves from the collective pipe network by installing their own pipes, drawing water from the open canals far upstream from their farm to make use of the gravity. A key element of these ‘systems’ is the fact that farmers on both schemes have a secure market as they are (partly) under contract to produce high value vegetable export crops for the Vanduzi company located nearby. Issues to further study:

- Level/nature of collective management;
- Partnership modalities with Vanduzi (contract farming)
- Perceptions & rationales of PROIRRI engagement and related changes

### Buzi

Two different types of sites, both close to one another, were visited. The first one comprised individual farmers using small diesel/petrol pumps drawing water from a small tributary of the Buzi river and using (mostly) PVC pipes to irrigate vegetables over a few hectares each during the dry season (maize being cultivated in the same plots during the rainy season). Use rights over these areas have been acquired from 1992 onwards, after the collapse of the Companhia de Buzi sugarcane estate. The government seems to have supported some farmers (extension, capacity building) in the framework of national-wide rural development programs from 2012 onwards but such practices seem largely initiated and supported by farmers “on their own” and highly profitable. The second site was a large area of lowland rainfed rice cultivation (whose productivity may have been quite low, 2t/ha, due to low inputs by farmers) that had witnessed several largely unsuccessful ‘upgrading’ projects within the last 15 years. The latter involved increasing water control by means of an electric pumping station on a neighbouring river supplying a network of underground pipes to irrigate a portion of the rainfed rice area. The PROIRRI project envisions rehabilitating these infrastructures in the near future, which will be linked to the establishment of a Water User Association. Issues requiring further clarification include: Level/nature of collective management in the rainfed rice area: and nature and types of exchanges/support between “pump farmers”.

## Next Steps

### Refining research questions and design of research protocol.

The inception visit generated important insights for the research team. One, in particular, prompted a revision of our research questions. This was our perception that ‘farmer initiatives’ in irrigation development rarely take place in complete isolation from ‘external’ agencies of government, markets and international funders or NGOs. Accordingly, we agreed to modify somewhat the emphasis of our research questions as follows:

1. What are the modalities of engagement between farmer-led irrigation development and external agencies?
2. How do different models and ideals shape this engagement in the interconnected political domains of irrigation development, community development, agricultural development, natural resources management ?
3. How do these models and ideals play out in practice and how do irrigation realities shape these engagements?
4. How do different groups of farmers engage with these irrigation initiatives, including (different forms of) exclusion, and with what outcomes for their assets and abilities to derive benefits from agriculture?
5. What forms of irrigation initiatives can be identified on this basis?
6. How significant are these different forms of irrigation development and the outcomes for farmers in the respective countries?

### Priority actions for the remainder of 2015:

- Recruitment of field research staff (August 2015)
- Completion and field testing of research protocol for case studies of irrigation (September/October 2015)
- Review of key policy documents (September – November 2015)
- Initial interviews with policy-makers and technical advisors at national level in Mozambique and Tanzania (December 2015 / January 2016)



## Appendices

### Team members

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### Itinerary

12 July	Arrival of team in Arusha
13 July	Preparation for workshop
14 July	Arusha inception workshop
15 July	Travel to Moshi and visit to lower Moshi irrigated areas
16 July	Travel to Same and visit to irrigation on southern side of South Pare mountains (Bangalala and Makanya).
17 July	Visit to Ndungu and Mheza schemes, north eastern side of South Pare mountains, and travel to Moshi.
18 July	Travel from Moshi to Maputo
19 July	Preparation for Maputo workshop
20 July	Maputo inception workshop
21 July	Travel to Chimoio and visit to Vanduzi irrigation schemes
22 July	Travel to Buzi and visit to small-scale irrigation schemes near Buzi District centre.
23 July	Travel from Buzi to Maputo
24 July	Work on summary of inception outcomes and planning next steps.

## Participants in Workshops

### Tanzania

<b>Name</b>	<b>Organisation</b>
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## Mozambique

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