FANRPAN

Food, Agriculture & Natural Resources Policy Analysis Network



POLICY BRIEF 01/2018

PATHWAYS FOR IRRIGATION DEVELOPMENT IN TANZANIA

INTRODUCTION

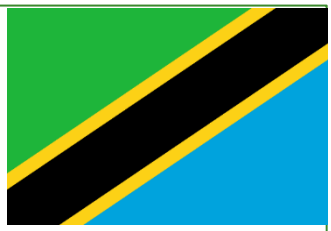
Access to water is directly linked to food security, and drought is the single most common cause of food shortages in developing nations (FAO, 2016). Despite vast water resources on the continent, agriculture in Africa remains primarily rain-fed. The proportion of land under irrigation in Africa is approximately 6% – only a third of the world proportion of land under irrigation (AGRA, 2016). **There will be less freshwater available in the future, as climate change is set to impact on rainfall patterns globally** – leading to longer, more frequent droughts, and a higher incidence of severe weather events such as floods which damage infrastructure and/or reduce crop yields (IPCC, 2014).

Agriculture is currently responsible for the largest proportion of water usage in Africa, with 84% of freshwater withdrawals utilised in agriculture (FAO, 2016). In a changing climate, Africa will need to get 'more crop-per-drop', but cannot pursue this agenda without considering how increasing agricultural productivity may place stressors on water resources, ultimately competing with or even compromising other development goals.

Irrigation is a means to overcome risks associated with rain-fed agriculture in Africa, thus leading to improvements in agricultural productivity and greater uptake of technology (AGRA, 2016). Successful irrigation development also has the potential to be climate-smart through reducing the impact of agriculture on the environment and increasing the resilience of the sector, thereby contributing to the dual goals of increased yields and decreased water stress. Studies show that irrigation for smallholder farmers contributes to increased income and improved livelihoods (Oates, Bosello & Jobbins, 2017).

However, several attempts to leverage irrigation for improved productivity in Africa, including Tanzania, have yielded disappointing results, and have failed to accommodate smallholder farmers adequately. In order to fully enable irrigation to achieve its potential in Africa, context-specific solutions of a multidimensional nature that are technically efficient and sustainable, but socially and culturally appropriate, must be sought. This must be achieved whilst ensuring that other sustainability goals are not compromised.

PRINCIPLES FOR GOOD PRACTICE TO PROMOTE IRRIGATION IN TANZANIA



ONE: Consider practices and approaches carefully, negotiating trade-offs through transparent processes to ensure risk and benefit are distributed equitably across scales and sectors.

TWO: Develop contextualised, local solutions that account for the unique circumstances of farmers through collaborative processes.

THREE: Identify ways to make irrigation profitable and sustainable for smallholder farmers over the long-term – taking into account access to markets, price volatility, and the socio-economic realities of farmers.

FOUR: Ensure benefits reach the poor and marginalised by addressing constraints to participation for marginalised groups – for example, farmers in mid- to low-potential areas, as well as women.

FIVE: Invest in multi-layered capacity strengthening for farmers, governments, and extension agents. Incorporate social learning mechanisms into capacity development activities for greater ownership.

SIX: Improve accountability mechanisms to monitor outcomes at sector and scheme level to understand the social, economic, and environmental impacts of investments.

TANZANIA IN CONTEXT

The United Republic of Tanzania (URT) is an East African country, consisting of the mainland and Zanzibar Island. Lying just south of the equator, Tanzania is a tropical country with a variable and complex climate and agro-ecology.

The northern and eastern parts of the country have two rainy seasons – the short rains in October to December (*Vuli*) and long rains in March to May (*Masika*). The rest of the country has a single rainy season from October to April/May (McSweeney *et al*., 2010).

The Rufiji Basin is the largest of nine river basins in Tanzania, covering about one third of the country's land area. The basin experiences high rainfall variability and increasing water scarcity. The Great Ruaha is the largest sub-catchment of the Rufiji, occupying 47% of the basin and contributing 15% of the basin surface water. The main sources of livelihoods in the Great Ruaha are rain-fed agriculture, irrigation, fishing, and livestock-keeping.

ECONOMIC GROWTH AND DEVELOPMENT

Tanzania is considered an emerging economy with high growth potential (URT, 2011). With the support of development partners, the country has made important economic and structural reforms over the past decade (World Bank, 2016), and has maintained impressive growth rates over this period. GDP growth was 7.1% in 2015, and averaged 6.7%from 2002 to 2015 (Trading Economics, 2016).

Growth has been particularly strong in construction, transport, and financial services, with somewhat weaker performance in the agriculture sector, whose contribution to GDP has been declining (World Bank, 2016).

Nonetheless, agriculture remains central to Tanzania's social and economic development. The sector generates 24% of GDP and 30% of exports, and is the predominant livelihood for around 75% of the population (URT, 2013a). In arid and semi-arid regions, many households depend entirely on livestock and food crop production for their survival (World Bank, 2013).

AGRICULTURE IN TANZANIA

Since the 1990s, significant progress has been made in expanding the production of key crops such as maize and rice, hence reducing national food insecurity. However, it is only in the past decade that agricultural output has exceeded population growth, and productivity per hectare remains disappointingly low, despite considerable research and adoption of 'good practices' (Coulson & Diyamett, 2012).

The dominant policy discourse attributes the low productivity of agriculture to smallholder production systems, and promotes modernising and commercialising smallholder farming as the principle solution (URT, 2011; 2013a).

At present, the main vehicle for achieving this is the Agricultural Sector Development Programme (ASDP). In parallel there have also been initiatives to attract private sector investment, the most notable being the Southern Agricultural Growth Corridor of Tanzania (SAGOT).

CLIMATE CHANGE AND VARIABILITY

Climate variability and change pose a considerable challenge for Tanzania's development. Currently more than 70% of all-natural disasters in Tanzania are climate-change related and are linked to recurrent droughts and floods.

Climate change projections in Tanzania indicate a consistent change in key climate variables, including warming from 0.5˚C in 2025 up to around 4˚C in 2100, with more warming over the south-western part of the country. Mean seasonal rainfall is projected to decrease consistently and progressively for the most parts of the country.

These changing climatic conditions have serious implications for smallholder farmers in Tanzania.



MAPPING IRRIGATION IN TANZANIA

PREVALENCE AND TYPES OF IRRIGATION

Tanzania has a long history of informal irrigation constructed by smallholder farmers, managed through customary arrangements, but state support for this has waxed and waned in a context of changing political agendas and macroeconomic conditions.

In the National Irrigation Master Plan (NIMP) (2002), the area with high potential for irrigation development, based on available land and water resources, is estimated at 2.1 million hectares. A further 28 million hectares has medium or low potential for irrigation development (JICA, 2002).

Irrigated agriculture is concentrated mainly in the mountainous eastern and south-western regions of Tanzania, such as Kilimanjaro, Mbeya, and Morogoro – where traditional irrigation has flourished – as well as Arusha and Iringa. It is less commonly found on the coastal plain or in arid and semi-arid areas, although subsistence farmers do practise some flood recession agriculture and water harvesting (AgWater, 2010; Nkonya, 2013). Most irrigated agriculture is small in scale and managed by farmers, although a few larger schemes have been developed.

Currently, only 5% — 461,000 hectares — of Tanzania's cultivated land is irrigated, out of the estimated 29.4 million hectares available for irrigation development. Irrigation coverage in the Rufiji Basin varies from 25,000 to 55,000 hectares, depending on the season, representing about 15% of Tanzania's total irrigated area (Patel *et al*., 2014).

The most common technology is surface (gravity) irrigation, whereby water is distributed through a canal system, furrows, and basins. Sprinkler and drip irrigation are less prevalent and in the past, were mainly found on commercial farms (FAO, 2005). However, drip irrigation does appear to be increasing in popularity (AgWater, 2010), including uptake by smallholders, for example, in the Uluguru Mountains (Mdee, 2014).

Efforts to develop modern irrigation have been capital-intensive and the results disappointing. Many larger schemes have been unable to operate at their full potential and a number of key problems persist, such as lack of investment in maintenance and ineffective institutions for scheme management (see Mdee, 2014 on Dakawa). Much of the ASDP investment has been spent on rehabilitating or upgrading existing schemes.

POLICY ENVIRONMENT

Irrigation development is currently very prominent in Tanzania's major agricultural and poverty reduction policies and strategies, and cited as one of the key strategies for achieving food security and agricultural growth (Nkonya, 2013).

Tanzania has developed a National Irrigation Policy (2010) and a National Irrigation Act (2013), but a plethora of policies and strategies related to agriculture, water, environmental management, and climate change bear relevance to irrigation.

The ASDP (2005) set an ambitious target to develop 1 million hectares of irrigation by 2016. Although this target has not been met, expansion appears to have accelerated over the ASDP period. In general, the pace of irrigation development has been slow in Tanzania, suggesting it is not easy to bring new schemes into production.

MANAGEMENT OF IRRIGATION SCHEMES

The National Irrigation Commission is the main government body responsible for irrigation activities in Tanzania (URT, 2013b). The mandate for planning, design, construction, and rehabilitation of community managed schemes has been devolved to the local government authorities, with zonal irrigation office engineers playing a supporting role (Therkildsen, 2011). Managing smallholder irrigation schemes is the responsibility of water user groups (WUAs), who must register as irrigation organisations (IOs).

This series of nested integrated water management institutions (IWMI) leaves much to be desired. Managing the nine basins with the current model is likely to be an expensive endeavour and will continue to be rife with capacity challenges for the foreseeable future.

PRINCIPLES FOR IRRIGATION POLICY AND PRACTICE IN TANZANIA

The success of Tanzania's future irrigation efforts will depend heavily on the extent to which key bottlenecks can be overcome and replaced with evidence-backed good practices.

KEY BOTTLENECKS TO SUCCESSFUL IRRIGATION DEVELOPMENT

Based on case studies and desktop reviews, several key bottlenecks limiting the successful implementation of irrigation projects in Tanzania have been identified.

- **Lack of political incentives** to ensure that investments in irrigation are adequate, effective, or equitable, or even that investments are targeted at stated policy objectives. This is intensified by widespread misuse of funds at both national and local levels.
- **A proliferation of institutions responsible for irrigation development**, which hinders effective coordination, transparency, and accountability. This is coupled with relatively weak coordination between the ministries responsible for agriculture and water.
- **The emphasis on building infrastructure without due attention to and investment in farmer institutions** for scheme management, operation, and maintenance.
- **A severe lack of capacity for implementation,** particularly in district offices (to which responsibilities have been devolved), but also in the private sector (responsible for constructing schemes).
- **Limited monitoring of water resources and their use, and limited monitoring of project outcomes at scheme level.**

Improving performance in Tanzania's irrigation sector will require a range of solutions at different scales. Some of these will be technical or managerial in nature, but many relate to the political or institutional environment and are likely to be more challenging to implement. The sections below describe six principles and actions to address the identified key bottlenecks and improve irrigation in Tanzania.

ONE

Consider practices and approaches carefully

In water-scarce basins, irrigation schemes pose a risk to other water users, and are themselves vulnerable to water shortages – problems that climate change will exacerbate. In Tanzania, conflicts over water are already being experienced where demand is increasing.

There is therefore a need to move away from a simplistic understanding of irrigation efficiency, and to consider how efforts to increase 'crop-per-drop' at scheme level may affect other users (and the environment) in the basin. This must be done through participatory processes and together with the relevant experts.

Although support for smallholder irrigation is a political priority, to be sustainable these investments must be complemented with simple but effective measures to allocate water equitably at a sub-catchment or basin level, as well as to regulate water use. Strengthening permitting procedures and compliance monitoring is vital in this regard – the remit of the basin water boards. Nevertheless, attempts to restrict water use for agricultural production will likely meet resistance from farmers, and to date have largely been ignored.

Basin water boards should be supported with the proper level of resources and autonomy needed to deliver their functions, as enshrined in the National Water Resources Management Act (2009) and other Tanzanian legislation. Mobilising political support at both national and local levels will be crucial in enabling these boards to realise their powers and sanction other actors where necessary.

Given the shortcomings of existing institutional arrangements, there is perhaps a need for alternative (complementary) approaches to safeguard future investments in irrigation. A critical step to identifying solutions is to establish shared understandings of water management practices, problems, and goals. This can happen at ministerial level, entailing better communication between sectors, but also at the local scale, bringing together different water user groups around a specific set of issues.

Negotiating trade-offs between different interests is an inevitable part of the process and will need to be dealt with collectively and transparently to ensure that risks and benefits are distributed between stakeholders at multiple levels and across sectors.

TWO

Develop contextualised, local solutions

Attention to smallholder institutions is a significant gap in current approaches to irrigation scheme development in Tanzania. Blueprint approaches to institutional design are unlikely to work without significant local adaptation, given the diversity of socio-cultural and agro-ecological contexts in Tanzania. Institutions often 'elude design', meaning that imposing structures on farming communities can yield mixed and unexpected results.

It is thought that small-scale irrigation as an adaptation method is more likely to be successful if there are concomitant policies to provide local farmers with information on changing risks and alternative production techniques. Policies also need to facilitate access to the financial means to adapt physical systems (Deressa *et al*., 2009; Lankford, 2009; Sakaki & Koga, 2011). When addressing the vulnerabilities of poor farmers, it is also important to consider existing coping strategies, human relationships, and social norms (Sakaki & Koga, 2011). In this vein, Ziervogel *et al*. (2006) argue that climate change adaptation has a social and political dimension, and is not solely governed by environmental or economic concerns, which can determine options and outcomes.

In a country as diverse as Tanzania, tailored approaches such as Agriculture Innovation Platforms (AIPs) will be essential to ensure that public investment in irrigation is impactful and sustainable.

THREE

Identify ways to make irrigation profitable

Unless the Government is willing (and able) to continue subsidising repairs and rehabilitation, irrigation must do more than meet farmers' subsistence needs. Irrigation is an expensive business, and will be sustainable only if it is financially lucrative. Moreover, farmers are unlikely to see the value of paying water use fees to invest in managing and maintaining infrastructure unless they make a reasonable profit.

The costs of production are perceived to be relatively high when compared with market prices, and the risks of investing are considerable for farming households, given that markets are unreliable. Improving transport, storage, processing, and market information systems, alongside policies to moderate input prices, will be necessary to make irrigation viable.

FOUR

Ensure benefits reach the poor & marginalised

Farmers who irrigate are generally better off than non-irrigators (Mosello *et al*., 2016). However, access to land, water, and other forms of capital can hinder participation in irrigated production, and are often barriers for marginalised groups – for example, poorer households or women. These barriers are in part a product of local power relations and social norms, which can be difficult to change.

Irrigation development thus does not benefit everyone equally and can reinforce existing social inequalities. More research is needed to understand the nature of these effects and trade-offs, and how more equitable outcomes might be achieved. Additional support to disadvantaged groups may be necessary to overcome entry barriers, such as access to land or financial resources to pay for inputs.

High-profile initiatives have tended to target districts that already have high potential, meaning that less public money goes towards the semi-arid areas of Tanzania, where populations are highly vulnerable to drought. There may be opportunities to counterbalance this trend in the next iteration of the ASDP, or through other government or donor initiatives. Addressing constraints to participation will be crucial in tackling extreme poverty, and will require more (gender-) sensitive approaches.

FIVE

Invest in multi-layered capacity strengthening



Although irrigation can be lucrative, many farmers report difficulties in accessing inputs and markets, and for various reasons schemes repeatedly fall into disrepair. One underlying factor is an overemphasis on

infrastructure, with limited attention to local capacities and institutions.

Education centres have an important role to play in training the next generation of irrigation professionals and extension workers who will work with farmers on-site.

Social learning approaches can be a useful strategy to build the capacity of farmers and local government staff alike, but require long-term investment. Such an approach entails cycles of knowledge-sharing and joint action to co-create information, institutions, and practices. Conventionally trained engineers, who predominate in Tanzania's zonal irrigation commission offices and in the National Irrigation Commission headquarters, need to develop the know-how to facilitate such processes. In the short term, donors and non-governmental organisations (NGOs) can provide support in the form of technical assistance and on-the-job training, but in the longer term there is a need to recruit staff with the relevant expertise.

Incorporating a stronger social learning component into budgets, timelines, and terms of reference for irrigation projects would also incentivise consultancy companies and other private contractors to build capacity in this area, creating demand for graduates with different skill sets.

SIX

Improve accountability mechanisms

Irrigation performance can be understood and measured in different ways and a distinction can be made between efforts to evaluate the technical performance of irrigation and those evaluating the outcomes of irrigation investments. There is a need for a clear framework to evaluate performance outcomes at both scheme and sector level, including technical and managerial aspects of performance, as well as the social, economic, and environmental impacts of investments.

In this framing, economic growth encompasses income generation, employment, economic and livelihood diversification, and the generation of exports and taxes. Sustainability addresses questions of the scheme's water demand and impact on water resources; its vulnerability to drought; the potential impacts of climate change; and other issues of long-term financial, environmental, and technical viability. Questions of equity consider the extent to which, and how, the costs and benefits of the scheme are shared among farmers on the scheme, the scheme beneficiaries, and broader society. An irrigation scheme may have a positive, a negative, or no effect on each of these issues, and setting objectives for irrigation policy and individual schemes usually involves making explicit or implicit trade-offs between these effects.

At local level, investments should be based on assessments of people's needs, patterns of wealth and asset ownership, agro-ecological conditions, local markets, supply chains, and so forth. However, public investment decisions are often influenced by political concerns and patronage networks. Independent reviews and post-construction monitoring could perhaps help identify such malpractice and increase accountability in the irrigation sector. Patronage and corruption are difficult to tackle, but putting in place a strong framework for monitoring outcomes (as opposed to the current focus on activities or outputs) may help shine a light on problem areas and ensure sensible investment decisions are made. This information could also be used to identify capacity gaps and training needs.

Ownership of such a monitoring framework should lie with the National Irrigation Commission, which is responsible for coordinating irrigation activities in Tanzania, but other actors will also need to champion it. Donors and other development partners have an important role to play in supporting this process, funding monitoring activities and capacity-building, as well as leading by example – in other words, placing a strong emphasis on long-term results in their own programmes.

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About FANRPAN

The Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN) is an autonomous regional stakeholder driven policy research, analysis and implementation network that was formally established by Ministers of Agriculture from Eastern and Southern Africa in 1997. FANRPAN was borne out of the need for comprehensive policies and strategies required to resuscitate agriculture. FANRPAN is mandated to work in all African countries and currently has activities in 17 countries namely Angola, Benin, Botswana, Democratic Republic of Congo, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.

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