



Farmer-led irrigation in sub-Saharan Africa: building on farmer initiatives

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Key messages

- To feed sub-Saharan Africa (SSA) in 2050 without large additional imports requires more productive agriculture. Irrigation can make a big difference, but currently as little as 4%–6% of sub-Saharan Africa’s cultivated land is irrigated, despite water being available to irrigate larger areas.
- In the past, large-scale public irrigation schemes too often failed, making governments wary of further investments. Since 2000, most new irrigation has come from farmer-led irrigation (FLI), largely by smallholders individually and in groups.
- Smallholders have often been able to develop irrigation effectively, aided by small affordable pumps, largely in response to the opportunity to sell high-value produce, such as vegetables, to Africa’s growing towns and cities. But FLI has been constrained by a lack of formal finance, business and organisational know-how.
- FLI can raise production and farm incomes, creating jobs on and off farms, thereby driving agricultural development. Less is known about how efficiently and productively water is used and consumed.
- Social equity is a concern: the first irrigators tend to be the better-off, and to be male. Farming incomes can generate benefits for others, but this is far from automatic. Water-related impacts on both the environment and on human health vary, but systematic evidence is lacking.
- The profile of FLI is rising among policy-makers. They need to be aware of the differences between (a) the needs of micro-irrigators, many on low incomes [in or close to poverty] and vulnerable; and (b) those small-scale, but commercial, irrigators with prospects of considerably higher incomes from irrigation. They also need to recognise the number of women irrigators and that their priorities may differ from those of men.
- Policies need to reflect three stages of growth and development. First, when irrigation is limited, roads and facilitating farmer access to finance, equipment, inputs and technical knowledge are priorities. Second, as irrigation starts to be adopted, policies need to assist irrigators to raise their productivity and to spread benefits to those who have yet to adopt irrigation. Finally, as irrigation becomes common, effective ways to regulate water use, assign rights and to mediate conflicts over water use need to be established.

Cover image: Irrigation on a very small scale can improve livelihoods. Photo: Tessa Steenbergen.

Background and questions

This brief addresses three questions:

- How much FLI in SSA has there been by the 2010s? What has been developed, and how?
- How successful has FLI been? What problems arise? How do such developments compare to irrigation initiated by public authorities?
- How has public policy assisted or hindered FLI? What are the lessons for policy-makers?

The brief is based on a synthesis of findings from research conducted under the UK's DFID-ESRC Growth Research Programme (DEGRP) and the wider literature on irrigation in SSA, especially relatively recent findings.¹

If SSA is to meet its food needs in 2050 without large increases in imports, it will have to irrigate more farmland.² Currently, official

records indicate that 4%–6% of cultivated land is irrigated in SSA, compared to more than one-third in Asia. Untapped water and land are available to expand irrigation,³ but can the potential be realised sustainably?

From colonial times through to the 1970s, governments across SSA invested in large-scale, publicly run irrigation projects with tenant farmers. Most schemes were costly and ran into problems, failing to irrigate as much land as planned or to reach the yields targeted. By the 1990s, governments were thus reluctant to invest in irrigation. Since 2000, most of the expansion of irrigation has been undertaken by smallholders, individually or in groups, irrigating on a relatively small scale, a process known as FLI.



While many irrigators are women, irrigation ownership, income and benefits accrue mainly to men.
Photo: Fessa Steenberg taken in Mozambique

1 Full report available at <https://degrp.odi.org/publication/farmer-led-irrigation-in-sub-saharan-africa-synthesis-of-current-understandings/>
2 Van Ittersum et al. 2016. <https://www.pnas.org/content/113/52/14964.short>
3 Xie et al. 2014. <https://www.sciencedirect.com/science/article/pii/S0378377413002205>

DEGRP research on irrigation

Since 2013 DEGRP has funded three studies of irrigation in SSA:

Innovations to promote growth among small-scale irrigators [Elizabeth Harrison, University of Sussex] explored through ethnography the role of power, politics and institutions in shaping small-scale irrigation in Bangladesh, Malawi and Tanzania.

Assessing Models of Public-Private Partnerships for Irrigation Development in Africa (AMPPPIDA) [Ruth Meinzen-Dick, International Food Policy Research Institute] aimed to guide governments on how best to form public-private partnerships (PPP) for irrigation. Drawing on insights from focus groups, key informant interviews, document review, and mapping of networks in Ghana and Tanzania, the project has developed a framework for assessing PPP.

Assessing the growth potential of farmer-led irrigation development in sub-Saharan Africa (SAFI) (<http://www.safi-research.org/>) [Phil Woodhouse, University of Manchester] examines the characteristics of FLI, the processes and outcomes, and relationships of irrigators to other actors and agencies. In Mozambique and Tanzania, informal irrigation schemes have been studied in detail, national policies have been examined and a framework developed by which to compare the irrigation schemes reviewed.

Findings

The full extent of FLI, much of it small-scale and informal, is not known. Substantial areas may escape official records. Localised estimates indicate that FLI may cover several times the area officially recorded as irrigated. Hence some of the much-vaunted additional area to be irrigated may well already have been developed.

FLI takes diverse forms. Farmers in groups may divert water from streams down earthen canals to their fields. Some individuals pump from reservoirs and wells, deep or shallow, using small affordable units. Lacking formal finance, smallholders economise on capital costs, building fairly rudimentary, but cost-effective and locally suitable, intakes and canals.

FLI has been stimulated by increasingly available and ever-cheaper small affordable pumps, but above all by market opportunity, especially the rapidly growing urban markets for higher-value produce: fruit, vegetables, fodder for dairy cows, and the like. Staple crops have not often been irrigated, with the marked exception of rice.

Assessments of informal irrigation tend to suffer from a bias to surviving systems. When informal irrigation fails, it often disappears, making it unlikely to attract the attention of researchers.

That said, **FLI can raise production and incomes.** When soils are productive, farmers deploy additional skills and look to get their produce to market. Returns from irrigated land can be several times those from rainfed crops. Irrigated farming usually requires more labour per hectare than rainfed, so creating jobs. It can, moreover, boost the local economy as further work is created in delivering inputs, processing and marketing output, and in providing local goods and services to farmers with extra income.

Much less is known about the **productivity and the efficiency of water and its rate of use.** Most **physical problems** reported from FLI concern over-abstraction of water, especially when water scarcity and competition – with livestock herders or downstream users – increase in dry seasons and during droughts.

Social equity is a concern. Those irrigating tend to have better-than-average incomes, land, labour and education: not for nothing has irrigation been described as a 'privileged solution'. That said, small-scale irrigators vary along a spectrum from micro-irrigators, who water plots of a tenth of a hectare or less by hand, to those who have pumps irrigating two to 10 hectares on which they grow (very) high-value crops.

Effects on those unable to irrigate vary. They can benefit from more jobs on farms and off, as well as from the availability of more food at a lower price. But they may lose access to common land they once used for grazing, hunting or gathering.

The impacts of FLI on women vary. Women farmers can grow more food under irrigation. They may benefit from increased local employment. Canals and furrows may be a more convenient source of water, saving time collecting water. But men, who typically have better access to improved technology than women, may appropriate irrigated land formerly allocated to women, or they may demand that women provide labour on irrigated fields. When irrigation raises health risks, women bear the brunt of caring for the sick.

Irrigation affects the **natural environment**, both directly through the abstraction of water changing hydrological systems, as well as less directly through the way irrigated land is farmed. Potential effects include: loss of water to rivers and wetlands, affecting ecosystems, groundwater and fisheries; land and soil degradation; loss of agricultural biodiversity; and pollution from overuse of fertiliser and chemicals. Although such risks are frequently alluded to, specific accounts are rare in the literature, so the incidence and severity of such problems are not much known.

Irrigation's impacts on **human health vary**. Risks include waterborne disease in canals, toxic chemicals applied on fields, higher water tables impeding sanitation, and unsafe irrigation water used domestically. On the other hand, increased income and extra food from irrigation can improve human health. Documented impacts on health, however, are few. The one study that compared the benefits of irrigation to health costs found a net benefit.



Affordable pumps facilitate small-scale irrigation.
Photo: Tessa Steenberg taken in Mozambique

Policy implications

Strategies to develop irrigation in SSA at the regional level are set within the renewed drive for agricultural development, established by the 2003 **Maputo Declaration**, made operational by the **Comprehensive Africa Agriculture Development Programme (CAADP)** – irrigation forms part of its Pillar 1 Framework on Sustainable Land and Water Management, reinforced by the 2014 **Malabo Declaration on Accelerated Agricultural Growth and Transformation**.

In 2018 three significant reports and declarations on irrigation were published:

- the **Malabo Montpellier Panel report on smart irrigation** recommended realising much of the physical potential to irrigate
- the September 2018 **Kigali Joint Statement on Inclusive and Sustainable Farmer-led Irrigation** prepared at the 2018 African Green Revolution Forum conference singles out FLI and commends it
- closely associated with the latter, the **World Bank and Global Water Security & Sanitation Partnership (GWSP)** initiative on farmer-led irrigation that again aims to promote this.⁴

All see financing irrigation, and making use of improved technology and institutional support, as central to irrigation development. All recognise the private sector as a prime source of finance and technology. Hence much interest has been shown in public-private partnerships (PPP) between public agencies and formal firms to facilitate this. PPP may provide the capital and know-how, but effective partnerships require considerable care and time, including working with the smallholders involved, if they are to allocate costs, benefits and risks fairly and effectively across the different parties. PPP may

spare public agencies investment funds and field staff, but they call for quite advanced skills in planning and negotiation.

Policy successes with FLI are either scarce or not documented. A prime need is to have working models of policies that have been effective in similar circumstances.

Supporting farmer-led irrigation development

A key initial challenge is to convince enough policy-makers that FLI can indeed contribute to local and regional development in the ways the evidence suggests it can.

In promoting FLI, two distinctions are worth bearing in mind. One is **social**. For micro-irrigators, public policy forms part of wider efforts to reduce poverty: the costs and benefits of irrigation need to be compared to those of cash transfers, food aid, pensions and other forms of social assistance.

For the more commercial small-scale irrigators, most of their needs form part of the mainstream issues of agricultural development: facilitating access to technology and finance, and marketing. Where irrigation is carried out by groups, opportunities to improve the performance of their groups may exist – such as training in book-keeping, including smart fintech, to manage group funds and expenditure; in registering water rights; leadership skills, and supporting thinking about strategies and organisation at a community level, etc.

A more **gender-sensitive approach** to irrigation would begin by recognising that many irrigators are women farmers, and that they may have different priorities for irrigation than their male counterparts.⁵

4 Other similar initiatives are in the pipeline. For example, the African Union is preparing a **Continental Irrigation and Agricultural Water Development Framework (CIAWDF)** to launch later in 2019.

5 Reflections on women's perceptions, however, need to appreciate their setting of time and circumstance. Rather than being the representation of some fixed, predetermined differences in outlook between men and women, women's views will vary as circumstances change and as time passes.

Beyond these considerations lie the practical needs of women as irrigators: ensuring that they have access to land and water, to technology and technical advice, to support services and inputs – all tailored to women’s limited labour time and capital. Women’s rights to land and water need to be reflected in regulations and governance of irrigation, especially where men’s interests tend to prevail.

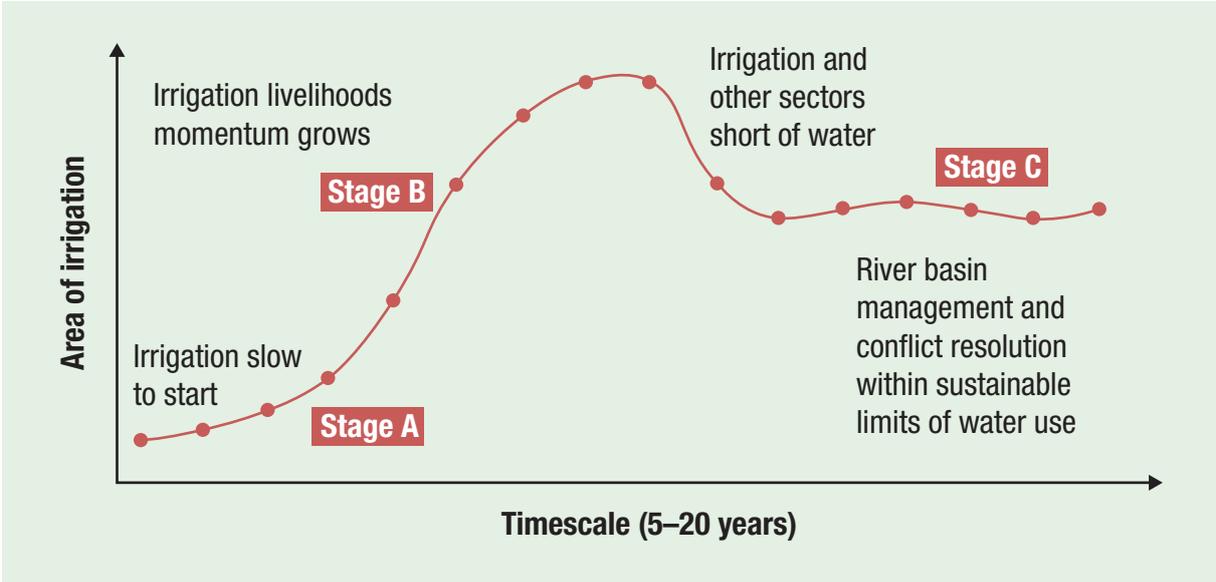
The **other distinction is the three stages of irrigation development** that unfold at catchment level (Figure A). Initially, little irrigation takes place because conditions are lacking – including prices and incentives to grow more; skills and knowledge of irrigation possibilities; scarcity of capital to take up irrigation opportunities; or the inability of farmers to organise if collective action is needed to put water to use. At this stage, policy needs to facilitate access to markets through roads, ensure an enabling environment for investment, and overcome the lack of access of most smallholders to financial services, heavy plant equipment, inputs and technical knowledge.

Subsequently, conditions for irrigation improve and farmers further take up the opportunity to irrigate. Since some farmers or groups have

advantages over others in skills, access to funds, political connections and so on, this process will probably increase differences between farmers. Policies appropriate to this stage include helping farmers raise the performance of their irrigation through: technical, financial and organisational training, soil moisture management and water scheduling; helping would-be irrigators to overcome obstacles they face in adopting irrigation; spreading benefits to the poorest within irrigating communities; and starting to regulate use of water, especially during dry seasons and droughts, to ensure water consumption does not exceed supply.

In a third stage, irrigation becomes increasingly significant in the water basin, as substantial amounts of the irrigation potential are taken up – surpassing water supply in some cases. The challenges of effective and equitable regulation can hardly be overstated, given that irrigation’s various impacts arise at different scales and times, the complexities of natural systems, temporal variations in water supply and demand, and the political conundrum that first movers feel they establish rights to water through their initiative. Policy priorities are to find effective ways to regulate water use, assign rights and to mediate any conflicts over water use.

Figure A
Three stages of irrigation development



SOURCE: LANKFORD (2003) [HTTPS://WWW.SCIENCEDIRECT.COM/SCIENCE/ARTICLE/PII/S1474706503001475](https://www.sciencedirect.com/science/article/pii/S1474706503001475)



Irrigated vegetables promise high returns when sold in cities.
Photo: Tessa Steenbergen taken in Mozambique

This brief is based upon:

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