Understanding the extent of Farmer-Led Irrigation Development (FLID) and its implications for policy.

Understanding the extent of Farmer-led Irrigation Development

Through irrigation, farmers can plant crops in the dry season and diversify the crops grown, increasing their resilience to weather and climate. Moreover, through irrigation, farmers in Mozambique are transitioning from subsistence to commercial farming systems because they produce high-value irrigated crops like horticulture. Farmers have been developing and expanding irrigated areas for decades, often without much external support. This process is dubbed Farmer-Led Irrigation Development (FLID) in recent academic literature. Although this expansion largely takes place "under the radar", there has been an increased awareness of the extent of irrigated area already developed by farmers (by IWMI, the World Bank and the African Union) and the potential that FLID has as a process to catalyze smallholder irrigated agriculture further. FLID is characterized by farmers who take the lead in developing their own (irrigated) agricultural practices by using the opportunities and resources around them. The bottom-up development of irrigation through FLID processes makes it a sustainable form of development responding to the needs of the farmers within the resources and capacities that farmers have. Over the whole of sub-Saharan Africa, hundreds of thousands of farmers have developed irrigation in this way. There is considerable potential to facilitate and catalyze this FLID process so that many more farmers can benefit, farmers who are now constrained and face hurdles that increase risks. These hurdles include (access to) knowledge, technology, markets, finance, and favorable policies, to name a few. Public action can address these hurdles if they are aimed at facilitating and catalyzing this FLID process.

One of the reasons why FLID has not been receiving much attention until recently is that its development has been happening in the informal sector without much formal support. Consequently, it is not registered in formal statistics. It was therefore seen as a more anecdotal activity of farmers and not a potential scalable pathway for development until the World Bank picked it up.

Knowing the extent of irrigation developed through FLID helps inform the Mozambican government, which aims to develop 300,000ha of irrigated agriculture by 2042 (PNI, 2016), to formulate targeted policies and actions through acknowledgment of the scale at which (smallholder) irrigation developed. Understanding these dynamics of irrigation development allows for making informed decisions on water allocation, water management, development strategies, and directing investments and services.

The extent of irrigated agriculture

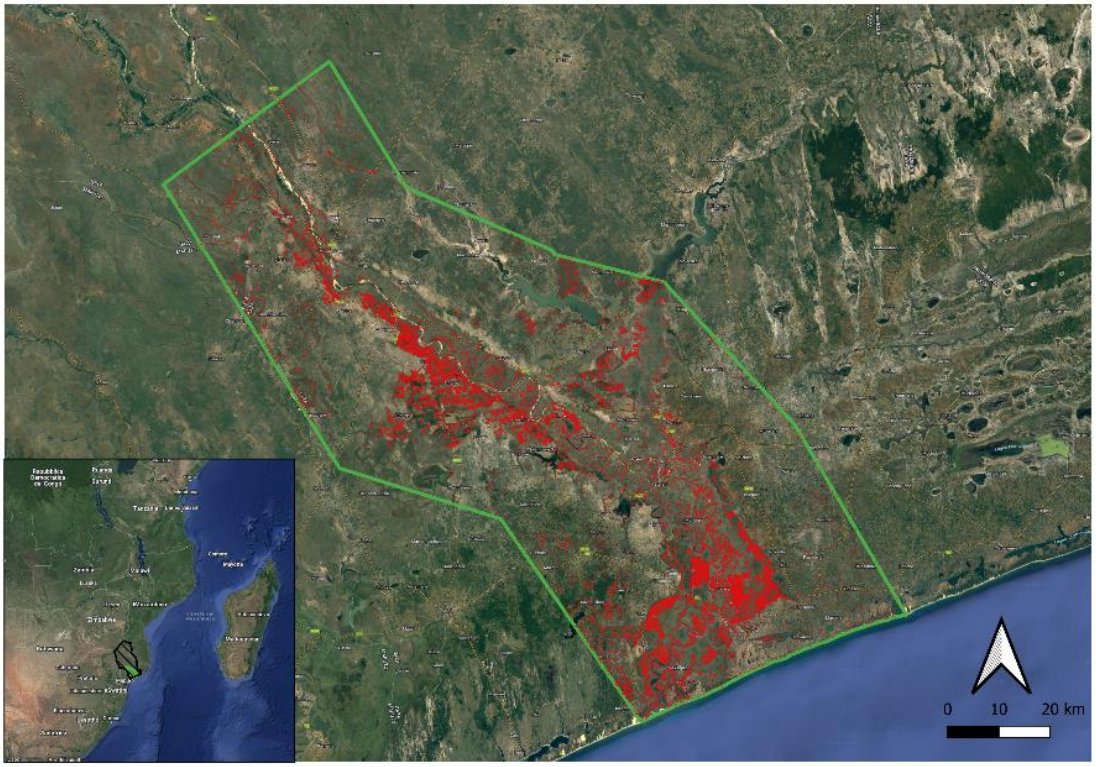

Figure 1 A remote sensing case study map of the Lower Limpopo area (around Chokwe and Xai-Xai) marked in green and in red the irrigation hotspots.

To illustrate the extent of irrigation that is not recorded, consider the map above (Figure 1). One of the FASIMO case studies covers the lower Limpopo River and its banks, from Chokwe to Xai-Xai, and contains the sizeable Chokwe irrigation scheme and two large privately owned rice schemes near Xai-Xai. This case study covers an area of 780 000 hectares, of which 80 000 hectares were classified as irrigated agriculture. This classification was done using remote sensing imagery and machine learning algorithms, which is a method to map large areas that are otherwise difficult to cover by car or would take a long time[1].

Approximately 10% of the case-study area is covered by irrigated agriculture, of which the majority is not included in formal records. In contrast, the Mozambican National Irrigation Plan mentions that there is 90.000ha of irrigated land in the whole of Mozambique, which is about the same area as mapped in Chokwe and Xai Xai, while many other irrigation areas are known.

Of the 80 000 irrigated hectares in the study area, between 4-7 000 hectares are in the government-led irrigation scheme in Chokwe (HICEP), and about 10 000 hectares are in the Xai Xai rice schemes, leaving around 60 000 hectares of smallholder irrigation, initiated, and maintained by smallholder farmers themselves. Even if the classification overestimates the extent by 50%, the area that covers irrigated agriculture through farmers' own investments is twice the size of the production area

[1] We refer to Technical Reports 3A and 3B for more detail on how classifications in the case study work and on the sensitivities of such models to field data, satellite data, and other model-related parameters.

irrigated through government or large private sector investments. This shows that FLID has a significant contribution to local food production.

Supporting farmers in small farmer-led schemes

The remote sensing exercise shows that it is very probable that over the whole of Mozambique, more than 300.000ha of irrigated land has already been developed by smallholder farmers. Therefore, the focus could shift from building new irrigation infrastructure towards supporting current FLID systems in improving their water use and agricultural output while continuing to facilitate and catalyze the process behind Farmer Led Irrigation development.

The Remote Sensing exercise can be used to 'find' irrigation 'hotspots' (i.e., areas that have a large concentration of irrigation). With this information, the visits of extension officers can be done guided and more efficiently and used to understand what are the success stories of that area that can be used to showcase the next steps for neighboring farmers (through farmer-to-farmer learning activities) and how to address the bottlenecks of those example farmers to further improve their production system by linking them to ongoing facilities that can support them (Projects, NGO's, Market players).

This type of information allows INIR, for example, to decide where and how to allocate the limited resources and where their return on investment (ROI) is the highest; with targeted support, the impacts can be significant. The role of the technicians/engineers from government institutions would change from a role of a *designer* (technical irrigation infrastructure design for smallholders) to a *facilitator* (facilitating the discussions on ambitions/goals the farmers have, facilitating peer-to-peer learning activities, facilitating technical advice for irrigation options, facilitating linkages to local technology providers/constructors that can help deliver/construct the irrigation technology, facilitating linkages to markets/input suppliers/out growers, facilitate farmer-to-farmer learning excursion to successful irrigation development, etc.). This role change ensures that the farmers decide on what pathway to develop their irrigated production, which ensures sustainability; the facilitator widens options farmers have to invest and link to outside actors that support their production systems after project interventions. At the same time, this builds on the strengths of extension officers as connectors and facilitators instead of expecting them to be irrigation engineers, agronomist specialists, market experts, veterinary, etc., all simultaneously.

Conclusions and policy recommendations

We can conclude from the Remote Sensing exercise that farmers have successfully developed irrigated agriculture to a scale that they might have already reached the policy goals for 2042. From the in-depth case studies from FASIMO, we see that farmers acquire knowledge on how to develop irrigation through examples around them and peer-to-peer exchange; there is a considerable spillover effect. Furthermore, we see that within their irrigated production systems, there is room for improvement on water management, good agronomical practices, and access to finance and markets.

As part of the long-term sustainability strategy, INIR, in partnership with other departments within the Ministry of Agriculture, should facilitate and promote service providers (either the private sector or NGOs) through subsidies or projects to focus on supporting farmers in business plan development, overall scheme management and maintenance, irrigation agronomy training, stronger and transparent institutions (WUA's or Farmers associations) and linkages to (profitable) markets.

This will catalyze commercial irrigated agriculture developed by smallholders, as observed in FASIMO case studies.

Extension services (at the district level) assisting irrigation schemes should adopt peer-to-peer learning methodologies and showcase good working examples of irrigation developed by farmers, to reduce the pressure on limited manpower. This allows extension officers to showcase working irrigation development options (focused on FLID or working government irrigation schemes) where the farmers explain how they got there (i.e., the process or development) without the need for the extension officer to have the technical capacity or specialized training.