Food and Agriculture Organization of the United Nations

Strengthening of research-extension-farmer linkages for field demonstrations in Zambia

Testing scalable climate change adaptation practices

AUTHORS: Kokwe, M., Chama, T., Pali, P., Ramasamy, S.

KEY MESSAGES

- To reduce vulnerabilities to climate risks, climate change adaptation (CCA) practices should be tested and disseminated through networks involving researchers, extension workers, and farmers.
- Farmer field schools (FFS) provide a fruitful learning environment where researchers, extension workers, and farmers can test innovative CCA practices and technologies collaboratively.
- Collaboration between researchers, extension workers, and farmers ensures that smallholders adopt science-based, location-specific, and relevant CCA practices.
- A policy directive for strengthening the research- extension - farmer linkages in both the development and dissemination of adaptation practices is needed to ensure relevance and effectiveness.

INTRODUCTION

Climate change impacts are linked to low productivity, food insecurity, and poverty (Makate, 2019). In Zambia, the agriculture sector is affected by reductions in precipitation levels and an increased frequency of dry spells, which shorten growing seasons and consequently reduce production. To improve their resilience to climate change, farmers need to adopt coping mechanisms, such as choosing specific crops or crop types or changing land management practices and climate-resilient agricultural techniques (Mullins *et al.*, 2018). However, the uptake of climate-resilient agriculture approaches in Zambia remains low due to poor linkages between research, extension, and farmers.

Institutional innovations have the potential to reduce the barriers to the adoption of climate change adaptation practices by farmers and ensure their durable scaling-up, thus maximizing their impact (Makate, 2019). Vertical and horizontal linkages between the research and extension organizations and farmer networks need to be improved to ensure access to resources, information, and innovation. Well-functioning vertical linkages provide access to extension services through various extension models and agents, inputs, and marketing outlets. Well-functioning research and extension systems

and their linkages constitute a vehicle through which relevant technologies and practices can be communicated to the farmers for manning the climate-related risks.

In Zambia, extension services are largely provided by the public sector. In addition, other actors in a pluralistic system are also playing a dominant role in enhancing access to advisory services to the farmers. However, the outreach of extension services remains limited, and messages are often distorted. A report by the World Bank (2019) suggests that a more pluralistic extension system, with strong linkages between research institutes, dissemination channels, and farmer field schools, would facilitate community-based learning and promote the adoption of climate change adaptation practices.

Against this background, the Government of Zambia and the Food and Agriculture Organization of the United Nations (FAO) partnered to test climate change adaptation practices for smallholder farmers. This was done through demonstration trials in FFS, which were set up by extension workers of the respective districts (with regular technical support from research and FAO). The basic understanding of the FFS approach and engagement of extension workers in such type of system was a prerequisite for the promotion of climate change adaptation practices.

This policy brief presents several institutional actions that enhance the capacities of farmers, researchers, extension workers, and other actors to anticipate climate risks and reduce vulnerabilities to climate extremes and strengthen adaptation and resilience.

KEY FINDINGS

The climate change adaptation practices that were tested focused on improving the resilience of crop and livestock production systems and agroforestry. Key technologies that demonstrated resilience improvements in the cropping systems included, different drought-tolerant crops and varieties, sustainable land management practices (use of basins and rip lines), green manure cover crops species for soil fertility enhancement, and water retention improvement, biological pest management practices (use of Tephrosia for pest control) and setting up agroforestry fodder banks for livestock fodder provision during the dry season. The testing was carried out in FFS settings, whereby farmers, extension workers, and researchers regularly observed and discussed the performance of different techniques, from planting to harvesting.

Field days were organized at different stages of the production process to share the experiences and learn from the farmers' groups. Each FFS was centered around a lead farmer, who provided demonstration sites and mobilized farmers (up to 30) living in the same farming catchment area. The lead farmer was also availed training in recording rainfall data, crop condition, and pest incidence measurement through the rain gauges and Pheromone traps installed at each of the FFS to improve the farmers' practical understanding of the linkages among weather/climate and pest conditions and CCA practices. The project also made efforts to improve farming communities' access to weather and climate data through various platforms (FFS, radio). However, there is limited evidence that these data were used to generate forecasts that could reduce the vulnerability of communities to climate risks.

Picture 1: Cowpea variety *(Masandile, Bubebe) trials in eastern Zambia*

All photos: © FAO

Picture 2: Groundnut variety trials, Maize cowpea intercrop, Maize velvet bean intercrop in eastern Zambia

All photos: © FAO

Based on the project experiences over the course of three years of demonstrations, the table (Table 1) outlines key observed and discussed (during field days, FFS learning sessions and annual results dissemination meetings, mid-term review meetings) benefits of working in a tripartite (research, extension, and farmers) arrangement through the FFS approach.

Table 1: Benefits and challenges of tripartite networks involving researchers, extension workers, and farmers in the Nyimba and Mambwe districts of Zambia

RESEARCHERS	EXTENSION WORKERS	FARMERS
The Zambia Agriculture Research Institute (ZARI) (Msekera Station) viewed the FFS approach as a sustainable way to improve research capacities and strengthen extension linkages.	Extension workers highly appreciated the FFS approach as one of the methodologies that increases the frequency of contact between farmers and extension workers.	In the FFS, farmers shared experiences, knowledge, and skills. Farmers learnt different technologies through hearing and doing through demos.
Researchers were able to test newly developed practices and products (e.g. agroforestry, new varieties, etc.,) in real farm settings.	Extension workers increased the frequency of their interactions with researchers and farmers, which allowed them to learn and adequately guide the farmers.	Farmers appreciated the group approach to learning using demonstration sites.
Researchers had the opportunity to train extension workers about the development of protocols aimed at facilitating learning.	Extension staff reported that their contacts with ZARI allowed them to learn about decision support tools (e.g. cost-benefit analysis) for the prioritization of climate change adaptation approaches.	Through the FFS, climate information was provided to farmers; this allowed them to make better cropping decisions.
Researchers were able to combine the agronomic performance with the cost-benefit analysis to reach relevant conclusions and recommendations on the best bet CCA practices	Extension staff better understood the rationale behind the layout of different types of demonstrations in a manner that statistical results can also be derived over and above observed differences in technologies.	Farmers improved their understanding of different practices from both the agronomic and socio-economic perspectives through the interactive sessions during the production cycle and annual results dissemination meetings.
Researchers valued FFS (interaction with farmers) as a source of knowledge on various aspects such as indigenous knowledge collection as well as being sources for identifying relevant/area-specific research priorities.	Extension workers were able to directly ask questions to researchers, thus avoiding delays in the flow of feedback on the in-field performance of practices from farmers to researchers.	The implementation of demonstrations by the FFS members helped disseminate the new practices to a wider audience especially during field days.
Researchers were valued by both the extension workers and farmers on various aspects such as variety development, in-depth knowledge of various characteristics and performance, innovative analytical skills among others		In some cases where FFS members cohesion was not strong, there was a risk that demonstration fields would be neglected, as the responsibility for the management of the demonstration trials was left to the lead farmer.
	Improved practices (including the use of new varieties) were implemented in direct collaboration with researchers.	
	Initially, extension workers found the protocols complicated and cumbersome to understand and implement.	

Source: Primary Data, 2020

POLICY OPTIONS

The Ministries of Agriculture of various African countries have been called upon to strengthen the regulatory frameworks for their multi-layered agricultural extension systems and bring coherence to the profusion of climate change adaptation practices.

The Government of Zambia plays the role of regulator of extension services and should therefore also guarantee the quality of the adaptation practices that are promoted.

Multi-stakeholder networks – whereby researchers, extension workers, and farmers collaborate in an FFS setting – could be used to explore which adaptation practices are being used and how they are being implemented and examine their efficiency and suitability to the local context.

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CONTACTS

FAO Representation in Zambia
E-mail: FAO-ZM@fao.org

Office of Innovation
E-mail: OINR-Chief@fao.org

Food and Agriculture Organization of the United Nations

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