RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security

CGIAR CCAFS

Info Note

Problems Faced and Strategies Adopted by Farmers for Adapting to Climate Change in Xai-Xai District, Gaza Province, Mozambique

Findings from a CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) and the Agricultural Research Institute of Mozambique (IIAM) joint-study focused on "Managing Climate Related Risk to Improve Livelihood Resilience and Adaptive Capacity in Agricultural Ecosystems in Southern Africa"

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Key messages

- Farmer with poor access to agricultural information and technologies are vulnerable to climate change
- Post harvesting strategies, including agro-processing, can help farmers to reduce their vulnerability to climate change effects and food insecurity
- Investment in accessible skills training and crop production practices, such as pest and disease management, equips farmers with crucial tools to adapt to climate change

Xai-Xai district

Mozambique is considered one of the countries that will suffer significant negative effects of climate change, such as droughts, floods and cyclones. The district of Xai-Xai, a coastal area at the mouth of the Limpopo river – one of the biggest river in southern Africa - will suffer frequent cyclones and floods due to its geographical location. More important, though, is that, the households that live in the upland are dependent on rain-fed agriculture and will be affected by irregularities of rainfall. As a result, these weather events are expected to affect the majority of the population of the district due to their dependence on climate change-sensitive activities, such as agriculture, livestock and the exploitation of forest resources. In other hand, a large proportion of the farmers in this area also have limited access to information and basic infrastructure essential for climate change adaptation.

In order to enhance the climate change adaptation strategies of the farmers, the Institute of Agricultural Research of Mozambique (IIAM) and the International Centre for Tropical Agriculture (CIAT), on behalf of the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) developed a Project, "*Managing Climate Related Risk to Improve Livelihood Resilience and Adaptive Capacity in Agricultural Ecosystems in Southern Africa*", which was implemented in Xai-Xai and Chicualacuala districts, Gaza province.

*Figure 1. Gaza Province, Mozambique (*Wikipedia)

Research objectives

This research aims to:

- Identify climate-related risks and challenges faced by Xai-Xai households (agriculture, livestock and forest resources);
- Describe their current coping strategies and needs;
- Recommend interventions that meet their needs and improve their livelihood resilience and adaptive capacity to climate variability.

Methodology

The data collection was based on three strategies: (i) household questionnaires; (ii) focus groups discussion with clusters of members of farmers' associations and; (iii) semi-structured interviews targeted at community leaders, leaders of farmers' associations and extension agents

working in the villages studied. In total, 166 households in four villages were surveyed in the district; four focus groups consisting of four to 12 people were organized, and 10 key informants were individually interviewed.

Results

Crop production

Almost all households (99%) have crop production as their activity. The main crops grown are **maize** (which is cropped by 98% of households), **cassava** (90%), **cowpea** (83%), **groundnut** (80%), **sweet potato** (78%), and **vegetables** (57%). Maize, sweet potato and vegetables are grown mainly in the lowlands, along the Limpopo River valley; and cassava, cowpea and groundnut are grown in upland and rainfed areas.

Figure 2: Vegetables grown in Limpopo River valley

The main constraints affecting crop production are related to **poor use of improved agricultural technologies and practices** that could improve production and productivity and minimize the effects of climate change. This research shows that more than 50% of the respondents do not use any improved practice for improving soil fertility, to control pests and diseases in crops and to improve soil moisture conservation. And also they do not plant drought-tolerant varieties of crops.

Due to the poor adoption of improved technologies, Xai-Xai farmers are continuously faced with problems of **low yields and productivity** due to the **shortage and irregularity of rainfall** and the attack by **pests and diseases** of the following main crops: (i) maize (black beetle , armyworm, corn borer, elegant grasshopper, mildew and striped) ; (ii) rice and cowpeas (black beetle); (iii) cabbage (caterpillars and leaf aphid); (iv) tomato and potato (bacterial wilt); (v) Garlic (rust) and; (vi) cassava (elegant grasshopper). They also face post-harvest losses in maize and cowpea due to weevil attacks on stored grains.

The most widely used climate change adaptation strategy is the **seasonal rotation of crop production** between the upland and lowland areas. About 61% of farmers in Xai-Xai have upland and lowland farms. The upland or rainfed farms are used in rainy seasons when the lowlands are usually flooded, and conversely, the lowlands are used mostly in the dry season, to take advantage of water availability.

Other important strategies such as **improving soil fertility** through the use of **organic compost and manure** and improving soil moisture conservation through **mulching** were not adopted because these strategies are labour intensive. The use of pesticides and improved drought-tolerant seed varieties were not widely used due to the lack of financial resources required to acquire these inputs.

Livestock

Around 67% of households rear livestock. The most important livestock raised are poultry (chicken and duck) that are found in 67% of households, goats (47%), cattle (25%) and pig (24%).

Less than 30% of farmers have adopted the **feeding management practices**, such as the production of hay and silage, conservation and the treatment of agricultural waste, and the growing of **drought-tolerant fodder**. There are also few producers (23%) that have constructed **improved accommodation** for their animals. A reasonable number of farmers, around 34% to 75%, use some form of **health management practices** with the assistance of livestock extension workers.

Livestock production in Xai-Xai district is affected by various constraints such as: lack of pasture and parasites (in cattle and goats), diarrhea and scabies diseases (in goats), Newcastle disease (in chickens), viral hepatitis (in ducks), injury (in cattle and goats) and African swine fever (in pigs).

Figure 3: Livestock grazing in upland

The lack of pasture affects cattle and goats and occurs mainly between June and October for those who graze in the uplands, due to drought, and from January to February, for farmers grazing in the lowland, due to flooding. This problem is also affected by a reduction in grazing areas due to the increasing number of livestock farmers in the district, the extension of the residential area and the expansion of agricultural lands with the implementation of Chinese Uambau Project.

Production of fruit trees

In Xai-Xai district there are numerous varieties of fruit trees. Around 97% of households have mango trees, 77% have orange trees, 74 % produce avocado, 69% have banana trees and 68% have planted *mafurreira (Trichilia emetica)*. Fruit tree production is constrained by **pests and diseases**, including aphids, mealybugs and fruit flies (in citrus trees) and powdery mildew (in cashew trees).

Management of forest resources

A substantial part of the forest lands in Xai-Xai has been taken over by expanding residential and agricultural areas. Consequently, there are limited forest resources to exploit and very few families exploit these resources. For example, only 13% of households collect and sell wild fruits and other non-timber products; less than 6% sell firewood and construction material and only 0.6 % are engaged in the production and selling of charcoal.

The main native fruits used by local population are canhu ([*sclerocarya birrea* (A. Rich), Hochst. Sbsp. Caffra]), mapfilwa (*Vangueria infausta* Burch.), tindziva (*Dialium schlechteri* Harms), nheva (*Manilkara discolor* (Sond.) J.H. Hemsl.), ata silvestre (*Annona senegalensis* Pers.), massala (*Strychnos spinosa* Lam.) and tâmaras (*Phoenix reclinata* Jacq.).

This research found that 74% of the households have **poor knowledge and skills** in matters of management of forest resources, including the collection and treatment of native species seeds, the establishment and management of nurseries and the management of forest trees.

Processing and storage of agricultural products

In general, the level of knowledge and skills of Xai-Xai farmers, in regard to agricultural products processing is poor. More than 80% of the households surveyed have no knowledge of how to process fruits, vegetables and orange-fleshed sweet potato, into various products with better storability. For products of animal origin, about 75% of the households have no knowledge of the available processing techniques.

The few farmers with some level of knowledge of processing are limited to the preparation of juices, biscuits and cakes from orange-fleshed sweet potato. In addition, there are a few other farmers with any knowledge of cassava processing in gari (locally known as tapioca).

Consequently, the large seasonal losses of mango and orange fruits in Xai-Xai district have been attributed mainly – in addition to other factors – to the poor knowledge of fruit processing; because farming households cannot consume the entire production but also do not have the capacity to conserve and/or to commercialize the fruits at the peak of ripening.

The preservation of maize and cowpea, the two most important crops for food and family income in the district, is one of the main concerns for producers. Products stored suffer attack from weevils, reducing the availability of maize and cowpea, especially during the food shortage period of the year.

Conclusion and policy implications

Most households from Xai-Xai district are vulnerable to climate change, because of their dependence on climate-sensitive activities, such as subsistence agriculture, livestock production and the exploitation of forest resources. Moreover, most farmers have poor knowledge and limited information about certain agricultural technologies and practices that may help them to cope with climate change events such as droughts and floods that are becoming increasingly frequent. Also, due to their financial capabilities, there is a low probability that they will be able to adopt technologies that demand high financial resources.

Therefore, it is necessary to **invest in their training** in crop production practices, especially **low cost pests and diseases management practices** and low cost **soil fertility practices** to equip these farmers with the required knowledge and skills to adapt to climate change. These practices must, however, not be too labor-intensive in order to not discourage their adoption.

It is also important to **scale up the use of drought-tolerant seed varieties** and the use of low cost **improved storage practices** for maize and cowpea. To successfully scale up the adoption of these technologies we recommend the use of value chain approach and active involvement of the farmers during the dissemination process.

In livestock production, the dissemination of knowledge of the methods of hay and silage production, conservation and treatment of agricultural waste and growing of drought-tolerant fodder for feeding cattle and goats in the dry season is highly recommended.

Further Reading

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This brief summarizes the findings of a research paper entitled "Problems Faced and Strategies Adopted by Farmers for Adapting to Climate Change in Xai-Xai District, Gaza Province" undertaken by researcher from the Agricultural Research Institute of Mozambique (IIAM) under a project called "Managing Climate Related Risk to Improve Livelihood Resilience and Adaptive Capacity in Agricultural Ecosystems in Southern Africa", for the districts of Xai-Xai and Chicualacuala, Gaza province, Mozambique.

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