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Climate Change Awareness and Smallholder-oriented Constraints and Opportunities in the Upper Rift Valley in Ethiopia

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Introduction

Ethiopia is one of the countries most vulnerable to the impacts of climate variability and change on agriculture (KASSIE et al., 2014, p. 58). Ethiopia's mean annual temperature is showing a significant warming trend leading to increasing rates of evapotranspiration and crop water requirements, further adding to the already frequent water stress of crops (KASSIE et al., 2014). Future projections show that the mean maximum temperature will increase by 2 - 2.3°C until 2030 and by 2.2 - 2.7°C until 2050, while the mean minimum temperature will rise by 0.8 - 0.9°C until 2030 and 1.4 - 1.7°C until 2050, all in conjunction with a surge of hot days and nights and a decrease of cold days and nights (HADGU et al., 2015). Between 1977 and 2007 rainy seasons varied drastically from 76 to 239 days. While the decrease of total rainfall is not significant, its variability is. Growing seasons are increasingly less predictable and tend to become shorter. As the number of rainy days decreases, dry spells become more severe, impacting crop moisture stress in the growing season. A higher intensity of rainfall with less rainy days but constant amount of precipitation can lead to erosion and runoff of soil and nutrients (KASSIE et al., 2014). The current drought is worsened by El Nino, threatening wide parts of the country with famine (MCGRATH, 2015). Official reports of December 2015 stated that 10.2 million people were in need of emergency food assistance (GOVERNMENT OF ETHIOPIA, 2015).

All these developments ask for a close examination of how well the country's most affected inhabitants, small-scale farmers, are aware of the phenomenon climate change and what countermeasures are taken. Additionally, it is useful to examine the governmental bodies´ dealing with the effects and challenges of climate change.

This paper is based on a study project for master students at the Humboldt University in Berlin which took place in 2015. The project was organized by the ValueSec Project (Value Chain Development for Food Security in the Context of Climate Change), initiated by the Department of Horticultural Economics at the Humboldt-Universität with funding from the Heinrich-Böll Foundation. The ValueSec Project is a collaboration between Karatina University and Nairobi University in Kenya, Haramaya University in Ethiopia and Humboldt-Universität zu Berlin.

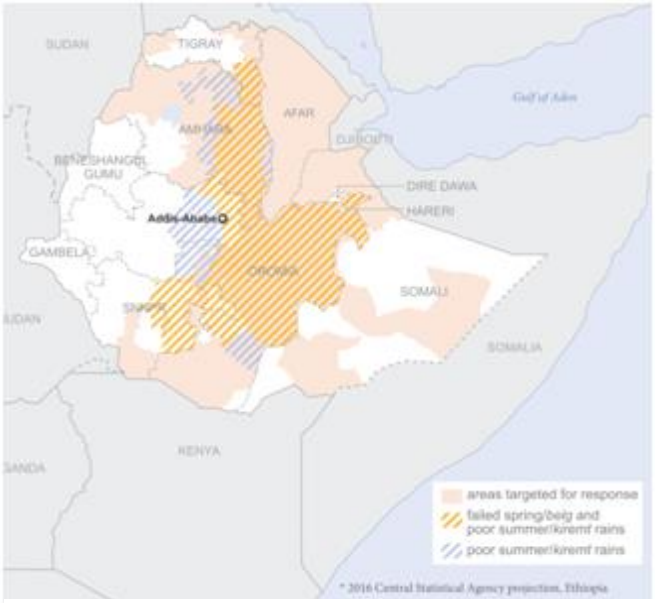

Figure 1 (GOVERNMENT OF ETHIOPIA, 2015)

Methodology

After intensive literature research, a field study applying various interview methods was conducted in the Rift Valley in Ethiopia during September 2015. Students from Haramaya University assisted the interview process. The study area is located about 90 km south of Addis Ababa in the Meki-Ziway area, in the Rift valley of Oromia region. The area has some large surface water bodies, used for irrigation both by small-scale farmers and large commercial farmers, allowing the establishment of intensive horticultural agriculture production.

Representatives of the different stakeholders along the Vegetable value chain have been interviewed with a focus on awareness of climate change, knowledge and employment of mitigation strategies, adaptation measures and available technologies. The stakeholders comprise three groups: horticultural producers, market linkage actors, and as the third group public authorities, and legislative bodies. For every stakeholder in each cluster, semi-structured interviews and non-participatory observations were carried out. For the purpose of this study project the semi-structured interview seemed the most appropriate approach as it combines the possibility of theory construction and the verification of hypotheses at the same time (RYAN et al., 2009, ROCCO, 2003, WESSEL, 1996).

Results and Discussion

Findings fall in line with the current literature, ascribing Ethiopia's yield gap to low-technology production systems, as well as inadequate water management, unsustainable farming techniques, structural problems and poverty as well as the Ethiopian land tenure system (MESHESHA et al., 2012, AWULACHEW AND AYANA, 2011). These issues also represent the main obstacles preventing adaptation to changing climatic conditions in the study area.

The interviewed farmers unanimously stated that the year 2015 was one of the driest years they lived through. The lack of rain lead to drastically reduced yields, especially for farmers without or only reduced access to irrigation. Another effect of climate change is the appearance of new pests, Tomato Leafminer (tuta absoluta) is gaining importance. This was confirmed by farmers and can directly be associated with changing weather conditions. The use of pesticides is the only mitigation solution available, often over-applied and with the absence of consumer safety concerns. The Tomato Leafminer was also discussed by scientists of the International Livestock Research Institute (ILRI), who stated that it has devastating effects on harvests but indirectly also on soil and water bodies as uneducated farmers tend to overuse pest control chemicals in fear of losing income due to failed harvests, although appropriate seeds, adapted crop cycles, knowledge of right application of agro-chemicals would be far more advisable. Government employed Development Agents (DAs) are expected to cover this issue, but their effectiveness is questionable. The education of DAs is mostly inadequate to train farmers in appropriate mitigation techniques. Thus, awareness

of farmers concerning understanding of seed varieties, adapted to local conditions is very low to non-existent.

Overuse of irrigation has visible effects on soil erosion, especially on sloping fields. Soil conservation strategies, like contour farming, strip cropping, drainages, residue management and the like where practically not existent and never heard of by farmers when asked about them. Incentives for soil erosion conservation should be created and soil protection measures should be implemented. It has been proven in several studies that organic farming practices enable to maintain soil productivity in the event of drought (FREYER et al., 2015).

Irrigation based on surface water bodies is employed as the most important mitigation strategy in the study area. While Ethiopia's surface water resource potential is remarkable, the hydrologic balance of water influx and take-off is not a major concern to users and government sectors (BERHANU et al., 2014). Large parts of the country are very well suited for irrigation – human, land and water resources are available. However, the lack of institutional capacity, private sector involvement and also food insecurity and therefore the dilemma of cost recovery by growing food crops instead of cash crops, represent obstacles for the development of functioning irrigation schemes (YAMI, 2016, GOVEREH AND JAYNE, 1999). The irrigation water use efficiency in smallholder vegetable production in the Meki-Ziway area was estimated at less than 30% (PRISM, 2004: cited in JANSEN et al., 2007). High losses of irrigation water were observed due to leaking tubing, seepage and particularly evaporation. Knowledge and awareness of water use efficiency is uncommon among farmers. Water is perceived to be available ad infinitum and cost free. The introduction of monitoring systems for groundwater drilling, the promotion of water harvesting and the elimination of illegal drilling are important open points to be fostered by governmental institutions. There are still some serious knowledge gaps evident in this context and research by local universities is lacking. Focus of scientific studies should be set on water harvesting, watershed management and more efficient irrigation schemes.

In order to adapt to changing weather conditions, the farmers need appropriate information to make informed decisions. They often lack access to modern information distribution channels to receive weather forecasts. Without proper information about weather, other interventions such as improved seed varieties might be inefficient. Most important when improving climate information services, is decentralization to be closer to users' needs.

The government's strategy to improve farmers' conditions focuses strongly on intensification with respect to inputs like fertilizer and pest control. Further, the irrigated area shall be extended. These concerted actions lack locally and individually adapted solutions and the official extension service is far from being able to handle the formidable task of educating farmers in this broad range of problems. Furthermore, the Ethiopian land tenure system is based on lease and not on ownership and water can be extracted for free by small and semi-commercial farmers. This creates wrong incentives. Farmers are not encouraged to cultivate their land sustainably as they have no security that the land they are currently holding will still be theirs in the years to come. The government should consider a realignment of their priorities with respect to environment policies.

Conclusion

The effects of climate change are manifold and have a profound impact on the livelihood of small scale producers. The prevailing conditions in the country impede the development and employment of efficient and sustainable adaptation strategies. Small-scale farmers are less equipped to deal with

these threats than semi-commercial or commercial producers. The countermeasures by governmental bodies lack effectiveness and reach. Knowledge gaps, especially concerning watershed management must be closed. Furthermore, a definition and the reinforcement of maximum extraction rates according to the recharge potential is needed. It is unlikely to ever be able to control or prevent hydrologic variability; nevertheless there are ways to combat its effects. Fostering the implementation of effective irrigation systems is one possibility, as it lessens susceptibility in dry or drought years and reduces farmers' dependency on unreliable weather. To increase water use efficiency, a shift from furrow irrigation to drip irrigation is highly recommended. Nevertheless, as long as water resources are perceived to be infinite irrigation will be seen as the sole mitigation strategy, prohibiting urgently needed innovation.

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