Climate Change and Uncertainty in Local Agriculture in Kenya: Do farmers Have Options?

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Introduction

Climate change presents an unprecedented challenge for the 21st Century. Most developing country populations are primarily dependent on agriculture and natural resources for their livelihoods, and are also the most vulnerable to the ramifications of climate change, because of their low adaptive capacity. Most research on impacts of climate change has focused on the global and regional level. Yet, in Sub-Saharan Africa, effects of climate change are most felt at the local level; where small-holder agriculture is the main form of livelihood for over 85% of the region's population. Changes in temperature and precipitation pose a challenge to agricultural production (Hatfield, Boote et al. 2011). Additionally, uncertainties are bottlenecks in understanding the relationship between climate and natural or human systems (Gosling, Warren et al. 2011). So, how can agriculture deal with an uncertain future under changing climate regimes? This study draws attention to the plight of small-holders in Laikipia District of Kenya in the face of uncertain climate patterns. We examine local adaptations in agriculture and challenges faced. We scrutinize options for which local smallholder agriculture can be strengthened to enhance their adaptive capacity.

Photo 1: FGDs meeting with farmers, Umande Demu ya Samaki (Photo taken by David Kimathi, January, 2011)

Methodology

Data was collected between October 2010 to May 2011 using qualitative and quantitative methods in sub locations of Umande and Muhonia. Qualitative data included 20 focus group discussions, 36 key informants from both sites. Quantitative data comprised 206 open and closed ended questions from both sites. Quantitative data was analysed by SPSS software while qualitative data was analysed by Atlas-ti.

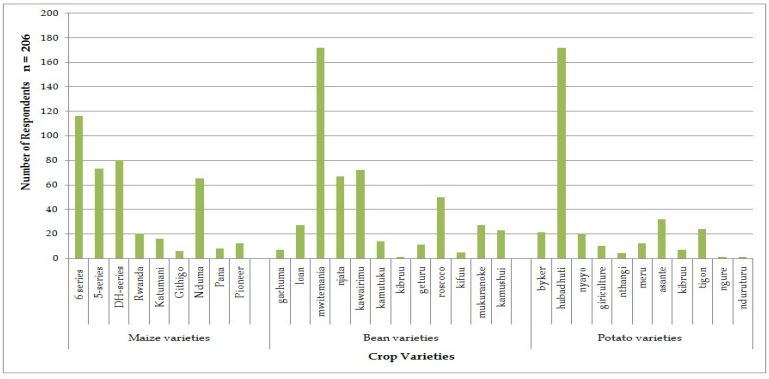
Results and Discussion

Farmers experience declining agricultural production attributed to unpredictable, sometimes incessant rains, low rainfall, coupled with high temperatures, and occurrence of extreme climatic events including hailstorms, frost, extreme sunshine events, droughts). This has led to an increasing level of uncertainty amongst farmers in their decision making processes particularly in farming. Farmers now juggle with mixing long series and short series crops on their farms as was alluded in informal interviews, focus group discussions (FGDs) and key informants interviews(KI):

'We plant maize, beans and potatoes, we plant and mix both the long and short season crops, We mix because of the rains, it rains sometimes and sometimes it doesn't rain, when we have long rains, we harvest the long season varieties and short season varieties with little rains' (selected Key informants, Muhonia and Umande, 2011).

These results concur with analysis from questionnaire interviews of chart 1, shows diversified crop varieties cultivated by farmers concomitantly per season. Six series maize hybrid (611, 614, 613, 627), *Mwitemania** beans and *Hubadhuti** potato varieties dominate in most farms. Beans and potatoes are highly grown on most farms because of their fast maturity of within 2½ - 4 months, unlike maize that takes 4-8 months, depending on variety.

Chart 1: Diversified crop varieties in response to climate related uncertainty



Other adaptations by farmers are categorised as follows:

a) Migration to escape from risks
- Migrating with livestock to other areas with pasture

b) Increase soil water holding capacity to increase chances of crop survival during droughts
- Using improved agricultural practices such as conservation agriculture, planting in trenches and mulching
- Construction of manually dug water pans to store water for use during drought seasons
-Use of shallow oxen/donkey made trenches (instead of hand dug holes) to conserve water
-Hiring land near river to access water for irrigation.

c) Early warning
-Increased use of farmer to farmer knowledge and networks

d) Innovative/Improved Agricultural practices
-Seed preservation through local innovative techniques
-Early planting coupled with planting whenever a spell of rainfall is determined
-Use of certified seeds
-Shifting from crop production to livestock keeping and grass growing for sale during droughts

e) Crop diversification to spread risks
-Diversified, combined use of various hybrid seeds per season to reduce possibility of total crop loss.

Photo 2: Maize crop of varied planting dates

Photo 3: Conservation agriculture with mulch

Photo 4: Rhodes grass farm grown instead of food crops

Photo 5a, b and c: water pan, shallow trenches with sowed seed & irrigation water from the river into trenches (Photos 2, 3, 4 & 5 taken by Sarah Ogalleh, March, 2011)

Uncertainties increase risk to natural systems and human systems (Gosling, Warren et al. 2011). Climate change leads to decline in agricultural productivity and crop yields, compromising millions of people's livelihoods (Ringler 2010). Farmers choice of adaptations certainly expresses their uncertainty in their local agriculture.

Conclusion and Recommendations

Farmers are adapting to climate change and variability with their meager resources. Support of farmers' adaptations is paramount to increasing their adaptive capacity. Government and development institutions focusing on increasing adaptive capacity of these farmers need to tailor and support the local sustainable adaptations through risk sharing and risk reducing investments for agriculture. This will decrease uncertainties in smallholder agriculture in Kenya and enhance adaptive capacity.

References

Gosling, S. N., R. Warren, et al. (2011). "A review of recent developments in climate change science. Part II: The global-scale impacts of climate change." Progress in Physical Geography **35**(4): 443-464.

Hatfield, J. L., K. J. Boote, et al. (2011). "Climate impacts on agriculture: Implications for crop production." Agronomy Journal **103**(2): 351-370.

Ringler, C. (2010). "Climate Change and Hunger: Africa's Smallholder Farmers Struggle to Adapt." Changement climatique et famine les petits exploitants africains peinent à s'ajuster **9**(3): 16-21.

**Mwitemani and hubadhuti are local names in Kikuyu, the dominant local language in both study sites*

Acknowledgement
The authors gratefully acknowledges the Umande and Muhonia communities, the Austrian Development Agency (OAD), University of Natural Resources and Life Sciences (BOKU), Vienna—Centre for Development Research (CDR), Volkswagen Foundation (VWF)- Centre for Training and Integrated Research in Arid & Semi Arid Lands Development (CETRAD).