



**TEGEMEO INSTITUTE OF AGRICULTURAL
POLICY AND DEVELOPMENT**

PROCEEDINGS OF THE WORKSHOP

ON

CLIMATE CHANGE AND RURAL LIVELIHOODS

HELD AT PANAFRIC HOTEL, NAIROBI ON 17TH DECEMBER, 2014

INTRODUCTION

Climate change is currently one of the major challenges facing the world. This is particularly so for Sub-Saharan Africa, which has minimal capacity to build resilience against its effects. Climate variability and change and associated droughts and floods directly affect agricultural production and food security given that most of the population in Africa lives in the rural areas and relies mainly on rain-fed agriculture for its livelihood.

Tegemeo Institute of Agricultural Policy and Development, Egerton University conducted studies on: (i) effects of climate change on household livelihoods, mainly focusing on agricultural income, fertilizer use and diversification, and (ii) uptake of crop insurance among small-scale farmers in Kenya. Assessment of crop insurance uptake was necessary given the role that it plays in providing a mechanism of sharing and transferring residual weather-related risks that traditional risk management measures are unable to handle. It is in the light of this that the Institute organized a workshop where key findings were presented and discussed.

The workshop drew participants from a wide spectrum of stakeholders including relevant government ministries, mainly Agriculture, Livestock and Fisheries, Representatives from County governments (Machakos, Embu, Laikipia), Kenya Meteorological Services (KMS), Agriculture and Climate Risk Enterprise (ACRE) - Kilimo Salama, the private sector, farmers and farmer groups/organizations, University of Nairobi and Egerton University- Tegemeo Institute, among others.

PROCEEDINGS

SESSION ONE: WELCOME AND INTRODUCTION

The workshop started at 9.00 am, moderated by Dr. Lilian Kirimi who welcomed the participants and opened the meeting with a word of prayer. She then led the participants through a brief session of self-introduction, and later welcomed Dr. Mary Mathenge, the Director at Tegemeo Institute of Agricultural Policy and Development.

Welcoming Remarks and Workshop Objectives

Dr. Mary Mathenge-*Director, Tegemeo Institute*

The Director welcomed the participants and thanked them for honoring the invitation despite the unfavorable time of the year for workshops. She gave apologies for the Deputy Vice Chancellor, Research and Extension, Egerton University who could not make it to the workshop because of unavoidable circumstances. In addition, she acknowledged the good representation from the Ministry of Agriculture, Livestock and Fisheries (MoALF) both from the National and County levels, the Kenya Meteorological Services (KMS), insurance/micro insurance firms/programs, famers, among others. Dr. Mathenge then welcomed Ms. Janet Oyuke from the MOAL&F to give some opening remarks.

Opening Remarks: Ms. Janet Oyuke- *Ministry of Agriculture, Livestock and Fisheries*

Ms. Oyuke expressed her pleasure to attend the workshop and hoped that the meeting would be interactive and enriching. She began by acknowledging that climate change is real and evident, a fact that is also emphasized in the Intergovernmental Panel on Climate Change (IPCC) 5th assessment report. Ms. Oyuke explained that since 1963, temperatures have been rising with current years recording the highest change by about 0.8 degrees Celsius. As a result, the ice is melting, the sea level is rising and eventually affecting agriculture. Crop yields are reducing and marine life is being affected as a result of acidification. Livestock deaths are common and the frequent flooding of the Kano plain and Budalangi is a further evidence of climate change. All this presents a cause for worry since 84% of the country is arid and semi arid and yet more than 64% of rural livelihoods are dependent on agriculture. According to Ms. Oyuke, these challenges can be turned into opportunities by coming up with strategic programs focusing on climate smart

agriculture, e.g. trading in high value cow breeds that can withstand drought, post-harvest handling management, marketing linkages and sustainable land management.

Workshop Objectives: Dr. Mary Mathenge-Director, Tegemeo Institute

Dr. Mathenge gave a brief introduction of Tegemeo Institute and its core mandate. She then explained to the participants the key elements of the project which include; 1) Integrating climate change in overall research agenda through building of the institutional and human capacity to handle current and future climate work and continuous updating of information through surveys; 2) interaction with other partners and stakeholders in the climate change arena; 3) conducting base research on the effects of climate change on agricultural production decisions and livelihood activities; and 4) informing and influencing policy on climate change-related issues.

Dr. Mathenge then enumerated the objectives of the workshop whose main aim was to: 1) present preliminary study results to stakeholders with a view to eliciting debate and feedback from the experts in the area; 2) share findings and lay some background for a wider discussion on critical challenges emanating from climate variability and change and future projections and how to reduce/mitigate against the potential effects; 3) provide a forum for open discussion among scientists, development agencies and policy-makers which is crucial in efforts geared toward making livelihoods more diverse and resilient to effects of climate change; and 4) lay a basis for future policy analysis and outreach/advocacy. The following subtopics were to be discussed: (i) Effects of climate variability and change on agricultural production, and (ii) Uptake of crop insurance: the case of small scale maize farmers in Laikipia and Embu Districts.

SESSION TWO: PRESENTATION I

Chair: Mr. Simon Gathara – Kenya Meteorological Services

Mr. Gathara expressed his joy to have worked with Tegemeo Institute in this particular research. He confirmed his involvement in the climate change research together with his fellow staff members. He acknowledged that research needs a lot of data and appreciated their collaboration with Tegemeo in producing the needed data. He then welcomed Dr. Justus Ochieng to make the first presentation.

Presentation by Dr. Justus Ochieng- Tegemeo Institute

Dr. Ochieng's presentation was entitled: *The Effects of Climate Variability and Change on Agricultural Production: The Case of Small-scale Farmers in Kenya*. The presentation highlighted that climate change has the potential to significantly affect smallholder farmers' livelihoods by either reducing or increasing the farm incomes, and also changing household fertilizer use.

The key findings from the study showed that a rise in annual temperatures and a decrease in rainfall significantly reduced gross revenue from all crops grown and maize when considered separately. Heavy rainfall significantly reduced tea revenue but increased that from maize and all crops. The climate effect on tea production exhibited a strong interaction between rainfall and temperature, and thus tea significantly depends on stable temperatures and consistent rainfall patterns. Predictions on the future effect of climate variability and change also suggest that agriculture will be adversely affected by 2020, 2030 and 2040 but a greater effect is likely to be observed in the Kenyan tea sector.

Further results showed that average fertilizer intensity in the country (148.12kg/ha) is higher than 50kg/ha targeted by African heads of state by 2015. However, the intensity varies across the zones with the lowest rate of 3.2kg/ha in Coastal lowlands. Between 2000 and 2009, rainfall has been increasing but with a sharp decline in 2010. The average temperature has been steady at 20.7⁰C with Coastal regions experiencing the highest of 26.7⁰C. Also findings from econometric analysis suggested that climate variability and change significantly affect farmers' decisions to invest in fertilizer. As temperature increases, farmers use less fertilizer per hectare but apply more as rainfall increases. According to Dr. Ochieng', although fertilizer intensity continues to increase, higher amounts release greenhouse gases. This implies that it is necessary for farmers to pursue an integrated approach comprising of adaptation strategies such as water management, efficient land use and afforestation, which can reduce the extreme effects of climate change in the country. It is also important to consolidate and implement policies particularly those focusing on climate variability and change to prevent further destruction of natural environment and enhance uptake of other strategies like crop and livestock insurance.

From the study it was evident that tea as the main foreign exchange earner in Kenya will be adversely affected by climate variability and change if nothing is done. Thus, there is need to

rethink about the likely harmful effect of climate change in the future and integrate it into agricultural and environmental policy formulation processes. In addition, given that human activities are the major drivers of climate change, it is necessary to invest in adaptation measures at national, county and farm level especially in tea growing regions as a way of building farmers' resilience.

Discussion

Following the presentation, the session chair noted that it was evident that climate change and variability was impacting on agriculture. Weather has other elements such as radiation and evapotranspiration that contribute to effects of climate change and variability on production. For instance, due to climate change in form of frost, there are large losses of tea yields. It was evident that crop diversification was essential for adapting to climate variability and change. In addition to the chairperson's comment, a participant suggested that further research be done on the effects of increased emissions as a result of increased temperatures.

One participant explained that when temperatures increase evaporation takes place and as a result, 50% of the rainfall is lost, while an additional 10% is lost through runoff. He commented on the need to indicate the effect of the upsurge of crop and livestock pests and diseases as a result of increased temperatures in the analysis. He also suggested if it was possible, the analysis could include some aspects of livestock behavior as a result of climate variability and change. Further, he added that although rainfall patterns promote diversification, the end result is that competition for nutrients occurs among crops leading to low production. He also suggested including the cost of fertilizer in the study. Finally, he said that the effect of frost may cause farmers to opt for other crops whether profitable or not.

In response to these comments, Dr. Ochieng confirmed that further research on the effects of climate variability and change on livestock could be considered. He also added that crop diversification could only be applied by farmers up to a certain extent beyond which the farmer will not benefit. He noted that the analysis will include the cost of fertilizer. Dr. Kirimi emphasized that although the cost of fertilizer was not included in this study, other studies conducted by the Institute had shown that most small-scale farmers do not use adequate fertilizer because of the high costs incurred.

A participant also wanted to know if Tegemeo Institute could participate in contributing towards policy development in the Ministry. He added that the climate change bill was going through the third reading in parliament and also a number of policies among them, agriculture policy, tea policy, soil fertility policy and climate change policy were being developed at the MoALF. Another participant also suggested inclusion of other parameters in the model since some variables like quantity of fertilizer used could be misleading. He suggested including fertilizer use efficiency since quantity used alone may not clearly relate to yields, and hence may give misleading information. In addition, he suggested that policy researchers should remap the Agro-Ecological Zones since rainfall and temperatures are constantly changing, unlike altitude. There was also a suggestion from the participants to do a follow up of the emerging diseases especially in maize and whether this could have had an effect in the results of the study.

In response, Dr. Ochieng' said that policy briefs will be prepared and circulated. He added that the MoALF was free to invite Tegemeo to participate in the policy formulation meetings. He said that it was important to see how farmers react to climate variability and change so as to help develop efficient mitigation strategies. He clarified that the study acknowledged the changes in temperatures and rainfall and hence used agro-regional zones as opposed to agro-ecological zones. The Director also emphasized that Tegemeo will appreciate to be engaged in the climate change formulation team at the MoALF. She added that analysis of this data is very complex and that the complexity of all crop requirements may not have been fully captured but the Institute was consulting experts from different fields to help in fine tuning the hard science. In the case of emerging crop and livestock pests and diseases, Dr. Mathenge said that there was no data on how to control for such emerging issues but the Institute tries to use all the available data to account for many factors so as to obtain better results.

SESSION THREE: PRESENTATION II

Chair: Dr. Kinama- *University of Nairobi*

Dr. Kinama introduced the session by noting that farmers were increasingly taking up agriculture as a business and not a hobby. However, farmers change with changing situations. He added that it was imperative for farmers to assess their potential risks and adopt a number of mitigation strategies to minimize the risks. According to him, the results of the study indicate that insurance is complex and not well known to farmers hence the low uptake. It was evident that insurance is

taken by farmers though with suspicion, there is also lack of capacity building and awareness. He commented Tegemeo Institute for their initiative to the start the research on crop insurance.

Presentation by Mr. Eric Mukundi – *Tegemeo Institute*

Mr. Mukundi's presentation was titled: *Uptake of crop insurance: the case of small scale maize farmers in Laikipia and Embu districts*. From his presentation, he emphasized that crop insurance is an important risk management strategy to cushion farmers from increasing crop losses resulting from weather related risks and other causes such as pests and diseases, and destruction by wild animals, among others. The presentation outlined the key important risk factors that affect crop production and these include drought, pest and diseases, excessive rainfall and frost. Other causes of crop loss especially among maize producers were poor seed germination rate, theft, destruction by wild animals and hailstones. The presentation revealed that the resultant crop losses from the major risk factors have been increasing overtime and this is believed to be a key source of destabilization of households' disposable incomes.

The major finding with respect to the uptake of crop insurance showed that uptake was very low and declining, and the insurance concept was not well understood by farmers. Farmers cited reasons for non-uptake as lack of understanding of how insurance works, non-availability of insurance services and high cost of insurance. On the other hand, reasons for dropping out of insurance program include non-compensation, and that insurance products and services did not meet farmers' expectations. Only 5% of farmers were relying on crop insurance as a coping mechanism since the insured maize crop contributed less than 1% of the total household income needs. He also noted that uptake of crop insurance did not have any influence on producer decisions such as input use and crop and income diversification. Despite low uptake of crop insurance, the presentation showed that training on crop insurance, increasing the number of weather stations and ownership of savings account were integral factors that could enhance its uptake. The presentation stressed the need to educate farmers on the principles of crop insurance and different products that exist. Similarly, designing of crop insurance products should consider the social economic conditions of different households and cover multiple crops to enable farmers to make preferred choices. For this study, the target crop, maize, contributed less than 1% to total household income and it's likely that farmers would have preferred to insure a

different crop that would contribute more to their income portfolio. Therefore, selection of target crop enterprises should involve all stakeholders to enhance insurance uptake.

Discussion

A participant from Laikipia County explained the requirements they were supposed to fulfill to take up insurance. Among them were that farmers were expected to have a minimum of 1 acre of land, buy specific variety of maize (Duma) and also plant that specific variety in the whole farm. They were also expected to do conservation agriculture. They bought maize seed over and above the market price of seed and there was no follow-up. There was no other maize variety that was supposed to be insured. This was limiting farmers to a larger extent since farmers have different tastes and preferences with regard to maize varieties. He said that farmers would wish to take up a better kind of insurance given the opportunity. In response, Mr. Mukundi commented that there were two products offered: Kilimo salama and Kilimo salama plus but farmers only took Kilimo salama because it was cheaper.

A participant also commented that the location of the weather station from their homes was frustrating because of the variability of rainfall, and suggested that a better way forward in estimating the effect of risk was required. She also noted that the compensation could go as low as Kshs.50, which was not encouraging to farmers at all. A participant also wanted to know if the insurance companies had the capacity to compensate all their clients at once to the level of the clients' expectations, if there was insufficient rainfall.

A trainer of Kilimo Salama indicated that the total premium was 10% whereby the farmers paid 5% and the remaining 5% was paid by the farm input companies. However, she argued that the compensation paid was lower than the farmers' expectations, since most of them expected to make profit. She added that it was, therefore, important to consider the expectations of the farmers before implementation of such services. In addition, a participant wanted to know if it was possible to improve the fertilizer content to enhance growth of crops instead of increasing the quantity used. Another participant also wanted to know if it was possible to get a maize variety that could take the shortest time possible to mature (possibly a month!) so as to minimize risks. In response, it was noted that in terms of fertilizer use, soil sampling and testing could be done to establish the soil acidity, and so help point out the right fertilizers required, with the

correct balance of nutrients. Also, it was reported that researchers have released a number of short-maturing varieties of maize that can help in areas where farmers receive minimal rainfall.

A participant appreciated the use of weather based index insurance and wanted to know if the study had considered any other index apart from the weather based index, which is so far perceived to have a variety of complexities. In particular, he mentioned the area yield based index. In response, Mr. Mukundi commented that a lot of working was going on to establish an insurance component that can work well with farmers. In addition, lots of studies have been done on area yield index, which is based on the expected yields, but it has a major limitation since it requires a lot of historical yield and area data.

According to one participant, risk management approaches need to be sustainable, and noted that conservation agriculture is not sustainable. He argued that land preparation is a major component in the production process and lower yields could result if it done using an unfamiliar method, which is not dependable. It was also noted that insurance is a business and hence, companies would want to avoid losses, making it difficult to implement insurance for subsistence farming, which is deemed to be risky. It was suggested that government should re-insure the insurance companies to help fully compensate farmers.

SESSION FOUR: WAY FORWARD AND CLOSING REMARKS

Dr. Lilian Kirimi-Tegemeo Institute

Summary of the presentations

1. Climate variability and change

- Climate variability and change have an effect on agricultural production and it was necessary to capture issues left out in the analysis to help refine the results.
- Climate change cannot be assumed and insurance alone cannot mitigate the losses experienced by farmers. This should be coupled with other farm management strategies.
- Farmers are using diversification as a strategy to mitigate climate change. This is not sufficient since it can only be used up to a certain optimum level, and hence the need to combine strategies.

- To achieve high yields, the focus should not be on just the quantity of fertilizer used but on fertilizer use efficiency.
- It is, therefore, important that an integrated approach should be used to mitigate the effects of climate variability and change.

2. Crop Insurance

- Insurance uptake is low and issues of insurance are seen as complex and not very well understood by farmers.
- However, crop insurance is needed as one of the risk management approaches.
- Training- knowledge and dissemination of information- are critical in enhancing uptake.
- Design of insurance products is important in enhancing uptake of insurance, and hence the following need to be considered in design:
 - How the design should address the issue of basis risk
 - Targeting of crop and seed varieties
 - Specific requirements such as conservation agriculture
 - Location of the weather station and access to meteorological data
 - Participation of other stakeholders e.g. farmers, Ministry of Agriculture, Livestock and Fisheries, in the design of the product
 - In targeting crops, we should target crops that contribute a reasonable proportion to household income.

Way forward and Closing remarks

In closing the following recommendations were suggested by the participants:

1. Collaboration and partnership with all stakeholders is necessary in research and dissemination of results.
2. Adoption of climate smart agriculture and capacity building for conservation agriculture. There is need to enlighten extension workers to understand conservation agriculture and how it works before tagging it to insurance.
3. Targeting high value crops.
4. Water harvesting needs to be encouraged.

5. Diversification of activities at the farm level needs to incorporate livestock, including emerging livestock.
6. Consistency of communication and early warning information needs to get to farmers in a timely manner.
7. There is need to educate farmers on the content of different insurance products and the expectations before take up.
8. Products should also be designed in a manner that allows crop preferences by the farmers and not limit them, and this should be consultative.
9. Soil testing services should be made available to farmers at an affordable cost.
10. There should be an enforcement strategy to ensure implementation of policies that will enhance to build farmer resilience to climate risks.

Dr. Kirimi concluded by thanking the participants and noting that workshop proceedings and policy briefs on the topics discussed would be prepared and shared with the relevant stakeholders.

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