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Research Application Summary

Assessing the impact of climate change adaptation on agriculture production in eastern Uganda

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Abstract

The objective of the study is to assess the costs and benefits of the key gendered climate change adaptation strategies used by farmers in Mbale and Soroti districts, two diverse areas in eastern Uganda and investigate their potential based on economic, social and environmental sustainability. A Trade Off Analysis (TOA) model will be used to analyse the relationship between the net returns from using an adaptation strategy and the effect on environment. Trade off curves will be generated to show the opportunity cost of choosing one strategy over another under similar environment. The results from this study will reinforce local knowledge on adaptation and importance of gender considerations in climate change adaptation policy formulation.

Key words: Adaptation, climate change, environment, gender, Uganda

Résumé

L'objectif de l'étude est d'évaluer les coûts et les avantages des stratégies clés d'adaptation au changement climatique en rapport avec le genre, utilisées par les agriculteurs de deux régions différentes dans l'est de l'Ouganda Mbale et Soroti, et d'étudier leur potentiel sur la durabilité économique, sociale et environnementale. Un modèle d'analyse de compromis (TOA) sera utilisé pour analyser la relation entre le rendement net en utilisant une stratégie d'adaptation et l'effet sur l'environnement. Les courbes de réduction seront générées pour montrer le coût d'opportunité de choisir une stratégie plutôt qu'une autre dans un environnement similaire. Les résultats de cette étude permettront de renforcer les connaissances locales sur l'adaptation et l'importance des considérations du genre dans

la formulation de politique d'adaptation au changement climatique.

Mots clés: Adaptation, changement climatique, environnement, genre, Ouganda

Background

Climate change has significant impact on crop and animal production in Africa. Higher temperatures affect yields of crops, encouraging weed and pest proliferation. Similarly, increased floods and droughts increase the likelihood of short-run crop failures and long-run production declines in both crops and animals (IFPRI, 2009) and threaten global food security. In Uganda, recent reports (MWLE, 2007) have shown that the frequency of droughts increased from one per decade to over seven experienced in the last decade alone. Erratic swings in seasons have caused an increase in frequency of food and water shortages in the country, with the worst hit areas being the dry cattle corridor that stretches from the Uganda-Tanzania border to Karamoja region. Death of livestock from lack of water in the corridor has been common and has forced traditional pastoralists to migrate with their herds during hard times to neighbouring districts or game reserves.

Africa's rural poor communities, most of which are heavily dependent on rain fed agriculture face major pre-harvest risks with the changes in climate. Because women are responsible for majority of agricultural activities, women and children are believed to be more vulnerable to the impacts of climate change. Additionally, women in rural Africa are culturally disadvantaged. They have unequal access to resources, gendered division of labour and decision making compared to men (CIDA, 2009; WEDO, 2007). These roles and inequalities also create differences in their vulnerability to climate change and hence their adaptations and adaptive capacity.

This paper describes a study to be conducted in two districts in Eastern Uganda. The objective of the study is to assess the costs and benefits of the key gendered climate change adaptation strategies used by farmers in Mbale and Soroti to enhance sustainable agricultural productivity. The study will identify the key climate change adaptation strategies in the community of male and female farmers in the community; assess the net returns associated with the strategies in the different farming systems; investigate the sustainability of potential strategies

based on economic, social and environmental criteria; and generate policy options or recommendations.

Literature Summary

Agriculture in Sub-Saharan Africa is particularly vulnerable to the impacts of climate change because it is rain-fed. Mixed rain-fed and highland perennial systems in the Great lakes region and in other parts of East Africa have been severely affected in the past (Thornton *et al*., 2006), in seasonality of rainfall, onset of the rain days and intensity of rainfall. Studies on southern African agricultural impacts indicate that crop net revenues will likely fall by as much as 90% by 2100, with small scale farmers being most severely affected. However, there is possibility that adaptation could reduce these effects (Benhin, 2006). *Adaptation* is adoption of practices that are relatively less vulnerable under the changed climate (Antle, 2008). Adaptation to climate change refers to adjustments in natural, or human systems in response to actual or expected climatic stimuli or their effects which moderates harm or exploits beneficial opportunities (IPCC, 2001; Hepworth and Goulden, 2008). Promoting adaptation is believed to be one of the key policy options for reducing the negative impacts of climate change (Adger, 2003; Daressa *et al*., 2009). If properly implemented with follow up, this would strengthen resilience of highly vulnerable poor people in developing countries to the impacts of climate change. Adaptation practices reduce loss due to climate change, or increases gains and these need to be explored in context of environmental sustainability.

While the exposure to climate change and variability may be the same for men and women in any given location, the sensitivity and adaptive capacity will depend on needs, challenges and resources they can access. These differences in vulnerability are brought about by their difference in roles and contributions to food security, health and livelihoods (GCARD, 2010). Women comprise the majority of the rural farming population (over 70%) and are mainly engaged in food crop production while men mostly engage in cash crops (MFPED, 2005; CIDA, 2009) and other non agricultural livelihood options which may or may not be natural resource based. Given this important role in agricultural production, focusing on the unique challenges women face and resources they lack is key to increasing overall agricultural productivity (GCARD, 2010). More gender differential impacts are attributed to existing inequalities such as unequal access to resources, gendered divisions of labour and decision-making power which may affect the vulnerability

and adaptive capacity of men and women (WEDO, 2007).Therefore these adaptations are both culture and location specific.

With regard to adaptation, common approaches used by rural African farmers include changing planting dates, use of new crop and livestock species that are better adapted, changing crop varieties, irrigation, crop diversification and use of mixed crop and livestock systems; changing grazing or cultivated land, supplementing livestock feed, water harvesting, mulching, manure application, management of water resources and tree planting (ROU, 2007; Daressa *et al*., 2009; Gbetibouo *et al*., 2009; Majaliwa *et al*, 2009). These adaptation strategies are practiced to varying extents by men and women but this aspect has not been adequately addressed by empirical research.

Study Description

The study will be conducted in two districts of eastern Uganda, Mbale and Soroti. However, much as these two districts are close to one another, they represent different climatic patterns, farming systems and Agro-Eco zones, which provides a good basis for comparison. Mbale is within the rangelands AgEco zone,with the medium Altitude intensive Banana Coffee system. Soroti, on the other hand, is in the Kioga plains AgEco zone, with annual cropping and cattle Teso system (MAAIF, 1999; MAAIF, DSIP, 2010).

The study will determine the impact of gendered climate change adaptation strategies on agricultural production. Initially, a multi-stakeholder workshop will be conducted in each district to establish key gender differentiated adaptation strategies, the key enterprise and farming systems. Two sub counties in each district will be purposively selected based on agreed criteria. From each sub-county 50 households will be randomly selected using a sampling frame provided by the local officials. A household survey using a structured questionnaire will be used to capture the costs and benefits and net returns associated with using an adaptation strategy for a given system or enterprise, and the potential risks of using the strategies as perceived by the farmers. The data set will include total area of production, yield kg/ha, number of animals, prices (sh /kg), costs of inputs (sh/ha,), weights/ha/crop), GPS readings and soil data. The Trade Off Analysis (TOA) model by John Antle (2008) will be used to analyse the dataset in EXCEL. The TOA model is able to assess how agricultural systems respond to changes in external stimuli such as climate change. This analysis is based

on econometric production functions. This model has been used in several impact and choice studies (Brown *et al*.,2002; Stoorvogel *et al*., 2004; AIACC, 2006). Trade off curves generated show opportunity cost of choosing one adaptation strategy over the other under similar environment.

Research Application

The results of this study will address the lack of gender disaggregate data as a constraint to fully integrating gender in policy research (GCARD, 2010). It will thus result in an increase in knowledge of appropriate gendered climate change adaptation strategies. It will also inform policy makers on the importance of gender considerations during the climate change policy formulation process and hence, community adaptations to sustainable development.

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References

Antle, J.M. 2008. Minimum-data analysis of technology adoption and adaptation to climate change. Workshop on Adaptation to Climate Change, Nairobi Sept 2008. Department of Agricultural Economics. Montana State University, USA.

AIACC, 2006. Assessments of Impacts and Adaptations to Climate Change (AIACC).Tradeoff Analysis of Adaptation Strategies for Natural Resources, Water Resources,and Local Institutions in the Philippines. Working Paper 32. The AIACC Project Office, International START Secretariat. 2000 Florida Avenue, NW Washington, DC 20009 USA www.aiaccproject.org

CIDA, 2009.Gender equality and climate change: Why consider gender equality when taking action on climate change? Canadian International Development Agency (CIDA), 200 Promenade du Portage Gatineau, Quebec K1A 0G4.

Daressa, T.T., Hassan, M.R., Ringler, C., Alemu, T. and Yesuf, M. 2009. Determinants of farmers' choice of adaptation methods to climate change in the Nile basin of Ethiopia. EU, Climate Change Brochure.

GCARD, 2010. Addressing gender for inclusive development. GCARD background Paper. Global Conference on Agriculture and Rural Development (GCARD), Montpellier, France 28-31 March 2010.

Gbetibouo, G.A. 2009. Understanding farmers' perceptions and adaptations to climate change and variability. The case of the Limpopo Basin, South Africa. IFPRI Discussion paper

00849. Washington, DC: International Food Policy Research Institute.

Hepworth, N. and Goulden, M. 2008. Climate change in Uganda: Understanding the implications and appraising the response. LTS International, Edinburgh http://www.ltsi.co.uk

IFPRI, 2009. Climate change: Impact on agriculture and costs of adaptation. International Food Policy Research Institute (IFPRI) Washington, D.C .Updated October, 2009.

IPPC, 2007. Climate change and water. Technical papers. Bates, B.C., Kundzewicz, Z.W., Wu, S. and Palutikof J.P. (Eds.).Intergovernmental panel on climate change. IPCC Secretariat, Geneva. 210 pp.

Majaliwa, M., Nkonya, E., Place, F., Pender, J. and Lubega, P. 2009. Case studies of sustainable land management approaches to mitigate and reduce vulnerability to climate change in Sub-Saharan Africa: The case of Uganda.

MAAIF (Ministry of Agriculture, Animal Industry and Fisheries), 1999. Country pasture/forage resource profiles, Ministry of Agriculture, Animal Industry and Fisheries.

MAAIF (Ministry of Agriculture, Animal Industry and Fisheries), 2010. Development strategy and investment plan.

Nhemachena, C. and Hassan, R.M. 2007. Micro-level analysis of farmers' adaptation to climate change in south Africa. IFPRI Discussion paper 714. Washington, DC: International Food Policy Research Institute.

NDWR, 2005. National Directorate of Water Development report 2005. The Water Assessment Programme, UNESCO 2005.

ROU, 2007. Republic of Uganda. National Adaptation Programmes of Action.

Thornton, P., Herrero, M., Freeman, A., Mwai, O., Rege, E., Jones, P. and McDermott, J. 2006. Vulnerability, climate change and livestock – Research opportunities and challenges for poverty alleviation. International Livestock Research Institute (ILRI), Kenya.