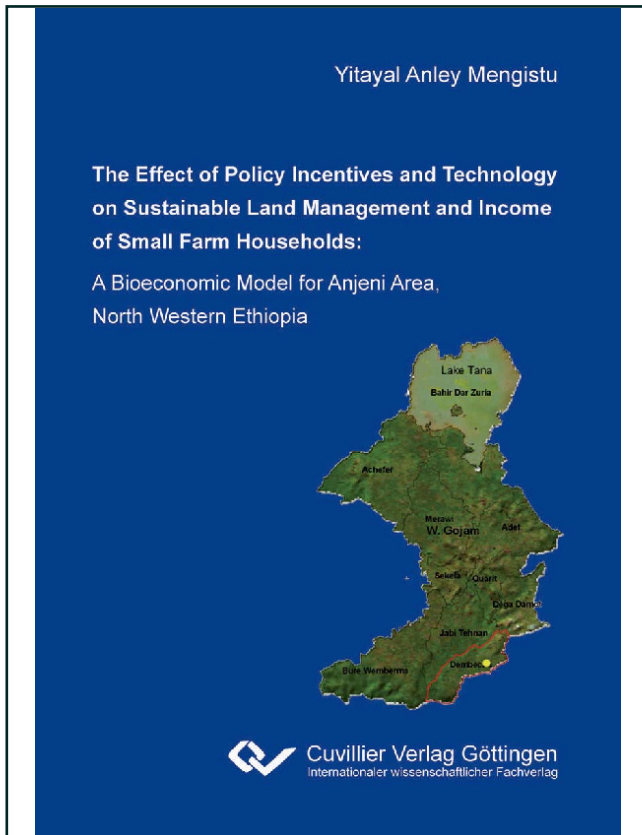




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The effect of policy incentives and technology on sustainable land management and income of small farm households

A bioeconomic model for Anjeni area, North Western Ethiopia



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CHAPTER ONE

INTRODUCTION

1.1 Background

Agriculture is the most important economic sector in Ethiopia. It provides about 44% of the GDP, 80% of the export revenue and 80% of employment opportunity (NBE, 2006). Despite its importance, the sector is characterized by low level of production and productivity and dominated by traditional methods of crop and livestock production systems (Tefera *et al.*, 2000).

One of the major problems threatening the productivity of agricultural land is land degradation in the form of soil erosion and soil nutrient depletion. Land degradation has contributed to declining agricultural productivity, poverty and food insecurity in the high lands of Ethiopia. High rate of population growth on one hand and declining productivity of agricultural land on the other hand are widening the gap between food supply and food demand and threatening the livelihood of small scale subsistent farmers (Gebremedihn and Swinton, 2003).

The introduction and promotion of improved soil and water conservation measures in Ethiopia started in the 1980s and 1990s. However, the process of human-induced land degradation is a long phenomenon and its causes are deeply rooted in its geography, agro-climatic factors, socioeconomic conditions and political history. Limited use of improved soil and water conservation measures, high cost of and limited access to agricultural inputs such as fertilizer and credit to replenish lost nutrients, continuous cropping on slopping and marginal lands and other socio economic conditions deprived the farmers of incentives to improve land management and their livelihood, while misguided development policies, population pressure, fragmented land holdings and insecure land tenure are considered to be the underlying causes of land degradation (Shiferaw and Holden, 1998; Bogale, 2002; Tefera *et al.*, 2000; Gebremedihn and Swinton, 2003).

Deforestation and continuous cropping on sloping and marginal lands without suitable soil and water conservation technologies and amendments to replenish lost nutrients has led to wide spread soil erosion and soil nutrient depletion in most Ethiopian highlands (FAO, 1986; Bogale, 2002). The average rate of soil erosion has been estimated to be about 42 tons per hectare per year on cultivated fields (Hurni, 1988). Serious soil erosion is estimated to have affected 25 percent of the area of the highlands to the extent that they will not be economically productive in the near future (Hans-Joachim *et al.*, 1996).

In an effort to bring about economic growth and agricultural development, various agricultural sector development strategies were designed in the past few decades. In response to the extensive degradation of land resources in the highlands of Ethiopia, the Ministry of Agriculture has undertaken some efforts to mitigate the problem of soil erosion and maintain the productivity of agriculture by introducing and promoting improved soil and water conservation technologies in some degraded area of the highlands including Anjeni area in the north western part of Ethiopia since 1980s.

However, different evaluations of investments in improved soil and water conservation measures by small farm households indicated that despite the efforts made and high expected benefit from soil and water conservation technologies, farmers appear to be sluggish and unresponsive to use them and the adoption and diffusion of soil and water conservation technologies has remained limited or sub-optimal. In addition, it is indicated that recent development and technology interventions were important but insufficient and the level of impact was very low due to economic, policy and institutional constraints (Gebreselassie, 2006; Kassa, 2005; EEA, 2006).

1.2 Problem Statement

The current situation of land degradation, poverty and food insecurity in Ethiopia is so critical that there is a strong need to enhance agricultural production, productivity and food security through appropriate research, development and technological interventions. Soil erosion by water coupled with soil nutrient depletion in the highlands

of Ethiopia might lead to irreversible changes in soil productivity that directly affects the food security situation of small farmers who are extremely dependent on their land and rainfall and cannot support further deterioration of soil productivity. Hence, promoting the use of improved soil and water conservation measures and other policy incentives and technology interventions are crucial to counter land degradation process and to improve the productivity of land and their income.

Due to the continuous dependency on agriculture, land degradation and unfavorable climatic conditions, rural development policies in Ethiopia are challenged by two important issues: a) the need to improve household income to meet the demand for food in the face of growing population and the need to improve or sustain the productivity of land; b) to improve agricultural production and productivity, the agricultural system should depend on conducive policy and technology environments. This highlights the important task of undertaking research to understand and design appropriate policy incentives and technology interventions to understand the potential impacts on sustainable land management, poverty and food security of small farm households.

1.3 Research Questions

The first research question related to the above problem is: “can small farm households in Anjeni area reverse the process of land degradation and improve their income if they are provided with incentives and utilize the full potential of existing technologies”? Second, “why farmers in Anjeni area appear to be so sluggish to use improved soil and water conservation technologies and why the use of soil and water conservation technologies has remained limited or sub-optimal despite the fact that different studies indicated high expected benefit from using soil and water conservation technologies”?

1.4 Research Objectives

The general objective of this study is to analyze the impact of policy incentives and technology interventions on land degradation and income of small farm households and

to assess the factors that influence the use of improved soil and water conservation measures in Anjeni area, North Western Ethiopia. specifically, this study tries to evaluate: a) the Impact of Improved soil and Water conservation technologies; b) the Impact of access to fertilizer credit to finance agricultural inputs; c) the Impact of high yielding crop variety on land quality and income of small farm households in a bioeconomic modeling frame work and d) to identify socioeconomic, institutional and physical factors that influence the use of improved soil and water conservation technologies by small farm households based on an econometric model in order to draw some conclusions and implications for policy that can help promote sustainable land use in the highlands of Ethiopia

1.5 Organization of the Thesis

This thesis contains a total of eight chapters. Chapter one consists of the background, problem statement, research questions and objectives. Chapter two describes the study area, data sources and socioeconomic characteristics of sample households. Chapter three presents an overview of the agriculture sector in Ethiopia and the policy and technology environments. In chapter four, the approaches and methodological issues in bioeconomic modelling are reviewed. The theoretical frameworks and empirical specifications of the bioeconomic model are presented in chapter five. Chapter six presents the baseline model results, the robustness test of the model, sensitivity analysis, policy incentives and technology scenarios. Chapter seven presents an econometric analysis of the factors that influence the use of improved soil and water conservation technologies. Chapter eight presents the summary, conclusions and policy implications and recommends future research areas related to this study.