

***Synopsis:* The Sustainable Land Management Program in the Ethiopian highlands: An evaluation of its impact on crop production**

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RESEARCH OVERVIEW

Agricultural productivity in Ethiopia's highlands, the country's breadbasket, is threatened by severe land degradation. To mitigate ongoing soil erosion and soil nutrient loss, the government of Ethiopia initiated the Sustainable Land Management Program (SLMP). We evaluated the program's impact on the value of agricultural production in select *kebeles* (administrative sub-districts) in which it was implemented using a two-round survey of farm households.¹

We find that participation by farmers in the SLMP is not associated with significant increases in value of production. Two factors may account for this. First, a longer timeframe may be necessary to realize significant benefits from soil and water conservation structures. Second, farm households in both treatment areas (those included in the SLMP) and non-treatment areas increased their use of SLM practices and also achieved greater value of production over the study period.

CONTEXT

Previous studies estimate the national loss of annual agricultural production due to land degradation at 2 to 5 percent of agricultural GDP. To address land degradation in the highlands, the Government of Ethiopia, in collaboration with development partners, launched the SLMP in 2009. The program is currently working in 937 *kebeles* in 177 critical watersheds to scale-up and increase adoption of appropriate SLM technologies, such as stone terraces, soil bunds, and trenches, given specific agroecological conditions within the program *kebeles*. The locations in which the SLMP was implemented were selected to assist communities struggling with soil and water conservation challenges.



Land degradation in Amhara

RESEARCH ACTIVITIES AND APPROACH

We use household survey data from the Ethiopian Watershed Survey collected from the same households in 2010 and 2014 to evaluate the impact of SLMP at household and plot level in nine *kebeles* in the Blue Nile Basin, specifically in Amhara and Oromiya regions. Round 1 of the survey was completed in September 2010 with 1,810 survey sample households. Round 2 was completed in January 2015 and surveyed 1,748 of the same households. The survey focused on watershed management activities, agricultural production inputs and outputs, and various factors affecting these activities and outcomes. Data on crop production, soil type, erosion, and other biophysical characteristics of each plot operated by the surveyed households also were collected.

For the analysis, the survey sample was divided into treatment and control (non-participants in SLMP) groups depending upon whether the household was in a *kebele* in which the SLMP was implemented or not, respectively.

OUTCOMES AND CHALLENGES

Overall, treatment and control households showed an increase in the average value of total crop

¹ For further detail on this study, see ESSP Working Paper 103: <http://ebrary.ifpri.org/cdm/singleitem/collection/p15738coll2/id/131114/rec/4>.

Table 1: Agricultural production inputs and outputs in treated and control kebeles at baseline and at endline

	Households in Treated Kebeles			Households in Control Kebeles		
	2010	2014	sig.	2010	2014	sig.
Value total crop production, prices in 2009 Birr	5,727	7,150	***	6,319	7,649	***
Total land allocated, %						
Cereals	79.1	78.5		79.4	79.3	***
Pulses	5.0	5.2		8.0	7.5	
Oil seeds	3.9	3.4		2.7	2.6	**
Root crops	6.3	5.9		5.6	5.7	
Yield, kg/ha						
Cereals	1,383	1,437		1,251	1,443	***
Pulses	1,091	1,131		1,201	1,053	
Oil seeds	502	724		565	520	
Root crops	4,601	7,956	***	5,503	7,514	**
Input use and SLM investments, % of households						
Fertilizer use	80.2	86.4	***	72.0	85.8	***
Improved seed	29.7	58.1	***	20.6	52.1	***
Any SLM structure	72.9	80.4		64.4	71.8	
Irrigation	1.2	1.9		1.0	1.0	
Stone terrace	23.0	32.6	***	22.9	29.4	***
Soil bund	45.9	52.0	***	21.3	43.0	***
Check dam	0.1	2.2	***	0.3	1.5	***
Trenches	0.9	8.2	***	0.1	10.3	***
Trees planted	0.7	6.6	***	0.9	3.8	***
Others	4.9	12.0	***	2.1	8.0	***

Meher and permanent crops only. The significance ("sig.") columns present statistical results from t-tests evaluating differences in means between the baseline (2010) and endline (2014) surveys for treated and control households, respectively. *, **, and *** are statistical significance levels at 10, 5, and 1 percent, respectively; Source: Authors' calculations, Ethiopia Watersheds Survey (2010, 2014).

production in the primary harvest (*meher*) season between 2009 and 2014 (Table 1). Total value of production increased by 25 and 21 percent in households located in treatment and control *kebeles*, respectively. The share of households, regardless of whether the household was a participant in the SLMP, that reported at least one SLM investment on at least one plot of land, increased significantly from 66 to 75 percent. Specific investments in SLM structures in both groups increased across all SLM structure types, except for irrigation. This suggests that spillover effects from the SLMP may be present.

Regardless of a household's exposure to the program, treatment households did not show a statistically significant increase in the value of their crop production compared to control households. These results support previous findings that improvements in agricultural productivity via investments in soil and water conservation structures are achievable only through investments in maintenance of SLM structures over many years.

IMPACT ON POLICY AND RECOMMENDATIONS

Although this study finds that the SLMP had no significant impact on the value of agricultural production compared to control areas over the five-year period of study, these data suggest that farmers across the highlands are investing in soil and water conservation structures. In addition, during the five-year analysis period increases in value of production were experienced in both SLM program and non-program areas.

Further analysis of the SLMP as it continues to reshape the landscape and livelihoods of rural households will provide insight for the Ethiopian government on key investments and expectations for sustainable land management. Informed planning and implementation regarding where, when and how investments in soil and water conservation address Ethiopia's land degradation challenges are key to ensuring sustainable land management strategies.



Soil and water conservation structures, Gozamin, Amhara

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