

Role of institutional and socio-economic factors on adoption, dis-adoption and non- adoption of SWC technologies: Empirical evidence from the North Western Ethiopia highlands

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INTRODUCTION

- Economies of Ethiopia depend on agriculture
 - Dominated by subsistence smallholder farmers
- Agricultural sector directly
 - Economic development,
 - Food security & poverty alleviation
- Role of Agr. sector in alleviating poverty and food insecurity undermined by land degradation
- A massive programme of natural resource conservation undertaken
 - Reduce environmental degradation & poverty
 - Increase agricultural productivity & food security



...INTRODUCTION

- Adoption rate of SWC measures has been minimal
- In the Amhara region, line interventions SWC technologies have been promoted
 - Stone, soil and Fanya Juu bunds, and agro-forestry practices.
- However, most farmers have
 - Not adopted
 - Dis-adopted (abandoned)
- Most previous adoption studies:
 - Limited in assessing the determinants of adoption versus non-adoption,
 - Ignoring factors which influence the different stages of adoption



OBJECTIVE

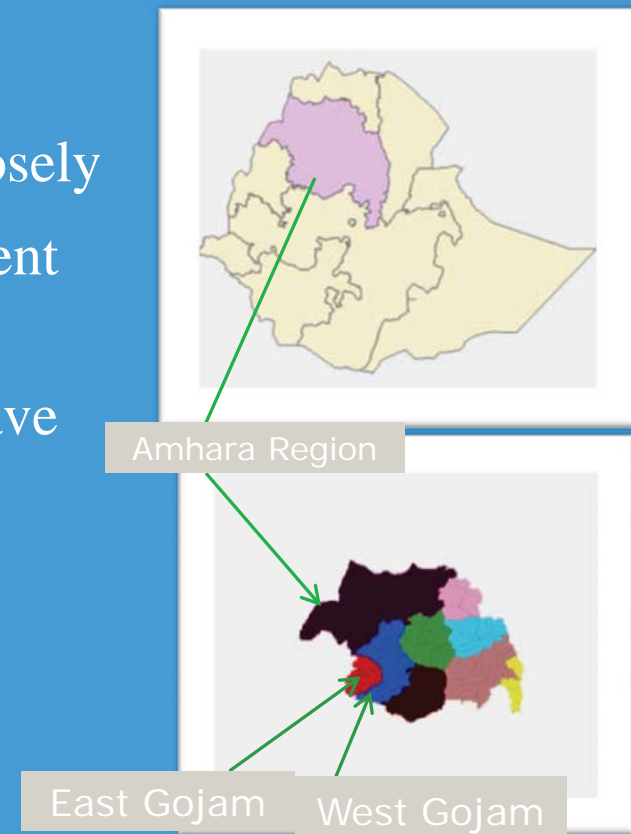
- To investigate the institutional and socio-economic incentives and constraints in the adoption (initial adoption, actual adoption and final adoption, dis-adoption and non-adoption) of line interventions SWC technologies in NW highlands of Ethiopia



METHODOLOGY

Study area

- Ethiopia, East and West Gojam Zones of Amhara region, three selected watersheds-Debre-Mewi, Anjenie and Dijil watersheds
- The zones and the watersheds are selected purposely
 - Specific experience with SWC development activities,
 - Different extent of SWC measures that have actually been implemented.
 - Diverse physical and socio-economic characteristics.



Data and data collection method

- Formal and informal surveys were
- A structured survey and PRA
- A two-stage stratified random sampling method
- Watershed areas were stratified into two categories, i.e., the upper and lower part of the watersheds.
- From each stratum, farmers were selected randomly.
- About 113, 60 and 125 farmers were selected randomly from Debre Mewi, Anjenie and Dijil watersheds, respectively



Data Analysis

- Descriptive statistics
 - F-test –continuous variables
 - Chi-sqaure analysis -discrete variables.
 - Analyze the unconditional mean difference between adopter categories

- A multinomial logit (MNL) model
 - Analyze econometrically the drivers of different stages of adoption
 - Multiple choice decisions



Conceptual Framework: Adoption, Dis-adoption and Non-adoption

- Our conceptual framework is based on
 - Adoption process of investment in SWC measures (de Graaff et al., 2008)
 - Concept of dis-adoption (abandonment) (Niel and Lee, 2001).
 - Decision-making processes for the use of soil conservation practices (Ervin and Ervin, 1982),
 - Property rights and investment incentives (Besley, 1995)
 - Role of social capital (Foster and Rosenzweig, 1995; Nyangen, 2008)
- Adoption is a sequential decision process and it has three major phases
 - the acceptance phase,
 - the actual adoption phase and
 - the continued use phase
- Farmers do not adopt and dis-adopted SWC measures for various reasons.



- Five major categories in the adoption process, i.e., Initial adopters, Actual adopters, Final adopters, Dis-adopters and Non-adopters .

Indicators for the respective level of adoption categories for SWC

<i>Categories</i>	<i>Indicators</i>
Initial adopter	Establishing long term physical SWC measures on 5-25 % of farm area to be treated
Actual adopters	Continued use SWC for past four years on at least 25-50% of the farm area to be treated
Final adopters	Continued use, replication and more than 5 years maintained, and in total covering 50-100 % of farm area to be treated.
Dis-adopters	Failed to undertake any maintenance and/or have started to remove/abandon the SWC measures
Non-adopters	Never used these type of physical soil and water conservation measures in any plots



RESULTS AND DISCUSSIONS

Adoption categories of soil and water conservation measures

The extent of adoption of SWC line interventions by adoption stage and by watershed

Adoption stage	Watersheds				
	Debre Mewi (N=113)	Anjenie (N=60)	Dejil (N=125)	Total	
	%	%	%	N	%
Initial adopter	37.2	0	39.2	91	30.5
Actual adopter	15.0	1.7	33.6	60	21.1
Final adopter	8.8	98.3	18.4	92	30.9
Dis-adopter	11.5	0	1.6	15	5.0
Non-adopter	27.4	0	7.2	40	13.4
Total	100	100	100	298	100.0



Descriptive statistics of the explanatory variables for the adoption of SWC

Variables	Mean of Adopter Category					F- value
	Intial Adopter	Actual Adopter	Final Adopter	Dis-adopter	Non-adopter	
Age of HH head (in years)	43.5	43.3	45.6	46.0	52.0	0.004*
Family size (persons)	5.8	5.8	5.9	5.5	5.6	0.75 NS
Persons working fulltime(No.)	2.1	2.2	2.3	2.1	2.0	0.21NS
Total Farm size(in timad)	4.4	5.1	4.81	4.3	4.7	0.23 NS
Cultivable land(in timad)	3.8	4.8	4.4	3.2	3.7	0.003*
Average plot size	0.8	0.9	1.1	0.9	0.9	0.001*
Distance from road (in min.)	13.6	14.3	17.0	12.1	16.4	0.37NS
Number of oxen	1.9	2.0	2.0	1.2	1.5	0.001*
No. of farmers participating in collective action	5.9	6.1	7.1	3.7	3.3	0.046**
Off-farm income(monthly in Birr)	72.6	34.3	50.0	53.7	71.6	0.56NS

*, **, *** significant at 1, 5 and 10% level of significance, respectively. NS=Not significant



CON....

Variables	% proportion across adopter categories					χ^2 -value
	Intial Adopter	Actual adopter	Final Adopter	Dis-adopter	Non-adopter	
Tenure security -Yes	81.3	88.3	81.5	66.7	67.5	0.08***
- No	18.7	11.7	18.5	33.3	32.5	
Having shovels -Yes	54.9	70.0	75.0	26.7	47.5	0.00*
- No	45.1	30.0	25.0	73.3	52.5	
Perceived prob. of erosion -Yes	95.6	100	100	93.3	90.0	0.01**
- No	4.4	0	0	6.7	10.0	
Is SWC profitable ? -Yes	94.5	97.8	96.7	100.0	100.0	0.33NS
- No	5.1	2.2	3.3	0	0	
Training in SWC -Yes	28.6	49.2	46.7	13.3	17.9	0.00*
- No	71.4	50.8	53.3	86.7	82.1	

*, **, *** significant at 1, 5 and 10% level of significance, respectively. NS=Not significant



Variables	Percentage proportion across adopter categories					χ^2 -value
	Initial Adopter	Actual adopter	Final Adopter	Dis-adopter	Non-adopter	
Social position in formal inst.-Yes	13.2	6.8	9.9	6.7	0	0.17N
-No	86.8	93.2	90.1	93.3	100	S
Coop. with adjacent farmers - High	40.4	42.4	67.0	20.0	28.9	0.00*
- Medium	24.7	33.9	26.4	40.0	34.2	
- Low	34.8	23.7	6.6	40.0	36.8	
Plots slope status -Flat	11	1.7	4.3	20.0	30.0	0.00*
- Medium	45	61.0	50.0	60.0	52.5	
- Steep	44	37.3	45.7	20.0	17.5	
Education status-Illiterate	46.2	46.7	39.1	53.3	60.0	0.27N
- Literate	53.8	53.3	60.9	46.7	40.0	S
SWC program in the area - Yes	41.2	70.0	85.9	6.7	10.0	0.00*
- No	58.8	30.0	14.1	93.3	90.0	

*, **, *** significant at 1, 5 and 10% level of significance, respectively. NS=Not significant



Econometric result

Multinomial logit

Variables	Adopter Categories			
	Initial adopter Coefficient	Actual adopter Coefficient	Final adopter Coefficient	Dis-adopter Coefficient
Constant	-1.66	-22.35	-40.16	-16.34
Tenure_security	1.26**	2.25*	1.65**	0.37
Full_time_working	0.72	0.91	1.38**	1.67**
Tootalfarm	0.01	-0.27	-0.55	0.16
Age	-0.07**	-0.09*	-0.07**	-0.11**
Distance	-0.04***	-0.03	-0.01	-0.03
Shovel	2.17*	2.32*	2.71*	1.38
Cultivated_land	0.04	0.63	0.51	-0.43
Family_size	-0.06	-0.11	-0.06	0.14
Erosion_problem	1.46	19.53	18.35	1.55



CON....

Variables	Adopter Categories			
	Initial adopter	Actual adopter	Final adopter	Dis-adopter
	Coefficient	Coefficient	Coefficient	Coefficient
Training SWC	0.13	0.37	0.78	-1.12
Assistance_in_coll	0.07	0.09	0.14*	-0.08
Formal_position	15.12	13.55	15.38	15.34
Medium_cooperation	-1.36***	-1.34	0.84	-0.08
High_cooperation	-0.50	-0.61	2.15**	-0.89
Off_farm_income	-0.50***	-0.001**	-0.001**	-0.001
Steep_slope	1.47**	0.43	1.09	-0.37
Flat_slope	-0.36	-3.10**	-1.46	-0.28
SWC_program	3.99*	5.33*	5.33*	1.46
Average_plot_size	-0.38	0.64	1.67**	1.72
Oxen	0.44	0.15	0.57	-0.94
SWC profitablity	1.94	1.73	16.87	15.77



CONCLUSION AND RECOMMENDATION

- Farmers have a good understanding about the problems of soil erosion and the benefits of SWC measures.
 - Severity of the land degradation problems
 - Commitment of the government to avert degradation
- But the adoption stages differ from farmer to farmer
 - due to socio-economic and institutional factors.
- Tenure security is an important factor that affects the probability of investing SWC
 - Secure land rights increase the planning horizon of farmers to undertake long term investments.
- Therefore, the land policy should provide long-term and lasting tenure security to the peasant.



CONCLUSION AND RECOMMENDATION

- The initiatives to address the problem of tenure insecurity through a land certification is a promising approach.
 - Investigate the impact of the land certification on tenure security and SWC
- The ownership of equipment(shovels) and project assistance for SWC interventions are very important for different stages of adoption.
 - need for technical support and resources (equipment for SWC measures) for farmers in order to facilitate the adoption process.
- Availability of labor is very important for continued use of SWC measures. Specifically, the maintenance costs for the final adoption stage are very important.
 - Conservation structures need to be made less labor demanding by reducing the maintenance costs, i.e., by stabilizing bunds through biological measures.



CONCLUSION AND RECOMMENDATION

- Social capital and specifically cooperation with adjacent farm owners is an important factor for the final adoption and dis-adoption stages of SWC
 - Adjacent farm owners need to work together to avert the problems of erosion.
 - A watershed approach at community level is the remedy for the problems of cooperation between adjacent farms.
- The average plot size (ratio between farm size and total number of plots) is influencing the final adoption stage positively.
- Land fragmentation may weaken farmer's interest and motivation for investing in SWC practices.
 - Either land consolidation or alternative SWC measures is important to enhance the productivity of farm land.



Thank you!!!



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