

Linking NRM with Market Oriented Commodity Development: Does it help SLM?

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Land Degradation in Ethiopia

- Land degradation has been identified as severe environmental problem in Ethiopia especially since the early 1970s.
- Because there is significant degradation on cultivated lands in Ethiopia, there is a potentially high payoff to addressing degradation in the country.
- A number of programs and projects for sustainable land management have been implemented in Ethiopia since the early 1970s, aimed at promoting private and collective efforts to conserve natural resources.
- However, the results of these efforts have been mixed.

Land degradation in Ethiopia (2)

- **Due to externalities (Spatial and intergenerational externalities) and the public good nature of conservation services, neither private nor public efforts by themselves have been successful at preventing land degradation.**
- **Both are required in Ethiopia to curb soil erosion, restore and enhance soil fertility, maintain and improve soil structure and water holding capacity, and to ensure sustainable use of communal natural resources.**

Causes of Land degradation

- In designing policies, programs and projects for sustainable land management, it is of critical importance to make a distinction between
 - the proximate (direct) and
 - underlying (indirect) causes of land degradation
- The proximate causes of land degradation are the factors that are directly related with the activities and practices that result in the degradation of the land resource and include
- Proximate causes include cultivation of steep slopes and erodible soils, low vegetation cover of the soil, burning of dung and crop residues, feeding crop residues, declining fallow periods, erratic and erosive rainfall patterns, declining use of fallow, limited application of organic or inorganic fertilizers, low vegetation cover of soils, deforestation and overgrazing.
- The underlying causes include such factors as population pressure; poverty; high costs or limited access of farmers to fertilizers, fuel and animal feed; limited farmer knowledge of integrated soil and water management measures; limited or lack of farmer access to credit; underdeveloped markets; low profitability of agricultural production and conservation technologies; non-responsive extension services; high market and production risk; insecure land tenure; short planning horizon of farmers; information asymmetry; and lack of or inadequate short-term benefits to land users

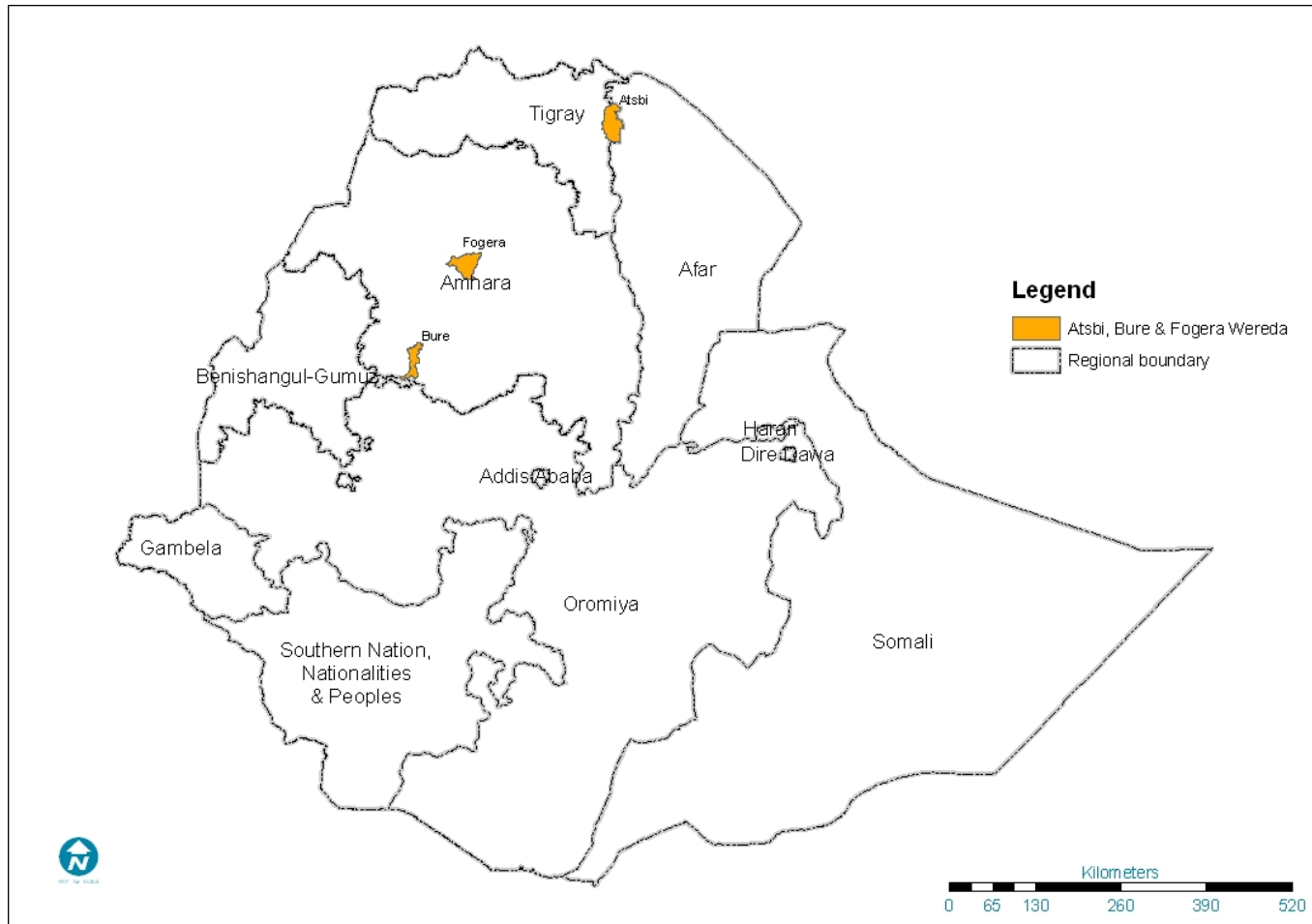
Tackling Land Degradation

- The proximate causes of land degradation are the consequences of inappropriate land management practices as conditioned by the underlying factors.
- Hence, efforts for soil conservation need to address the underlying causes primarily, as focusing on the proximate causes would mean to address the symptoms of the problem rather than the actual causes.
- Unless the real causes are addressed, sustainable land management is unlikely.

Hypothesis

- We hypothesize that linking natural resource management with market oriented commodity development enhances sustainable land management by providing farmers with short-term benefits.
- We test this hypothesis with analysis of case studies of forage development in two districts in the highlands of Ethiopia.
 - The case studies deal with the linkage between forage resource development and market oriented livestock and apiculture development.

Study sites



Case Study 1- Atsbi forage development

- Since 2005, collaborative efforts have been put into action to intensify livestock and bee forage development
- The innovative forage development interventions focus on :
 - communal sloppy grazing lands,
 - Bottomland grazing lands
 - backyards,
 - irrigated sites.
- The forage development efforts were aimed at enhancing the market oriented commodity developments of beekeeping, fattening, and dairy.

Case Study 1 (2)

Problem diagnosis

- In 2004, a participatory rapid appraisal (PRA) study conducted by the Improving Productivity and Market Success (IPMS) of Ethiopian farmers project revealed that feed was the most important critical constraint for market oriented livestock and apiculture production in the district.
- The PRA results were presented to stakeholders workshop for verification: farmers and community leaders, extension service providers, NGOs, researchers and IPMS staff.
- The stakeholder workshops confirmed the findings of the PRA, and identified small ruminant fattening, apiculture and dairy as the most important market oriented enterprises that could be linked with the forage development.

Case study 1 (3)

Knowledge gap assessment and Knowledge acquisition

- Following the diagnosis phase, a technical team consisting of experts on forage, animal production, forestry, agronomy was formed from the district office of agriculture and rural development, the regional bureau of agriculture and rural development, the regional research institutes and IPMS.
- The team conducted discussion with the community and community leaders, and decision makers on the possibilities of forage interventions.
- The team also assessed knowledge gaps in forage development, and visited various forage development sites in the region to share experiences and draw lessons.
- The experiences and lessons learned from the various field visits were shared with experts at the district office of agriculture and rural development, and communities and their leaders.
- Following these deliberations, work plans were drafted jointly with beneficiaries.
- The beneficiary farmers and extension service providers were given intensive training on improved forage management and utilization.

Case study 1 (4)

Intervention implementation

- Forage demonstration sites were identified in four land types: bottomland grazing areas, degraded sloppy grazing lands, irrigated areas and backyards
- Communities contributed free labor and traction power



Implementation of forage interventions in Atsbi

Site	Area (ha) and location PA	Site condition prior to intervention	Interventions	Actors involved
Bottomland grazing areas	69 ha in Barka Adi-Sebha PA	<ul style="list-style-type: none"> •Traditional land ownership demarcation existed •Open grazing system •Little soil and water conservation practice •Heavily grazed and low vegetation cover 	<ul style="list-style-type: none"> •Area enclosed from animals. •Cut and carry system introduced 	<ul style="list-style-type: none"> •Community and community leaders, •Decision makers, •extension service providers, •NGOs, •Research •IPMS.
Degraded Sloppy grazing lands	26 ha in Golgol Naele PA	<ul style="list-style-type: none"> •Traditional land ownership demarcation existed •Open grazing system •Various physical soil and water conservation techniques (stone and soil bunds, stone and soil faced bench terrace with trench were in place. •Heavily grazed and highly degraded 	<ul style="list-style-type: none"> •Collective action organized to prepare grazing land for enrichment plantation of improved forage species •Area enclosed from animals •Various improved forage species (<i>Phalaris aquatica</i>, Rhodes, <i>Sesbania sesban</i> and Tree Lucerne) planted 	<ul style="list-style-type: none"> •Community and community leaders, •Decision makers, •Extension service providers, •NGOs, •Research and •IPMS.
Irrigated sites and backyards	Hayelom FTC demonstration, Hayelom PA	<ul style="list-style-type: none"> •Farmers Training Centre identified as training and demonstration centre for innovative interventions including forage. •Demonstration land available 	<ul style="list-style-type: none"> •300 cuttings of Napier grass planted in Hayelom FTC demonstration site •Individuals farmers planted forages around their backyards, 	<ul style="list-style-type: none"> •Community and community leaders, •Extension service providers, and •IPMS.

Case study 1 (5)

Performance of forage development interventions

- During the first year, the performance of the introduced grasses, especially the split of *Phalaris aquatic* was very impressive in the sloppy degraded intervention sites,
- The performance of the Napier grass planted in the irrigated sites and backyards also showed impressive performance
- Cover abundance of natural vegetation substantially increased in both the bottom and sloppy forage sites.
- In the bottomlands, farmers started to harvest forage three times per year.



Performance of forage intervention in Atsbi

Site	Results observed	Utilization
Bottomland grazing areas	<ul style="list-style-type: none"> •Performance of the introduced forage grasses and legumes was very good •Farmers started harvesting forage three times per year. •Availability of green quality feed relatively improved. •Bee forage flower during most part of the year particularly during the dry season emerged •Year round vegetation cover improved and the soil stayed moist with reduced runoff and evaporation, and increasing infiltration. •Enriched springs observed down the forage site. 	<ul style="list-style-type: none"> •The green forage collected used mainly for fattening sheep and dairy cows. •Bee colonies stabilized and reduce swarming during the dry season and produce some honey. •Water availability for livestock and bee colony improved.
Sloppy degraded grazing lands	<ul style="list-style-type: none"> •<i>Phalaris aquatic</i> splits showed very impressive performance. •The Rhodes grass and natural vegetation also established very well with very good soil cover to reduce runoff and increase run-on. •Among the legumes, Tree Lucerne performed very well and started to flower. •Abundant flowering plants emerged which flower during the rainy and after few showers during the dry season 	<ul style="list-style-type: none"> •In the first year farmers decided not to cut and carry the forage biomass rather decided to collect seeds and plant them further for full rehabilitation of the area. •Nectar and pollen from the developed sites became important bee forages •Farmers reported that there was an increase in honey production and reduced colony swarming.
Irrigated sites and backyards	<ul style="list-style-type: none"> •The 300 cuttings of Napier grass introduced established very well 	<ul style="list-style-type: none"> •Many farmers started collecting Napier cuttings from the FTC demonstration sites and planted them around their irrigated plots or back yards near ponds or shallow wells.

Case study 1 (6)

Popularization of forage development experiences

- Popularization of the forage development experiences have been conducted among the community and community leaders, extension service providers and decision makers within and outside the woreda.
- Within the woreda, farmers, community leaders of the 16 PAs, DAs, supervisors, experts and decision makers visited the forage sites on different occasions formally and informally.
- Outside the woreda, the regional BOoARD, the southern and eastern zone extension service providers and decision makers visited the forage sites.
- Outside the Tigray region, decision makers and extension service providers from Oromiya and Amhara regions visited the forage sites on different occasions



Case study 1 (7)

Scaling out forage development experiences within and outside the woreda

- Within the woreda, forage development experiences have been scaled out to different sites. For instance forage development in the bottom grazing lands expanded from 69 ha in one PA to about 1746 ha in 13 PAs in 2007 (within two years).
- Similar expansions were observed in the degraded sloppy grazing lands and irrigated sites.
- Outside the woreda, improved forage management approaches have been expanded to many woredas in the eastern zone of Tigray. In Amhara region, Fogera woreda office of agriculture and rural development experts and farmers started to develop communal grazing lands in the district

Scaling out of forage interventions in Atsbi district

Forage intervention sites	Demonstration area (ha, cuttings)	Scaled out coverage (ha, PAs or cuttings)	Utilization
Forage on degraded sloppy grazing lands	26 ha	581 ha in 8 PAs harvested once/yr	<ul style="list-style-type: none"> ●Biomass: > 3 million kg biomass produced in 2007. ●Fattening utilization: Feed contributed to about 11,904 shoats and 2103 cattle fattened in 2007. ●Dairy: Feed contributed to about 1700 dairy cows produced butter and some calf. ●Beneficiaries: More than 7,800 households benefited ●Flowers are sources of bee forage to about 19,272 bee colonies.
Forage on bottom grazing lands: Year round cut and carry system of feeding	69 ha	1746 ha in 13 PAs harvested 3-4 times/yr	
Forage on bottom grazing lands: Partial cut and carry system of feeding	Modified/traditional	5,764 ha in 16 PAs	
Irrigated sites and gullies	300 cuttings introduced into FTC	> 45,000 cuttings	
Private/ backyard forage development	Emerged by itself	10 PAs	
PAs fully transformed into cut and carry system of feeding	26 ha and 69 ha	4 PAs	

Case study 1 (8)

Other Environmental and social changes

- *Changes in botanical composition:*
 - *Initially the number of the type of vegetation observed in the open grazing fields were very low (less than 10 forage species). Within 2-3 years, about 45 different grass and legume species were recorded in the improved forage sites. Particularly the cover abundance of palatable legume species such as Trifolium spp., Medicago spp., and Lolium spp significantly improved.*
- *Environmental changes*
 - *Improved forage interventions slowed down runoff, increase water infiltration to the ground and helped to stabilize gullies. Furthermore, groundwater table is enriched and springs started to develop down the sites.*
- *Social changes*
 - *Female headed households have benefited more in the improved forage development than male headed households. Usually male headed households own more animals than female headed households. Thus in the open grazing system, female headed households were getting less proportion of benefit from the grazing lands. However, in the cut and carry systems, female headed households receive the same benefit as male headed households. Many of the female headed households either sell their forage in cash, or in exchange for traction power for plowing and threshing.*
 - *Cut and carry systems of animal feeding also frees children to attend school.*

Case Study 2- Fogera Forage development

- During 2004-2005, more than 17,937ha of communal grazing land is estimated to have been transformed into farm lands in Fogera
- The remaining grazing land became severely overgrazed over time and inundated by a notorious weed (*Hygrophilla auriculata*) locally known as Amecala.
- The IPMS project in collaboration with the district office of agricultural and rural development (OoARD), the Amhara Region Agricultural Research Institute (ARARI), the regional bureau of agriculture and rural development (BoARD) and other actors introduced the rehabilitation and development of communal grazing lands
- The grazing land development was explicitly linked with market oriented cattle production.

Case study 2 – (2)

Processes in grazing land development

- Several discussions were held with experts of the OoARD, DAs, communities and their leaders with regard to the negative effect of *Hygrophilla auriculata* on the grazing land, and scarcity of forage for livestock.
- Repeated deliberations were also held on the role of market oriented livestock production in household income.
- Six highly infested grazing lands were identified for intervention.
- Communities agreed to contribute one week free labor for the uprooting and eradication of the weed from the selected grazing lands. Communities also agreed to enclose the cleared grazing lands from livestock.

Hygrophilla auriculata in the field in Fogera



Community contributions of labor to clear *Hygrophilla auriculata*, 2007

Name of Peasant Association	Contributed labor (person days)		Area cleared (ha)
	Male	Female	
Shaga	1,200	350	75.00
Wagetera	436	98	67.00
Aboakokit	996	683	38.75
Kidist Hanna	923	143	42.75
Nabega	392	240	21.00
Shina	1,742	95	23.75
Total	5,689	1,609	268.25



Case study 2 (3)

Achievements

- Upon clearance of the weed and enclosing the grazing land in the two PAs of Kuhar Michael and Shina in June 2008, volume of biomass increased significantly.
- It was estimated that about 258 tones of forage was obtained from 6 ha in the Kuhar Michael PA during the first harvest. During the second harvest in December 2008, it was estimated that about 525 tones of forage was obtained from the 6 ha land.
- The harvested forage was distributed among the 183 farm household beneficiaries.
- About 50 households started fattening using cut-and-carry feeding system.
- Similarly, in the Shina PA, about 314 tonnes of forage was harvested from 7 ha grazing land during the first harvest. The forage was distributed among 126 beneficiary farm households.

Conclusions

- Linking NRM with market oriented commodity development to provide short-term benefits to farmers can enhance SLM
- Introduction and promotion of improved SLM technologies and practices need to be done with full participation of beneficiaries in problem diagnosis, intervention planning, and implementation and evaluation.