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Sustainable Land Management Through Market Oriented Commodity Development: Case Studies From Ethiopia.

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Introduction

Land degradation has been identified as severe environmental problem in Ethiopia, especially since the early 1970s (Gebremedhin, 1998). Betru (2003) reported that the country losses around 2 billion tons of fertile soil subsequently losses 2% of the annual grain production, which is roughly equivalent to 120, 000 tons of cereal per annum (Mesfin, 2004). Despite this fact, Ethiopia has been in continuous struggle to increase agricultural production, reduce poverty and ensure sustainable use of the natural resources, especially since the early 1990s. Increasing population pressure on an already degrading land resource has rendered the struggle even tougher. Eicher (1994) suggests that increases in agricultural production need to come primarily from improvements in land productivity since the land frontier are shrinking. However, a significant increase in agricultural productivity can not be attained if the land resource base continues to be degraded. Hence, ensuring sustainable land management is a matter of critical importance for agricultural growth in Ethiopia. A number of programs and projects for sustainable land management (SLM) have been implemented since the early 1970s. However, natural resources conservation interventions were primarily technology oriented, beneficiaries had less stake in decision making and not linked with activities generating better income in a short period of time to the community. As a result, the natural resources conservation efforts were less successful. Thus, IPMS project in collaboration with other stakeholders studied the effect of linking natural resources conservation interventions with market oriented commodity development on the sustainable land management in four districts of Ethiopia. This paper presents results of the analysis of the approach of linking market oriented commodity development with natural resource development.

Materials and Methods

The study was conducted in four districts namely Atsbi-Womberta, Bure, Fogera and Metema. Subsistence mixed crop-livestock agriculture is the dominant mode of

agricultural production in all districts. Land degradation is an important factor for the decline of agricultural productivity in all study sites. The linkage between market-oriented livestock production and grazing land development case study was conducted in Atsbi-Womberta and Fogera districts. On the other hand, the linkage between market-oriented crop production and conservation tillage case study was carried out in Bure and Metema districts.

Participatory rapid appraisal (PRA) conducted in each study site to identify problems on marketable commodities development and the PRA results were verified in stakeholders' workshop. Following the PRA and stakeholders' workshop, communities and experts prepared intervention plans for each site in a participatory manner. The intervention planning effort was supported with lessons from study tours, trainings and brain storming discussions. The community prepared bylaws and contributed land, labour and other locally available materials to implement interventions. IPMS project initially provided planting materials of improved forage species and Roundup for demonstration. Practical trainings were given to the community and development agents for the effective implementation of the interventions. Field days organized to scale-out or scale-up successful interventions. Data on the performance of each intervention were collected through focus group discussions, key informant interviews, field measurements and analysis of secondary data collected by Offices of Agriculture and Rural Development (OoARD) of each district.

Results and Discussion

IPMS project in collaboration with communities from different PAs in Atsbi-Womberta and the district OoARD started forage development on sloppy degraded grazing land, bottom grazing lands, irrigated lands and backyards for sheep fattening and dairy. The performance of introduced forage crops, especially *Phalaris aquatic* in the sloppy degraded grazing lands and Napier grass in the irrigated sites and backyards was quite impressive even in the first year. The natural regeneration of palatable forage species substantially increased both in the bottom and sloppy degraded grazing lands. The number and type of naturally regenerated vegetations increased from 10 to 45 grass and legume species. Particularly the cover and abundance of palatable legume species such as *Trifolium* spp., *Medicago* spp., and *Lolium* spp. improved significantly. Consequently farmers started sheep fattening and dairy cow rearing. In addition, forage development interventions slowed down runoff, increased water infiltration and helped to stabilize gullies in the grazing lands. As a result, groundwater table is enriched and springs started to develop down the sites. This depicts the importance of linking marketable livestock production through forage development on the sustainable grazing land management. Currently the forage development intervention is expanding within and outside the district. The practice of forage development in sloppy degraded grazing land is expanded from 26 ha in one PA to 581 ha in eight PAs. Similarly, forage development intervention in bottom grazing lands scaled out from 69ha in one PA to 1746 ha in 13 PAs. Likewise backyard forage development expanded into 10 PAs after the intervention.

Fogera district is the origin of an important indigenous cattle breed, known as Fogera breed, which is characterized by bigger body framework, high traction power, and higher

milk yield. The productivity of this breed is declining due to critical feed shortage caused by invasion of the grazing land with a noxious weed, *Hygrophilla auriculata*. IPMS project in collaboration with the community and the district OoARD initiated forage development on communal grazing land for cattle fattening and dairy development. About 268 ha communal grazing lands cleared from the weed by the community within one week time. However, weed clearance alone was not found as effective as the combined effect of weed clearance and enclosure on the productivity of grazing lands. Communities harvested about 257 tons of forage biomass by weed clearing and enclosing six hectare grazing land in the first year. Consequently, fifty of these community members started cattle fattening by tethering their animals and feeding using cut and carry system. In addition, poor female headed households started benefiting by selling their share. This situation implanted uniform ownership feeling among members of the community on the communal grazing lands and contributes for the sustainable management of communal grazing lands. The proportion of naturally emerging palatable forage species increased when the grazing land was cleared from weed and enclosed. This could be since the enclosure protected emerging palatable forage species from over grazing and trampling effects. Field days organized to share lessons to community members from non-intervention areas, experts and officials within the district and to experts and officials outside the district. As a result, grazing land enclosure expanded from two PA on 6 ha grazing land in 2008 to five PAs on about 75 ha in 2009.

Land degradation is also severe in the crop lands of Ethiopia. The traditional crop production practice includes repeated farmland cultivation using ox-pulled ploughing tool, hand weeding, harvesting using sickle and threshing with animals. These activities require large amount of labour and draught power, consequently contributing to human and livestock population growth in the country. Overstocking of grazing land resulted in grazing land degradation. Similarly, population pressure coupled with less productive crop production practice triggered cropland expansion to marginal areas. Therefore, the traditional crop production practice may contribute to land degradation indirectly through human and livestock population growth and directly by destroying the soil structure. IPMS project in collaboration with Bure district OoARD and community members demonstrated wheat production using conservation tillage for the sustainable cropland management in 2008.

Conservation tillage required significantly low labour and draught power compared to conventional tillage for wheat production. As a result, the cost of wheat production reduced from Birr 2419 to Birr 1527 per hectare and wheat production using conservation tillage found more profitable. Wheat production through conservation tillage required only one plough to cover the seed and the fertilizer. Therefore, conservation tillage created better opportunity to poor and female headed households to fully benefit from their own lands. Conservation tillage increased the number of tillers per plant and extended the generative period of the crop. This could be since conservation tillage reduced run-off and soil erosion. This depicts the importance conservation tillage for the sustainable crop land management. Field days organized and leaflets distributed to share lessons to community members, experts and officials within the district and to experts and officials outside the district. As a result, crop production using conservation tillage

expanded from two PAs in 2008 to 12 PAs in 2009. Moreover, farmers started using conservation tillage to grow maize, wheat, teff and chickpea.

Metema district is known for the production of cash crops such as cotton and sesame. The district has hot and humid climate. Therefore, weed infestation is the major problem for crop production. Farmers prepare their crop field through repeated cultivation. This practice contributed to crop land degradation through destroying soil structure. IPMS project in collaboration with the district OoARD demonstrated conservation tillage for crop production in the district in 2006. Conservation tillage increased the productivity of cotton and sesame in the district through effective control of weeds using Roundup as well as through its soil and water conservation effect. It also contributed for the production of new types of crops such as teff and chickpea in the area. Farmers started growing teff and chick pea since conservation tillage reduced labour requirements for weeding and land preparation and control vigorously growing weeds during the planting time of these crops. Conservation tillage was demonstrated in six PAs in 2006 but now it is used in all PAs of the district to grow cotton, sesame, teff and chickpea. In addition, it is also expanding in neighbouring districts namely Quara and Armachoo. Conservation tillage was demonstrated using Roundup but currently, four types of non-selective herbicides (*Roundup, Mamba, Helosate and Agriset*) are supplied and used in Metema and the surrounding lowland districts. Therefore, expansion of crop production using conservation tillage is not only contributes to increase crop production but also for the sustainable crop land management through reducing soil erosion and improving soil structure.

Conclusions and Outlook

The success in forage development both in Atsbi-Wonberta and Fogera districts is primarily due to the explicit linkage of the forage development initiatives with the market oriented livestock commodities development. The coordinated efforts of actors that have stake in the development of the commodities facilitated implementation of interventions. Participatory appraisal of community resources and prioritization of interventions implant a strong sense of community ownership and facilitated the scaling out of interventions. With improved forage development, beekeeping, fattening and dairy re-emerged as key business oriented commodities with significant changes in the income of farmers. Therefore, these case studies revealed the importance of marketable livestock commodity development on the sustainable grazing land management. Similarly, the expansion of conservation tillage for crop production both in Bure and Metema district is not merely since it reduced soil erosion but mainly since it reduced cost of crop production and solved labour and drought power shortage. It is also expanded since inputs were locally supplied by private input suppliers. It is also expanded since crop production using conservation tillage was more profitable than using traditional tillage. Therefore, results of these case studies have shown the importance of linking soil and water conservation with marketable commodity development for the sustainable crop land management.

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