



## The Economy of Change: Livelihood Diversification and Land Use Change in Simanjiro, Tanzania

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*In East Africa, widespread conflict exists regarding the implications of land use practices for wildlife conservation. Among the Maasai of northern Tanzania, cultivation is increasing, and the impacts of these changes on the landscape and wildlife are still in question. The research project discussed in this brief aims to assess the impacts of cultivation on Maasai household economy, livestock mobility, and migratory wildlife movement in the Simanjiro Plains of Tanzania. Evaluation of these components of the system will promote informed conservation policy that can best balance the needs of people with those of wildlife. The goal of this particular study was to evaluate the economic role of cultivation and cash generated through the local gem trade in modern Maasai livelihoods. A household-level analysis of incomes and expenditures indicates that cultivation contributes significantly to livelihoods at the household level. Food and cash generated through cultivation not only feed families directly but also allow households to maintain herds by reducing the need to sell livestock to meet other needs. Cultivation also buffers against system shocks such as drought by generating new food quickly while herds recover. The gem trade appears to generate pulses of cash that may have important consequences for land conversion to cultivation and development at the village level.*

### Background

Across much of East Africa, a conflict has arisen between land users and governments and conservation agencies regarding the impacts of land use practices on the landscape, wildlife, and biodiversity in general. In northern Tanzania, the problem of balancing conservation goals with resident human needs has been debated fiercely in many areas, including the Tarangire-Manyara Ecosystem (TME). During the rainy season wildlife leave Tarangire National Park (TNP), dispersing to take advantage of widespread water resources and high quality forage in the pastoral zone (Borner 1985; Voeten 1999). The impact of cultivation on these migratory wildlife has been a concern because of the potential for cultivation to block wildlife migration corridors.

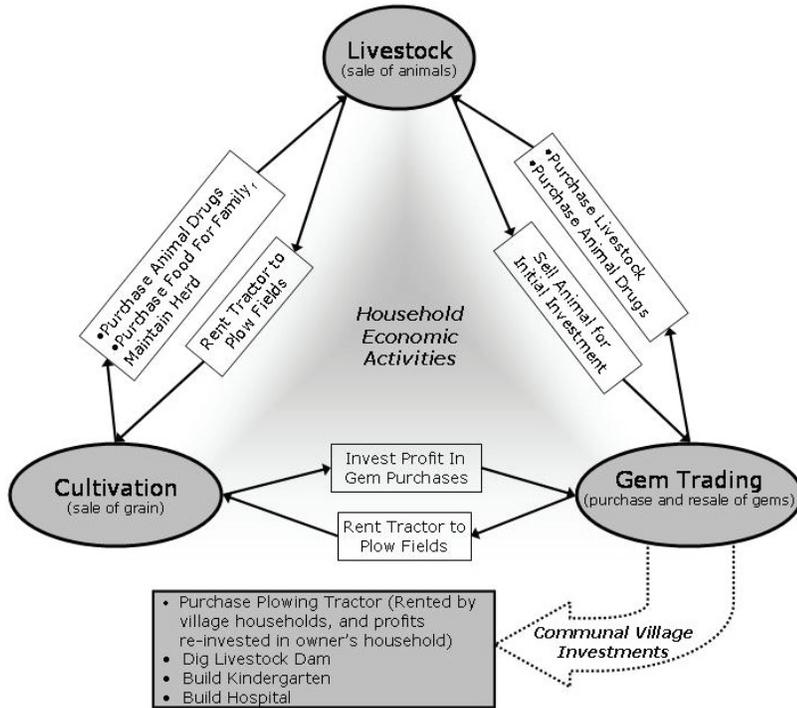
Pastoralists traditionally reduce the risks of highly variable resource availability through a multitude of adaptations (i.e. livestock movement to track forage and water availability, multi-species livestock herds, and social programs such as stock associations and wealth re-distribution). Economic diversification may further reduce vulnerability to stochastic events, such as drought, and perceived future risks (i.e. food security and land tenure changes), and compensate for or preempt changes in the ability to maintain a household through pastoralism alone. The widespread perception or recognition of increased vulnerability by Simanjiro Maasai may be a key factor in cultivation increases that continued through 2006.

The two most common means of livelihood diversification in Simanjiro at the time of data collection (2002-2003) were cultivation and gem trading. Both of these activities have the potential to substantially increase food and cash availability to participating households, thereby buffering fluctuations in the livestock sector and possibly boosting its viability (Figure 1).

The fundamental question addressed here is whether diversification into cultivation and gem trading contributed positively to household and village economies, or whether they acted as a drain on resources that could otherwise have been invested in livestock. In 2006 cultivation was banned in Simanjiro, as the area is critical to the long term survival for Tarangire National Park because it facilitates wet season dispersal and breeding for wildlife, especially wildebeest and zebra. Land conversion to small and large scale agriculture threatens the area, and a moratorium on land allocations to agriculture was issued until the area could be properly zoned. This research study and analyses were completed prior to the cultivation ban and therefore reflect the preceding state of affairs, but the results remain relevant to the Simanjiro land use dialogue.

**Study area.** The boundaries of the 20,000 square kilometers of TME (Tarangire-Manyara Ecosystem) are based primarily on the annual movements of migratory wildebeest. The Tarangire National Park (TNP) was

Figure 1. The economic relationship between Simanjiro's three primary income-generating activities is synergistic, each supporting the other, and all invest in household welfare. Large gem trading profits were invested in several things that benefited village communities as a whole.



established in 1970, setting aside 2,642 square kilometers and an important permanent water source, the Tarangire River, for exclusive use by regional wildlife. Lake Manyara National Park (320 square kilometers) was established in 1960. The remaining 17,000 square kilometers is comprised of the Simanjiro Plains to the east of the parks (Tarangire-Manyara Conservation Project - TMCP 2002).

The TME is classified as semi-arid with a highly variable mean annual precipitation of 600 mm (Voeten 1999). A bimodal pattern of rainfall such as that found in the TME favors pastures, woody plants, and the pastoral land use that takes maximum advantage of these resources (Ellis and Galvin 1994).

The study area consists of three Simanjiro villages: Sukuro, Loiborsoit, and Emboreet (Figure 2). The primary shift in land use in these and other surrounding villages from 1980-2006 was an increase in cultivation. Despite the questionable suitability of the TME for agricultural purposes, cultivation had become a customary Maasai land use practice by 2006.

**Research hypotheses.** The objective of the study described in this brief is to determine the contributions of livelihood diversification activities to Maasai households in the Simanjiro Plains of the Maasai Steppe. Several hypotheses were statistically tested based upon 2001-2003 conditions:

*Hypothesis 01:* Livestock herding remained the most important income-generating activity for Simanjiro households relative to cultivation and gem trading.

*Hypothesis 02:* Cultivation made a positive monetary contribution to household economies despite the costs incurred.

*Hypothesis 03:* Gem trading activities made a significant contribution to household economies despite the costs incurred.

*Hypothesis 04:* The acceleration of land use change in Simanjiro was due at least in part to livelihood diversification into cultivation and gem trading, and the cash was generated through these activities.

**Data collection, processing and analysis.** A household is defined as a male herdowner, his wives and children, plus any other dependent individuals. A boma, or settlement, consists of one or more male herdowners and their associated households. One hundred long

and 107 short interviews were conducted. Inter-annual production varies widely, so two years of agricultural production data (2001-2002, 2002-2003) were collected.

Seventy bomas were stratified by village and subvillage: 31 bomas in Sukuro (33% of village, 96 total households); 28 bomas in Loiborsoit (20% of village, 65 total households); and 11 bomas in Emboreet (25% of village, 46 total households).

The relative contributions of livestock and cultivation to household incomes and expenditures were evaluated using household rank data and reported gains and losses. Household-level cost-benefit analyses were performed. Livestock numbers were converted to Tropical Livestock Units (TLUs) where one head of cattle equals 0.71 TLU, and one head of smallstock (sheep and goats) is equal to 0.17 TLU. SPSS version 15.0 for Windows (SPSS, Inc., Chicago, IL) was used for all statistical analysis. Skewed data that did not conform to a normal distribution were transformed for analysis.

## Major Findings

The mean age of interviewees was 47 years of age. The mean acreage per household across villages in 2003 was 13.5 acres. Data indicate that most men begin cultivating as young adults, so that the average age of those that began

cultivating in the 1960's is now 61 and that of those men who began cultivating in the 2000's is now 33. The use of handplows has decreased over time; the use of tractors has increased.

*Hypothesis 01:* Livestock was ranked by a majority as the primary wet season income source, while agriculture was ranked as the primary dry season income source with livestock a close second (Table 1).

*Hypothesis 02:* The net cash value of agricultural production remained positive even in the poor year (2002-2003). Livestock was a more important household expense than cultivation (Table 2).

*Hypothesis 03:* Most households that participated in gem trading activities reported a small overall gain.

*Hypothesis 04a:* Households that did participate in gem trading activities applied gains from these activities to other household sectors (livestock and cultivation).

*Hypothesis 04b:* The few households that made large gains in gem trading often purchased tractors to plow fields.

### Practical Implications

The analyses presented indicate that despite the costs of cultivation, the average household was profiting from cultivation activities both directly in the form of food produced and consumed by the family, and indirectly, in the form of cash used to purchase livestock medicines, clothing, school fees, hospital fees, and other household expenses. During the 25 years that cultivation has been actively practiced by Simanjiro Maasai, the size of plots increased, and its contribution to household food and cash availability likely grew proportionally.

Figure 2. Reference map of Tarangire National Park and nearby Maasai villages. Study area villages include Loiborsoit, Emboreet, and Sukuro villages. (not to scale).



A recent cultivation ban (2006) in some areas of Emboreet Village may present interesting implications for households residing in that area. The analyses indicate that cultivation had become an important means of subsistence for Simanjiro Maasai livelihoods since the 1980's. It is questionable as to how households will fill the void left in their incomes that was previously a buffer to the livestock sector. The inputs from cultivation sales into livestock medicines and actual livestock purchases serve as a boost to the livestock sector as a whole, not just a buffer in times of failure.

Table 1 - top. The relative importance of income activities was ranked by herdowners (n=107), where 0=No Participation, 1=Most Important, 3=Least Important. Table 2 - bottom. Additive values were calculated for the relative rankings of Livestock, Agriculture, and Supplemental Food expenditures for the wet and dry seasons. Higher values connote greater perceived contributions to household expenditures.

Relative Importance of Income Activities						
	Wet Season			Dry Season		
Rank	Livestock	Agriculture	Mining	Livestock	Agriculture	Mining
0	0.0%	0.9%	53.3%	0.90%	5.6%	54.2%
1	63.6%	35.5%	0.9%	43.9%	48.6%	5.6%
2	31.8%	61.7%	5.6%	50.5%	38.3%	8.4%
3	4.7%	1.9%	40.2%	4.7%	5.6%	31.8%

Additive Rankings of Household Expenditures			
	Wet	Dry	Average
Livestock	421	455	438
Agriculture	448	17	232
Supplemental Food	465	583	524

Further cultivation bans and controversy may leave the Maasai of Simanjiro more vulnerable to livestock sector failure in the event of a large disease outbreak, drought, or other system shock. When available, grain sales are the choice source of cash for household expenditures such as food, school fees, clothing, and hospital fees. The patterns of these expenses may change if livestock must be sold to support them. For instance, if there is no longer the presence of home-grown grain to fill either the food or cash needs of the household, households would need to sell livestock to free up cash.

Research such as that detailed in this brief is necessary to assess the impacts of cultivation on Maasai household economy, livestock mobility, and migratory wildlife movement in the Simanjiro Plains of Tanzania. Furthermore, evaluation of these components will promote and contribute to informed conservation policy that can best balance the needs of people with those of wildlife.

## Further Reading

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*About the Author:* Stacy Lynn is a PhD candidate in the Ecology Graduate Degree Program at Colorado State University in Fort Collins, CO. She has been working in Tanzania since 1998. This research forms a portion of Ms. Lynn's PhD dissertation with an expected completion date of August 2009. Email: stacyl@nrel.colostate.edu

The GL-CRSP POLEYC project (Integrated Assessment of Pastoral-Wildlife Interactions in East Africa: Implications for People, Policy, Conservation and Development in East Africa) focused on the development of integrated assessments of pastoral-wildlife interactions in East Africa and the corresponding implications for people, policy, conservation and development. The Principal Investigator was David Swift at Colorado State University. Email: davesw@nrel.colostate.edu. Stacy Lynn's project, more specifically, aims to combine ecological and anthropological data to take a broad look at the impacts of land use change, primarily increased cultivation, for people and wildlife in Maasailand, Tanzania. Ms. Lynn was a student of Dr. Jim Ellis, who was, prior to his passing, Principal Investigator for the POLEYC project. Dr. Ellis's scientific achievements and mentorship capabilities inspired the Jim Ellis Mentorship Program Fellowship award.



The Global Livestock CRSP is comprised of multidisciplinary, collaborative projects focused on human nutrition, economic growth, environment and policy related to animal agriculture and linked by a global theme of risk in a changing environment. The program is active in East and West Africa, Central Asia and Latin America.

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