



Tropentag 2010
ETH Zurich, September 14 - 16, 2010

Conference on International Research on Food Security,
 Natural Resource Management and Rural Development

Are local livelihood strategies compatible with a sustainable management of forest fragments at the east coast of Madagascar?

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1 Introduction

Since the first human settlement on the island of Madagascar, forests have been decreasing continuously, mainly due to shifting cultivation. By putting new forest management strategies and conservation activities into place, various governmental and non-governmental projects have tried to counter this trend. However, these efforts have not succeeded in halting deforestation. A possible explanation for the failure of these projects is that most of the implemented strategies have been based on western ideas of conservation and have not sufficiently taken the complexity of local livelihood strategies into account. To better understand the relationship between forest sustainability and local livelihood needs, our research focused on livelihood systems and strategies in a forested landscape on the east coast of Madagascar. Using the sustainable livelihood approach (SLA), we attempted to understand the importance of forest fragments and their resources to the livelihood of the rural population, the influence deforestation has on people's livelihoods and how humans adapt their livelihood strategies to forest resource scarcity.

2 Methods

2.1 The Sustainable Livelihood Approach (SLA)

Local livelihood strategies inevitably lead to deforestation. To understand the reasons for this, the complex issue of livelihood systems must be considered. The Sustainable Livelihood Approach (SLA), developed by DIFID and further modified and improved by Baumgartner und Högger (2004), enables analysis and explanation of decision making. It makes the distinction between context and core factors of a livelihood system. *Context* represents risks and vulnerabilities, opportunities, services and policy processes and institutions. *Core* represents personal, emotional and spiritual aspects, as well as the material and non-material resources of a household. Orientation of the core is assessed at the individual, family and community levels. *Livelihood strategies* reflect the range of activities and choices that people make based on the given context and core factors. Livelihood outcomes are the result of livelihood strategies, which in turn influence the whole livelihood system (Figure 1). Livelihood systems are based on a network of interacting relationships between context factors



Figure 1: The SLA (Baumgartner and Högger 2004)

Livelihood systems are based on a network of interacting relationships between context factors

and core factors. The SLA can be used to gain a holistic understanding of these factors and processes and to therefore better understand what is needed to halt current deforestation practices.

2.2 Interviews

Several methods were applied to obtain data about local livelihood strategies and forest resources. To get an overall understanding of the situation, we conducted open discussions (5 households per village). Specific details were explored using household surveys (110 households in total). Additional semi-structured interviews with resource persons (e.g., village authorities, village elders) allowed for the triangulation of results. We worked in 4 villages; two situated within half an hour's walking distance of the continuous forest. The other two are located 2-3 hours walking distance from the continuous forest, in a landscape where few forest fragments remain.

3 Results and Discussion

Debate about the cause of deforestation along the east coast of Madagascar is ongoing (Humbert 1927, Oxby 1985). It cannot be denied that the main direct cause of deforestation is the slash-and-burn system for cultivating rain-fed rice (*Tavy*) (Messerli 2006). Indirect reasons, however, are highly disputed (Jarosz 1993, Agarwal et al. 2005). A high rate of population growth is often mentioned as one of the important factors that directly influences the diffusion of *Tavy* practices, and hence deforestation. Many research and development projects therefore focus on alternative agricultural techniques that improve productivity while reducing the demand for arable land (Hume 2006). But up to now, these improved agricultural techniques have hardly been adopted by local farmers. In fact, our results show that in the last 5 years, deforestation in densely wooded areas with low population densities was higher (3.8 ha forest/family) than in sparsely wooded areas with high population densities (0.1 ha forest/family). This is one indication that the reasons for forest conversion and deforestation are much more complex and cannot be reduced to the need for arable land.

3.1 The context factors of livelihood systems

Vulnerability: Cyclones periodically destroy part or the entire rice crop of individual households. Because of the extreme poverty in the region, households do not have enough flexibility to risk the loss of time and crops that searching for alternative agricultural techniques would demand. Instead, farmers prefer to maintain *Tavy*, which is a flexible, low-input system that is adapted to a climate that includes frequent cyclones (Brand 1998).

Services: Even if adequate agricultural techniques were available, they would have to be introduced by agricultural consulting services and would need the constant support of local farmers. However, in eastern Madagascar, there is a significant lack of professional arrangements and limited access to knowledge. Most villages are located in remote regions at considerable distances from each other (up to 8 hours walking distance).

Institutions and Policies: Local customary rights hinder the adoption of alternative techniques for rice cultivation and are instead rather conducive to maintaining the *Tavy* system. According to customary rights, all framers (including immigrants) become the owners of converted land and of the surrounding forest fragments (Urech et al. to be published in December 2010). Thus, people have a double interest in converting forest; on the one hand, people become owners of arable land and on the other, they become owners of forest fragments which act as future land reserves. For large, continuous forests, a custom of open-access also makes resource management challenging. In such situations, Hardin's 1968 „tragedy of the commons“ theory becomes particularly relevant. The theory forecasts the over-exploitation of all common-pool resources as long as no local regulations are in place to ensure sound management (Ostrom 1999). Such regulations are overlooked in local customary rights. Only small forest fragments are considered the “private property” of a single family and can therefore be protected from further deforestation by other families.

Opportunities: Forests act as a safety net in times of shock and crisis, producing several non-timber forest products (NTFPs) and timber that can be sold or used for personal consumption. However, the potential of these opportunities is limited or even unused due to the lack of regulation in customary rights, poor market access and ineffective (or nonexistent) governmental control mechanisms. As a result, for the local population the value of converted land is much higher than the value of forests. Thus, forest conversion continues.

3.2 The core factors of livelihood systems

Context factors alone cannot explain the ongoing livelihood strategies that lead to deforestation if not considered in conjunction with the core factors of a household. Ultimately, value orientations, personal ambitions and existing material and non-material resources determine the decision-making of a household. One of the most important core factors characterizing the rural population of the east coast is the strong attachment to ancestors. As mentioned before, deforestation enables land ownership; however, the conversion of forest into arable land is also considered essential for ensuring a connection between the ancestors and future generations (Keller 2008). Descendants should be rooted in the land of the ancestors. According to long tradition, deforestation and subsequent cultivation are the only means of guaranteeing this connection. Villages with no forest left for deforestation may therefore be more amenable to adapting new and improved technologies. In such cases, alternative techniques help to reduce poverty and rice shortages, but not deforestation.

While exploring core factors, we also questioned people about their awareness of resource finiteness. Most farmers living close to the continuous forest massif are not able to envision a landscape without forests and therefore do not see forests as an exhaustible resource. Only farmers living far from the forest massif are aware of the exhaustibility of forest resources, as forests have already disappeared to a huge extent during the farmers' own life spans. The further away from the continuous forest a household is, the higher its interest is in preserving remaining forests and in changing current livelihood strategies. But communal interventions and regulations to enhance sustainable forest management are only possible if individual interest becomes collective concern. We did not observe any community-based approaches for sustainable forest management at any of our study sites. While tendencies toward management of particular forest products could be observed, no such regulation exists in regard to deforestation.

3.3 Livelihood outcomes

Our research results show that current livelihood strategies do not lead to an improvement of living conditions. The continuation of the traditional slash-and-burn system of *tavy* leads to increasing degradation and forest clearance. As a consequence, families need to invest more time in finding increasingly scarce forest products. Forest products once sold for income are now bought on the market, as the time investment required to collect increasingly inaccessible products is too high. As a result, the safety net offered by forests in times of shock and crisis is compromised, which may prove fatal for the poorest segment of the population (Völker and Waibel 2010). However, in villages far from the forest massif, where remaining forest fragments are highly degraded, families have found ways to adapt their livelihood systems to a new context. Interestingly, although the situation of natural resources has changed, wealth in general does not appear to be negatively affected. Rather, farmers have begun to improve the diversity of their crops (and hence their income) with agroforestry systems. Adaptation to the changing context is the inevitable outcome of local strategies.

4 Conclusions and Outlook

The livelihood strategies of the rural population on the east coast of Madagascar lead to forest conversion and fragmentation. Reasons for these strategies are complex and based on a network of relationships between diverse factors. Working with the SLA enables the broad understanding of this network. Our research with the SLA shows that to counter deforestation and to abolish the

system of *tavy*, the simple implementation of improved agricultural systems will not be effective enough. In order to reduce deforestation, the whole complexity of livelihood systems must be considered and substantially modified. Local people have to be directly assisted in adapting their livelihood strategy development. Both the context influencing a family's situation and the core characteristics of the household would have to be adapted to new living conditions. One may argue if the importance of forest conservation is sufficient justification for such a fundamental change. Nevertheless, the adaptation of livelihood systems is possible, as has been demonstrated in the example of the villages without any remaining forest. As there are no longer sufficient forest resources, families no longer have the possibility to disperse and to connect the descendants with the ancestors' land. This is a major change, which affects the process of continuation and growth of human life discussed by Keller (2008). However, these families have found alternative ways to sustain themselves without losing their cultural cohesion.

To minimize the adaptation of livelihood systems, entry points for possible intervention must be found. An interesting possibility suggested by our research is the modification of the concept of "ownership" regarding forest fragments and open-access to the forest massif. While adopting a policy of private property is not the solution we propose, such a policy may be further developed and adapted to the local culture. Similarly, a viable entry point may also exist in increasing the awareness of forest resource limitations in villages situated far from the cohesive forest massif.

5 References

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