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Photo: J.G. Zaehringer

Conservation versus local livelihoods? Sustainable development challenges in Madagascar

In the imagination of people worldwide, the island of Madagascar is synonymous with beautiful rainforests and exotic animals, like lemurs, found nowhere else. Often absent from this foreign view, however, are the island's human inhabitants – the Malagasy people. Largely reliant on small-scale agriculture, they depend on land access to survive. With few agricultural inputs and little technology available, shifting cultivation is a well-adapted, rational land use practised by many Malagasy to grow staple crops. But as various factors – demographic, market-based, etc. – put the whole land use system under pressure, shifting cultivators are forced to expand their farming into remaining forests. This causes conflict with those who want to conserve Madagascar's forests and biodiversity as a global good. To date, no environmentally just and equitable solutions have been found that ensure conservation of the region's extraordinary biodiversity while enabling local land users to escape poverty and food insecurity.

A biodiversity hotspot

Due to its separation from other landmasses 88 million years ago, Madagascar harbours countless species of plants and animals that do not exist anywhere else. In 2000, it was recognized as possibly the world's most important biodiversity hotspot in need of protection from the threat of rapidly advancing deforestation.^{1,2} Meanwhile, climate change mitigation

schemes like REDD+ called attention to the carbon sinks provided by Madagascar's rainforests.³

Against this backdrop of reverence for nature, however, decades of weak governance have meant persistently high levels of poverty (over 70%) among the Malagasy people.⁴ The largely rural populations along the humid northeast coast continue to rely on land in

KEY MESSAGES

- Northeast Madagascar is a biodiversity hotspot whose tropical forests and land uses provide vital ecosystem services to local people and the world. Protected areas appear necessary to conserve its biodiversity. But local people depend on land access to survive.
- Achieving a legitimate, equitable balance between conservation aims and local human rights requires inclusive dialogue and adaptive management.
- Many locals practise *shifting cultivation* to grow subsistence rice. It is often blamed for deforestation. But deforestation is largely the result of wider pressure on the land use system. Demographic changes, political marginalization, climate impacts, volatile cash-crop markets, and even protected areas all contribute to this pressure.
- Policymakers should support local land users in realizing improved income opportunities, including sustainable production of cash crops (e.g. clove, vanilla). This demands revival of agricultural extension services, strengthening links to value chains, and better regulations. Ecotourism and direct payments to locals also hold promise.



The research featured is focused on Madagascar.

Box 1. Shifting cultivation: An agricultural land use adapted to the tropics

Shifting cultivation is an ancient tropical land use. Its main feature is the replenishment of soil fertility through fallows, not fertilizers. In northeast Madagascar, farmers cut a plot of forest or fallow vegetation in the drier months. They allow the vegetation to dry, before burning it to incorporate nutrients into the soil. They then cultivate rice for up to two seasons, and then move on to a new plot. Finally, after leaving the original plot fallow for five years (on average), they return to cultivate it and the cycle restarts. The distribution of plots is regulated through a family lineage-based management system. Under the right conditions, shifting cultivation is sustainable. But when demographic changes, market demands, and/or other factors put too much pressure on the land use system, shifting cultivation plots may be expanded further into primary forests ("pioneering" cutting), or fallow cycles may be reduced, causing soil degradation. Like other local land uses, it is interwoven with people's beliefs and cultural practices.

forested areas to grow crops – especially rice – to feed themselves. They also greatly depend on small-scale cultivation of commercial crops like clove and vanilla to earn some income.⁵ Finally, they rely on diverse products obtained from forests or fallows – e.g. firewood, medicinal plants, woody vines, and wildlife – to satisfy a variety of basic needs.^{6,7}

In many tropical forest contexts worldwide – including Southeast Asia, West Africa, and South America – deforestation is mainly driven by large-scale commercial agriculture.⁸ Cutting forests to make room for export-oriented animal-feed monocultures is a typical example.⁹ In northeast Madagascar, by contrast, the main driver of deforestation remains smaller-scale agriculture – particularly shifting cultivation, also known as slash-and-burn agriculture or tavy, practised by local subsistence farmers (see Box 1).^{10,11}

Conservation and paddy rice

To prevent loss of the last remaining large humid forests along the northeast coast, Western (e.g. US) conservation organizations successfully lobbied Madagascar's government to establish the protected areas of Masoala, in 1995, and Makira, in 2005 (see Figure 1).¹² And at the 2003 IUCN World Parks Congress in Durban, former president of Madagascar Marc Ravalomanana announced the goal of expanding protected areas to cover 10% of the coun-

try's territory in the coming years. However, this has inevitably led to Malagasy farmers and families losing land and resource access to the vast protected areas. And issues of fair compensation remain contested.

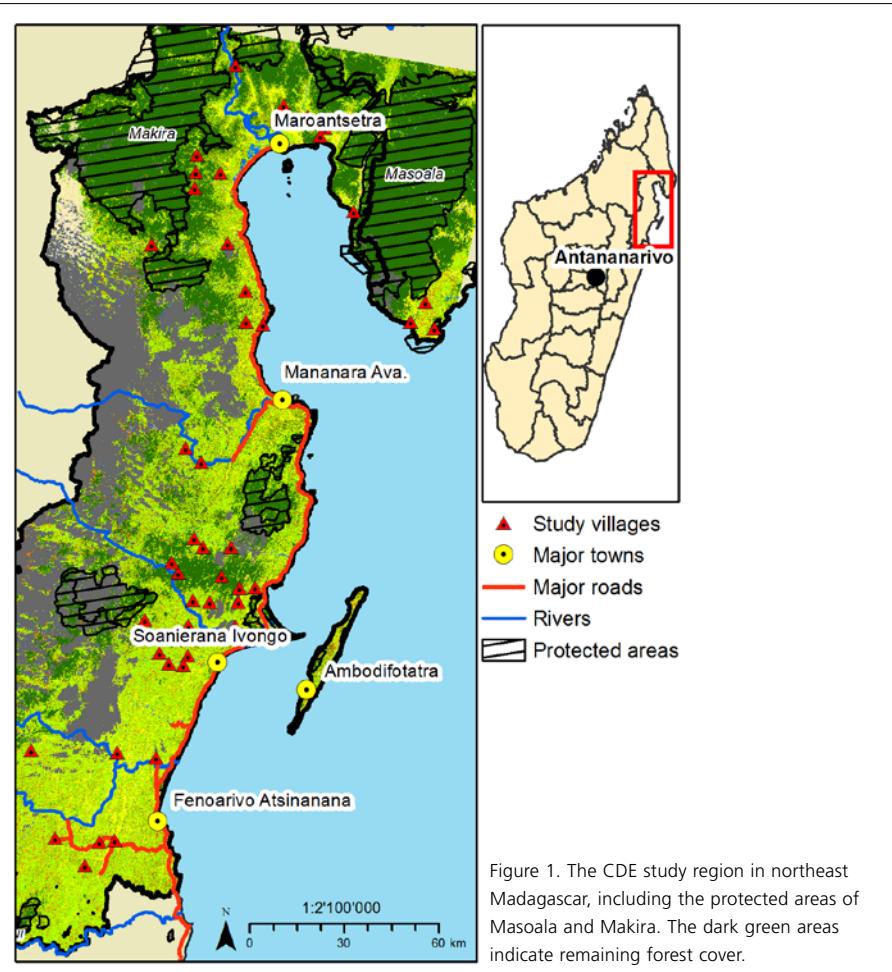
Parallel to these activities, conservation and development organizations launched projects to support intensification of smallholder agriculture – particularly irrigated (paddy) rice – in the areas near the newly established parks. They hoped this would make local land users quit shifting cultivation, thereby reducing deforestation. But shifting cultivation is difficult to monitor with common methods of remote sensing. So it remained unclear whether the protected areas or paddy-rice projects were having desirable effects. To obtain a clearer picture of land use changes, deforestation, and how different people benefit from land in northeast Madagascar, CDE researchers combined innovative satellite imagery analysis, use of geographic information systems, and ground-level studies with local land users (see Box 2).

Shifting cultivation not reduced

CDE's research shows that irrigated-rice production increased by 33% (by surface area) in northeast Madagascar between 1995 and 2011.¹³ Some of this increase might be due to the paddy-rice interventions. Critically, however, the increase in paddy rice *did not* reduce shifting cultivation in the region. Overall, shifting cultivation remains present to some extent across more than 80% of the landscapes in the study region (by surface area).¹⁴ Further, over 80% of approximately 1,200 households interviewed in 45 villages said they continue to rely on shifting cultivation to meet at least part of their subsistence rice needs.

Moreover, while deforestation decreased in the conservation areas, it *increased* in the rest of the landscape. With the large forest masses enclosed in protected areas, local land users were forced to target remaining forest fragments to expand their agricultural fields. Altogether, another 11% of the region's forests disappeared, mostly outside protected zones. And the deforestation rate increased at the end of the 16-year period.¹⁵ Notably, the threatened forest fragments may be crucial to the ecological integrity of the landscape, providing habitats for different species and beneficial microclimates.^{16,17} If this trend continues, landscapes in the study region will probably become much more homogeneous.

This highlights an often overlooked risk: *loss of diversity of land uses*. In northeast Madagascar, the rich tapestry of land uses has long sustained highly varied landscapes that afford diverse benefits and opportunities to people (and nature). These benefits go beyond mere provision of subsistence food. Fallow from shifting cultivation provide firewood and weaving materials, for example. Pastures provide grass to graze and



harbour fruit trees. Rice paddies provide added livestock fodder. Agroforestry plots provide cash crops and fruit trees. And the remaining accessible forests provide everything from timber and erosion protection to wild honey, medicinal plants, and vines to make rope.¹⁸ Local land users are fully aware of these rich “ecosystem services”, even as their situation compels them to sacrifice some in favour of others.

Persistence of subsistence

But a crucial question remains: *Why has shifting cultivation continued its dominance despite the expansion of paddy rice?*

Uneven support. For one, the benefits of increased paddy rice did not reach everyone. Different households have very different access to land in northeast Madagascar. Not all have irrigated plots. Shortage of tools and labour for terracing makes it hard to establish new paddies on rugged terrain. And faulty irrigation systems, lack of canals, and lack of water gates mean that even flat terrain ideally suited for paddy rice remains underused. Overall, it appears that only land users with existing rice paddies benefitted from the irrigated-rice support.

Food security. More importantly, however, shifting cultivation persists because of its inherent strengths, especially its core protective function: keeping people fed. Without pesticides or costly fertilizers, it enables Malagasy families to cultivate enough rice to ensure at least a minimum level of nutrition. It can be practised on steep hillsides and withstands the cyclones that can destroy rice paddies. Even successful cash-crop smallholders often keep land reserved for shifting cultivation, continuing to grow some subsistence rice when full market immersion would be more profitable.¹⁹

Cultural role. Finally, established customs and cultural norms should not be underestimated. Like other local land uses, shifting cultivation is intertwined with Malagasy beliefs about connection to the land and one's ancestors.²⁰ And under customary law, slashing and burning a new plot is the traditional way of staking a claim on land for one's descendants.^{21,22}

Ways forward

In general, short-term goals of eliminating shifting cultivation appear misguided. It still serves vital functions. Replacing it with massive monocultures would be much worse for the environment (see Box 3). But the current number of households depending on shifting cultivation to ensure their food security in northeast Madagascar is probably too high.

Overall, ways must be found to significantly improve the *incomes* of people in the region. This would enable more families to buy the food they need, rather than clearing new cultivation areas. To date, the few income

opportunities available have been far too uncertain (e.g. crop prices).²³ With proper guidance and investments – in knowledge and technology transfer, etc. – various options hold promise.

Sustainable cash crops and timber. Increasing smallholders' ability to cultivate and profit from high-value cash crops like clove and vanilla still bears untapped potential. Effective, adaptable techniques and technologies (e.g. of plant pest/disease control) that land users can make their own are likely best.²⁴ Notably, optimizing cash cropping need not increase the total land under cultivation.²⁵ Additionally, smallholders' access to and understanding of value chains must be improved. Further, organizing farmers into cooperatives could eventually enable better market links and bottom-up negotiating power. Finally, locals could also be permitted to sell certain forest products like high-value timber, if sustainably managed.

Payment for ecosystem services (PES).

Paying local people to protect and steward biodiversity could alleviate poverty and food insecurity while harmonizing the interests of land users and conservationists. Formalizing individual land rights is likely necessary for longer-term PES schemes to work. For now, whole communities could be compensated equally to prevent elite capture of benefits.²⁶ Above all, payments must reach the affected families facing livelihood pressures.

Ecotourism. With stable governance, long-term infrastructure investment, and proper risk management, ecotourism could one day be a key source of income for locals. It could work synergistically with PES schemes and involvement of locals in managing protected areas.

Where to begin

The need to preserve northeast Madagascar's biodiversity-rich forests and lift local farmers out of poverty bears all the hallmarks of a “wicked problem”. But this cannot be used as an excuse for not taking action to help local people. Wicked problems demand tractable, incremental approaches.²⁷ The first step is to bring together local land users with stakeholders from different levels to jointly debate the issues and become aware of each other's concerns. One example would be Malagasy farmers being invited to discuss cash-crop prices with regional exporters. In an ongoing project on “managing telecoupled landscapes”, CDE researchers are building such stakeholder platforms and testing video as a communication tool between distant actors (www.telecoupling.unibe.ch).

Box 2. CDE research in the biodiversity hotspot of northeast Madagascar

Reflecting global concerns about deforestation, data and maps on land use change in tropical areas tend to follow an oversimplified, binary approach, in which landscapes are categorized as either *forest* or *non-forest*. This can miss dynamic land uses like shifting cultivation. By contrast, CDE researchers employ an innovative geo-spatial mapping and analysis approach that renders detailed mosaics of land use and changes over time. They combined the approach with surveys of 1,200 households in northeast Madagascar (2013–2015) to shed light on people's evolving farming practices, people's impacts and dependence on nature, and the role of protected areas since 1995. Results revealed the continued dominance of shifting cultivation, diverse landscapes under pressure to continue meeting local people's needs, and deforestation rising outside the protected zones.

Box 3. Insights from a different tropical forest context

Côte d'Ivoire is a biodiversity hotspot in the Guinean humid forest region. Its development trajectory may bear lessons for northeast Madagascar as it faced similar challenges. Today, biodiverse forests mainly exist in Côte d'Ivoire's protected areas, while the surrounding landscapes are dominated by commercial oil-palm or rubber plantations. Locals regret the loss of forests and associated benefits to the massive monocultures. Little land is left for smallholders to cultivate subsistence crops outside the protected zones. This loss of subsistence farmland to commercial monocultures poses an ongoing threat to local food security. As for the remaining protected forest areas, they are viewed positively by older people and those involved in their community-based management. But those who are uninformed, do not understand the purpose of the protected areas, or experience only their restrictive aspects tend to view them negatively (Amin, Zaehringer, Schwilch, Koné 2015).²⁹

Julie G. Zaehringer, PhD
Senior Research Scientist
Centre for Development and Environment (CDE)
University of Bern, Switzerland
julie.zaehringer@cde.unibe.ch



Bruno Ramamonjisoa, Prof. Dr.
Director
Ecole Supérieure de Sciences Agronomiques (ESSA)
Université d'Antananarivo, Madagascar
bruno.ramamonjisoa@gmail.com



Peter Messerli, Prof. Dr.
Director
Centre for Development and Environment (CDE)
University of Bern, Switzerland
peter.messerli@cde.unibe.ch



Policy implications of research

Madagascar's biodiversity needs protecting, but locals must also be supported

The extraordinary biodiversity of Madagascar's rainforests is of incalculable value and should be preserved as a global good. Protected areas appear necessary for this. But the Malagasy people living near these protected areas depend on land access for their survival. Enforcing protected areas without adequately supporting affected land users raises serious questions of legitimacy and justice, and probably will not work to protect nature in the long term either.

Short-term elimination of shifting cultivation is not feasible or desirable

Despite decades of efforts to eliminate it, shifting cultivation persists in northeast Madagascar. If practised rotationally allowing long enough fallows, it is a sustainable agricultural practice embedded in a rich tapestry of diverse land uses. It enables Malagasy farmers to produce food staples without costly inputs, and provides added "ecosystem services". But the number of households practising shifting cultivation in the region is likely too high. Other stable livelihood options must be created – especially for younger generations.

Policies should emphasize sustainable agriculture and income opportunities

There are many ways to support rural Malagasy and ease local environmental pressures. Intensification of paddy rice remains worthwhile, but its benefits must be better distributed. Building added irrigation infrastructure and bringing more flat land into production could help. Overall, agricultural extension services should be revived and expanded to reach more people. Malagasy farmers require support in sustainably improving crop yields for themselves or markets, and in understanding, accessing, and profiting from value chains (e.g. clove and vanilla). Payments for ecosystem services and ecotourism also hold promise.

Platforms for mutual social learning could make international links work for locals

Rural Malagasy have long been subject to networked pressures from abroad – whether via colonialism, market demands, or conservation efforts. Rather than deny these global links, however, innovative ways must be found to make them work for local populations. Central to this is bringing together actors from different levels – e.g. state officials, conservation decision-makers, and local farmers – to discuss challenges and ways forward. Above all, local land users should be involved not as passive recipients, but as co-architects of sustainable development.²⁸

Suggested further reading

- Amin A, Zaehringer JG, Schwilch G, Koné I. 2015. People, protected areas and ecosystem services: A qualitative and quantitative analysis of local people's perception and preferences in Côte d'Ivoire. *Natural Resources Forum* 39(2):97–109. doi:10.1111/1477-8947.12069. <http://onlinelibrary.wiley.com/doi/10.1111/1477-8947.12069/full>
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Centre for Development and Environment (CDE)
University of Bern
Hallerstrasse 10
3012 Bern
Switzerland
www.cde.unibe.ch



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