

## Forests and Thorns: Conditions of Change Affecting Mahafale Pastoralists in Southwestern Madagascar

Jeffrey C. Kaufmann and Sylvestre Tsirahamba

**Abstract:** *Through two case studies of Mahafale pastoralists living along the Linta River in the spiny forest ecoregion of southwestern Madagascar, the paper explores the human impact on forest cover. While the environmental history of spiny forests along the Linta River indicates anthropogenic changes to forest cover, it also confirms out that forests have long been part of Mahafale landscapes. Thorns and spiny forests have not been inconveniences but preferences, and as much a part of their pastoralist strategies as grass. Two factors affecting forest cover are examined in detail, highlighting both external and internal processes. The first involves the increased sedentarisation of transhumant pastoralists who have integrated the prickly pear cactus into their landscape for use as cattle fodder and as human food. The second concerns the recent displacement of mobile pastoralists by immigrant farmers who made clearings in a large forest held intact by pastoralists as a reserve for livestock during times of stress. In an attempt to understand the complex processes of environmental change along the Linta River we focus our study on flexibility and on accenting a nature–culture mosaic that is largely determined by both ecological and social pressures.*

**Keywords:** Madagascar, Mahafale, pastoralism, dry forests, prickly pear cactus, anthropogenic change, conservation

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### **Conservation and Society, Pages 231–261**

Volume 4, No. 2, June 2006

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## INTRODUCTION

MALAGASY PASTORALISM is currently under threat. Various factors such as a weak beef market, cattle rustling, disease, drought, environmental degradation, displacement, and sedentarisation, to name a few have impacted forest cover.<sup>1</sup> Although mobile livestock raising activities remain important to the rural economies in western, south central, and southern Madagascar, they are diminishing. As Table 1 indicates, in the early part of the last century, Madagascar, the Grande Ile, the fourth largest island in the world, might have been called the 'Zebu Island' as cattle greatly outnumbered the human population (Bulletin de Madagascar 1955:1069; Granier 1965:1054). Nowadays, however, according to official estimates, cattle number less than half the total human population of nearly seventeen million. The World Bank (2003) calculated a national herd of seven and a half million heads in 2000 occupying fifty-five per cent of the land (thirty-two million hectares) from which sixty per cent of Malagasy households derived their living (fifteen per cent of agricultural GDP).

Livestock herding has taken its undetermined toll on the island's forests, wildlife, and biodiversity. Encouraging pasturage through the help of fires and migrating livestock that distribute grass seeds through their dung and coats, pits pastoralist landscapes against conservation projects, parks, and reserves (Wright and Rakotoarisoa 2003; Dewar 2003). To many conservationists working to protect the remaining endemic species, the image of a herdsman tending cows in pastures of flowing grass without a tree in sight, who sets the dry grassland ablaze before the wet season, and who carries on (un)aware of the island's unusually high species endemism, symbolises a threat to this UNESCO World Heritage site. As an indignant French ornithologist commented to the first author, 'Madagascar could be saved if all the cattle and herders just left the island'. The current pressures upon Malagasy pastoralism suggest that the ornithologist's wish could come true. And it would seem that this could benefit the conservationist's goal of saving Madagascar's natural heritage. But can it?

This article deals with pastoralism in Madagascar. It demonstrates the importance of forest cover to cattle herders in the spiny forest ecoregion of southwestern Madagascar. We present a case to demonstrate that mobile pas-

**Table 1**

*Ratio of cattle to people in the twentieth century in Madagascar*

Year	1921	1955	2000
Cattle	8,000,000	6,000,000	7,500,000
People	4,000,000	6,000,000	16,000,000
Ratio	2 : 1	1 : 1	<1 : 2

**Source:** Bulletin de Madagascar 1955: 1069; Granier 1965: 1054; Heseltine 1971: 259; World Bank 2003: 10

toralism is more beneficial than transhumance to the extremely rare spiny forest, because mobile pastoralism is concerned not with cultivation and permanent housing but with trading surplus livestock and stock products such as milk. On the other hand, transhumance is based on permanent settlements, involved primarily with agriculture and secondarily with a seasonal migration to higher ground. We present two processes impacting herd mobility, the processes of displacement and sedentarisation, which condition pastoralist practices that in turn affect conservation (Ruttan and Mulder 1999). We do not present Mahafale pastoralism along the Linta River as an outstanding model of conservation. Our purpose is mainly to gain a firmer understanding of why pastoralist environments in Madagascar are changing so rapidly and what the level of stock breeders' involvement could be in changing forests conditions.

Along the Linta River we provide two case studies that nuance anthropogenic change in one of Madagascar's highly variable and diverse environments of flux. In the southern Linta case, we demonstrate how 'plant enclosures' (prickly pear) and 'pastoralist trees' (*samata*) make the land 'wetter' by producing water and food for stock. They also increase sedentism among herders. In the northern Linta case, we indicate how forests have been degraded because of immigrant agriculturalists seeking land to crop. In the absence of exact data on immigration and deforestation in the northern Linta area, we rely more on qualitative data from the pastoralists themselves. This article is a work-in-progress and in time better statistics will be available. We explore the question: Who has changed forest conditions the most: mobile pastoralists, transhumants, or farmers?

To understand the role of pastoralism in both shaping and being shaped by ecological processes, we have adopted the approach of new ecology—in particular, the theory that semi-arid environments are more likely to be in flux or non-equilibrium than in stasis or balance. Contestations in the application of this ecological theory to semi-arid grazing systems question whether systemic changes are due to biotic or abiotic factors. Illius and O'Connor (1999) emphasise the impact of humans and their livestock (biotic) to other biota, while Sullivan and Rohde (2002) highlight rainfall (abiotic) as the lead factor creating environments of radical change from year to year. We seek a middle ground between these two extremes, one that acknowledges both biotic and abiotic factors in conditioning the landscape. Landscape theory avoids the pitfalls of 'systems' theory by relating human and nonhuman, biota and abiota, to the creation of a landscape (Bender 1993; Hirsch and O'Hanlon 1995; Bender and Winer 2001). We do not stress nonhuman conditions at the expense of the other, or vice versa, but rather explore their interactions. This allows us to conclude that pastoralists need to be flexible in environments of flux. Our perspective on non-equilibrium environments, informed by environmental history and historical anthropology, therefore highlights both human and nonhuman factors as affecting the changing conditions of Madagascar's spiny forests along the Linta River.

Flux paradigms ‘describe a human–ecological relationship that is non-equilibrial, historically contingent and constantly negotiated at both material and ideological levels by unequal actors’ (Gillson et al. 2003). The idea of non-equilibrium in nature is not new. In 1930, Elton pointed out that ‘the balance of nature does not exist and perhaps never has existed’ (Elton 1930:15). Flux paradigms involve a shift in ideas from stable adaptation to contingent interaction. Human populations and their biophysical surroundings are seen as interacting with each other over time in highly variable and innovative ways (Hamilton 1982; Westoby et al. 1989; Dougill et al. 1999). New ecology grew out of cultural ecology but without the assumptions that the ideal state of nature is equilibrium and that culture seeks a balance with nature through adaptation (Steward 1955). As a result, there is a move away from theorising nature as being distinct from culture, from human intervention, and vice versa (Kepe and Scoones 1999; Scoones 1999). In this chapter, we theorise that the landscapes along the Linta River are products of both a dry climate and human interventions skewed towards attending to the ever shifting problem of water and food.

### ***The Linta River***

The Linta River, the main watercourse dissecting the Mahafale plateau in the far southwest and the location for this study, is located in Ampanihy district (see Figure 1). Ampanihy is one of twenty-one districts (*fivondronana*) in To-liara province (*faritany*), one of six provinces in the island. The district is inhabited by 160,000 people, distributed over 13,253 km<sup>2</sup> (1993 census). Overall population density is 12 people/km<sup>2</sup>, with the highest density in the district’s northeast and along the coast, and the lowest population density in the district’s middle section (Madagascar 1996).

The Linta remains dry most of the year. For perhaps two months during the austral summer rainy season, water flows 150 kilometres from the river’s source, north of the market town of Ejeda, to its mouth near the sand-duned village of Androka Ela, where the Mozambique Channel and Indian Ocean join. From its source in the dry forests, decorated sparsely with baobab trees, the Linta weaves most of its way through spiny forests of endemic xerophytic plants. In Madagascar’s spiny forests, the endemism of xerophytic plants adapted to high water stress approaches 95 per cent (Phillipson 1996; Wells 2003:33). The endemic Didiereaceae family and a plethora of Euphorbiaceae species are much in evidence, while others, such as members of Cactaceae and Agavaceae, are recent introductions from the Americas that have naturalised in the island’s deep south and southwest.<sup>2</sup>

The length of the Linta River falls under a rain shadow effect below the southern highlands. Average annual precipitation levels range from 750 mm/annum—the minimum requirement for agriculture—at the river’s source, to just over 300 mm/annum at its mouth (see Figure 2). By contrast, stations

1000 km north average >300 mm/month (July 2003). The geology along the river's length consists of basement metamorphic rock (crystalline) in the upper Mahafale plateau at the northern end of the Linta, Tertiary limestone in the lower Mahafale plateau, and unconsolidated sands towards the river's southern end (Du Puy and Moat 2003). Vegetative zones correspond to different degrees of water stress and soil types, and extremely high is found in the limestone and sandy areas.

The region is aptly named *Mahafale*, meaning 'having the power to taboo'. The people of the Mahafale, who used the toponym at times as an ethnonym by referring to themselves as Mahafale, live in a precarious biophysical environment subject to sudden changes from year to year. In this unforgiving landscape a poor decision might bring swift disaster to a household.<sup>3</sup> Residents draw on the idiom of taboos ('*fale*') to help them interpret the unpredictable environment. A complicated array of proscriptions, many of which relate to water and animals associated with water, structure their social lives

Figure 1

Location of the Linta River study sites

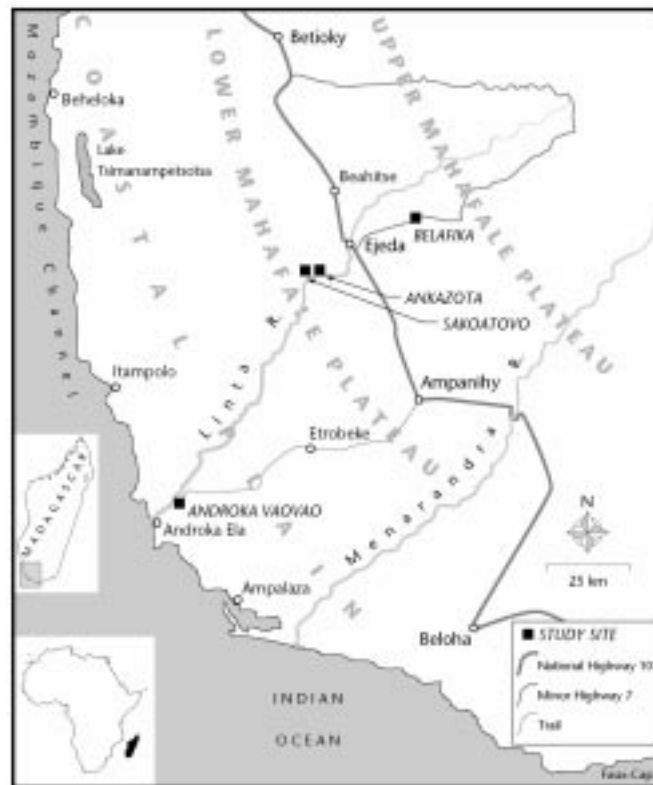


Figure 2

*Cattle watering at the Linta River before the dry season*



Photo Courtesy: S. Tsirahamba

and make sense of the difficulties they face while coping with some of life's basic needs (Ruud 1960: 76–110; Decary 1964; Kaufmann n.d.(b): 24–29). Autochthonous residents, those who have lived in the area and have several generations of dead ancestors buried there, but not all new immigrants, forbid the killing or eating of numerous endemic mammals and reptiles. For example, the ring-tailed lemurs (*Lemur catta*) and radiated tortoises (*Geochelone radiata*) are left alone by the Mahafale. The Mahafale link their long history of survival in the region to their being aware and respectful of the land's special demands and the animals that, as the stories go, at one time or another led their ancestors to water. The trope of 'being shown the way' (*toro lala*), of learning how to survive in the Mahafale, runs through innumerable origin stories of various taboos involving wild animals. People interpret taboos not as barriers to individual freedom but as guides to family survival in a land of difficulty where conditions fluctuate from year to year (Kaufmann 2004: 349).<sup>4</sup>

## METHODS

The two study sites along the Linta River, one near the river's mouth and the other near its source, were chosen by related research questions. Kaufmann's main research question was: Why did Mahafale pastoralists create a relationship with the prickly pear cactus? The effects of this pastoralist strategy on biota, on indigenous conservation ethics, and on the conservation of endemic species near the mouth of the Linta were ancillary questions. After consulting with Esoavelomandroso, a historian at the University of Antananarivo who had grown up in the Mahafale, Kaufmann decided on Androka Vaovao as the site to conduct ethnographic research on a form of pastoralism based on the

prickly pear. He discovered that 'cactus pastoralism' was a way of raising cattle in a semi-arid climate, a form of pastoralism that had received little attention among scholars of pastoralism. Tsirahamba's question was: How might pastoralism in southern Madagascar be improved to assure that it continues as a viable Malagasy way of life? He chose the Ejeda area because it had been both the heartland of Mahafale mobile pastoralists and the location of an ancient forest long held as a reserve by nearby herding communities.

In 1997, Kaufmann conducted ten months of participant-observation fieldwork in and around Androka Vaovao. This research complemented eight months of interviews among the Merina people in the capital city of Antananarivo and another eight months of research in the national archives and libraries (Kaufmann 1997).<sup>5</sup> During the fieldwork at Androka, he sampled a wide range of people in a dozen villages and hamlets in the vicinity. These included both male and female respondents, and young as well as old people. After initial exploratory conversations with potential consultants, he spent several days in the company of informants who welcomed the research project (for example, they parted with detailed oral histories or invited him to help tend to their cattle and see for himself how things were done). However, many residents were extremely conservative and suspicious of *vazaha* (white foreigners). The participant-observation method helped him to slowly earn wider participation in the project and the occasional trusting informant. Over time he met with scores of people, though most of his information came from ten collaborators from various backgrounds, status, and locale. The majority were men of modest means and herds. His key informants (either male or female) were engaged in pastoralist practices and knowledgeable of the area, its history, and its culture (these methods are explored in depth in Kaufmann 2002 and Kaufmann and Rabodoarimiadana 2003).

For Kaufmann, ethnographic fieldwork around Androka was more of an interactive process than a formulaic method. The interchange of ideas—of giving information and not just taking it—helped build rapport, pushed the conversations along, and created his most fulfilling ethnographic moments. Jan Vansina wrote about fieldwork in the Congo being at its best when 'conversations became a genuine exchange of information and not just one-way de-briefings' (Vansina 1996: 125). Joan Vincent, who also has done extensive fieldwork in Africa, emphasised the 'arena' of fieldwork: a 'situation that one is in, and other people are in, and you are trying to understand the resolutions that they come to with respect to the human conditions they face' (Nugent 1999: 538). The people whom anthropologists engage also engage their own anthropologists. They too were interacting and observing, pursuing their interests and learning, making mental notes and drawing conclusions, choosing to be silent about one topic or to expound on another.

Tsirahamba's field research is ongoing. He chose the pastoral zone around the town of Ejeda after surveying localities in the Ampanihy and Betioke districts (Ampanihy is east of Ejeda and Betioky is northwest on Highway 10),

then in other zones with a pastoralist vocation in Madagascar (Mandritsara, Ambilobe, Vohémar, Mitsinjo, Morondava, Betroka, Diego-Suarez, Ambovombe Androy, Southern Amboasary), in districts profiting from livestock coming from southern Madagascar (Tamatave, Fenerive-Est, and Mananjary), and in the important cattle market towns (Tsiroamandidy, Ambalavao, Mandoto, Gogogogo, Mahitsy). These preliminary studies made it possible to study in detail Malagasy stockbreeders at the geographical and historical levels, and to conclude that the pastoralist zone around Ejeda involved mobility as a characteristic pastoralist strategy in the semi-arid climate.

Tsirahamba sampled a wide range of the pastoralist population around Ejeda. He started with the notable ones (royalty), then the persons in charge of the local veterinary service, then the oldest population of the village (50 years and older), then those in the age range between 25 and 50 years, and finally young people between the ages of 15 and 25 years. He conducted interviews according to the level of knowledge of the targeted persons. His interview questions explored the importance of pastoralist activity at the village level.

To assess the correspondence between what people say and what they do in their everyday practices in the complex pastoralist environment around the Linta River watershed, we became constant participant-observers of their daily life and of interactions between people and the environment. We collected basic ethnographic information such as the social organisation of pastoralist production and exchange, herd sizes, herd composition, and herd movements and migrations. We also listened to oral histories from several key figures in the communities and reviewed documents found in various archives in Madagascar and France.

The ultimate goal of the research projects from which the two case studies in this paper are drawn is to gauge the state of pastoralism in the region and to determine how it could be improved and reconciled with conservation interests in Madagascar's spiny forest ecoregion. Compared to the African continent, pastoralism in Madagascar remains understudied (Kaufmann 1998). In the southwest, this situation could change as more of the spiny forest ecoregion becomes protected land involving conservation projects. The para-statal organisation ANGAP (Association Nationale pour le Gestion des Aires Protégées) has designated this ecoregion—with its high rates of endemism at the species, genera, and family levels and its low percentage of land (3.2 per cent) within protected areas—as a high priority area in need of protection (Hannah et al. 1998; Randrianandianina et al. 2003, Fig. 14.3; Fenn 2003).

### *Environmental History*

Historically, changes to the landscape by the Mahafale pastoralists have been made while labouring for herd security in an insecure land. Archaeologists excavating in the dry southern coast discovered an iron implements associated



with the earliest zebu herding activities in evidence on the island, with radiocarbon dates to the twelfth century A.D. (Dewar and Wright 1993). The earliest occupied site is that of an A.D. 450 campsite in north Madagascar with hunting activities much in evidence (Wright and Rakotoarisoa 2003). Before that, sailors and traders are believed to have visited the island up to 2000 years ago, hunting with iron implements, as evidenced by the bones of extinct pigmy hippopotamuses and other animals found in southwestern Madagascar (MacPhee and Burney 1991). Food production and food foraging activities spread slowly inward from the coasts and from established trading ports by the thirteenth century (Vérin and Battistini 1972; Wright and Rakotoarisoa 2003).

An influx of people and livestock into the Mahafale region occurred in the fifteenth century, as immigrants from the island's southeast established territories in the coastal plain from the Onilahy river in the north to beyond the Linta River in the south.<sup>6</sup> The immigrants were plagued by epidemics, famines, locust invasions, hunting accidents, battle casualties, and other struggles, large and small (Esoavelomandroso 1995). The people had difficulties increasing their population and keeping their stock alive in the arid southwest until they formed alliances out of several *raza*, which was evidenced in *sofin-drazana*, the ancestral line cut in the ears of cattle (Esoavelomandroso 1989a). One's 'pasturing allies' lived in different ecological zones from oneself—for example, in the northern and wetter part of the semi-arid southwest—thereby allowing access to seasonal pastures. The pioneers built their tombs on the land, buried their dead, and made it *tanindrazana* or ancestral land. They colonised new pastures as the herds grew—or as Mahafale say: 'cattle open pastures in the forest' (*ty aombe ro mandoake tane*)—away from the scarce cropped land (Esoavelomandroso 1989a: 47).

It should be noted that in the statement 'cattle open pastures in the forest', the 'pastures' referred to did not mean vast grassland landscapes or savannas almost devoid of trees. Forests have stood as reserves of browse and fodder in times of drought. 'Forest' was also a relative term, referring to a range of tree-scapes from dense forested lands to open woodlands. 'Open' (*mandoake*, root word *loaka*) meant to pierce or to make a hole (Richardson 1885: 394). It did not mean to clear-cut a forest for grassland. Grass cannot survive as well as the xerophytic plants and trees that have adapted to the high stress conditions in the semi-arid climate. It is important also to note that the process of opening up pastures did not involve fire. Nor did pastoralists use fire as pasture management. 'Forests in the Mahafale do not burn', they explained, referring to the fire-resistant moisture storing flora that dominated the landscape. Instead, the cattle browsed the lower storey and 'opened' more space for grass to grow between the trees and brush. The trees and brush remained, therefore, in the pastoralist landscape.

By the beginning of the eighteenth century, outside interests began to affect the environment as Mahafale contact with European slave traders increased as

did cattle and slave trading for European guns (Drury 1729; Esoavelomandroso 1995; Parker et al. 2002). In the nineteenth century, European brokers had to conduct their business from the seashore, where they purchased cattle, archil (a lichen producing violet dye matter), and rubber latex (Kaufmann 1999). Malagasy rubber trees, *Euphorbia intisy*, were much in evidence in the spiny forest at the time. European demand for high quality latex ushered in a deforestation operation. European buyers urged Malagasy to stop tapping the trees and start cutting them whole and extracting all the latex within. The practice nearly exterminated the *E. intisy* species (Decorse 1901a, 1901b; Drake del Castillo 1902; Vacher 1907).<sup>7</sup>

Clearly, then, the people that we are writing about were not innocent pastoralists or model conservationists. They have readily altered their environments, inscribing culture into nature. In recounting oral histories, for example, the tellers would start with the original ancestor who with their cattle first made an ‘opening’ in the forest. A typical recounting went as follows:

My ancestors came from the Tolagnaro region, they were Tanosy. I do not know why that first relative of mine left that area, if he fought with someone or whatever, or if there was a problem in the extended family. This particular ancestor arrived here in Mahafale land and married into several groups around the Linta River: Temitongoa, Temilahehy, Tetsirarake—Mahafale all. Once children were born to him here, it became their ancestral land. With marriage came the raising of livestock. With cattle, which came from the woman’s family in the form of cattle gifted to the bride at her marriage (*tandra*), he was able to open the forest for his family.<sup>8</sup>

A crucial segment of the area’s environmental history involved first the introduction of thorned prickly pear cactus to Madagascar and second the ensuing Mahafale adaptations of this plant to their subsistence system verses French colonial conflicts with it (Kaufmann 2001). The prickly pear species *Opuntia monacantha* had been introduced to the island in 1769 as a protective hedge plant around Fort Dauphin (Tolagnaro). Livestock raisers appropriated the plant and turned it into living fencing that supplied a source of food for their herbivores and themselves. Cactus proved to be a bewildering foe to the French and a powerful ally to the Mahafale pastoralists who knew its defensive strengths (Kaufmann 1998; Kaufmann 2001). The Mahafale lined trails with imposing walls of cactus thickets and wrapped their corrals and villages in labyrinths of thorns to repel unwanted intruders. The French, Senegalese, and Malagasy soldiers pursued local insurgents through narrow passageways made of tall cactus fences. However, these hid the spear toting Mahafale who singled out the French officers from behind their cactus blinds.<sup>9</sup>

By 1924, the French colonial government had had enough and unleashed a biological foe of their own. They introduced a cactus parasite, a cochineal scale insect of the *Dactylopius* genus, into the southwest at Toliara and infested prickly pear plantations with parasitised cactus cladodes. Four years after the eradication campaign had begun, all of the *O. monacantha* had been

killed in an area of 100,000 km<sup>2</sup> (Frappa 1932). The rapid and complete elimination of this pastoralist resource ushered in the 1930 killing famine, in which several hundred people and over ten thousand cattle died (Kaufmann 2000). With an embarrassing disaster on their hands, the French colonial government moved quickly to import replacement spiny and spineless species from America. Today, at least four species of *raketa* (*Opuntia* sp.) are naturalised in the deep south, with one species again serving as living fences (Kaufmann 2004, Table 2). The French-induced famine that had gripped the south three-quarters of a century ago demonstrated that, as with the capricious rainfall, the unexpected could occur as if by accident in this environment.<sup>11</sup>

As a fodder plant, *O. monacantha* had raised the carrying capacity of the land by helping store moisture in plants edible to cattle. It made a semi-arid land appear less arid in the sense of providing a 'water-food' plant for cattle and humans (Kaufmann 2004: 352). It was as if the climate had shifted towards the moister side of the semi-arid scale, (more towards the 750 mm of rain per year scale), without there actually being an increase in rainfall. In this way the cactus enclosures made the landscape more like wetlands (Woodhouse et al. 2000).

In contemporary times, the Mahafale resolve and resourcefulness are again being tested. Some pressures come from within, some from without. Malagasy citizens had traditional use rights in forested public lands that were the state's domain. King Andrianampoinimerina of Imerina claimed the forests as his in the eighteenth century, a claim which his successors continued throughout the nineteenth century (Callet 1908). Andrianampoinimerina also claimed to be one with rice, '*Izaho sy ny vary dia iray ihany*', which stamped rice onto Malagasy identity and encouraged clearing lands for cultivation (Callet 1908: 177). In 1881, the Code of 305 Articles established the statute of the state's rights to all forests and vacant (uncultivated) lands. Malagasy subjects were formally given the right to transfer and sell 'improved' *mise en valeur* holdings (Althabe 1968; Service Topographique 1968). These rules were expanded in 1974 to allow state appropriation of unutilised land and the designation of rural areas as land management zones (Rakotoniriana 1984). In 1984 the state established migration zones for the redistribution of the population to underdeveloped rural areas.

In the words of one Mahafale pastoralist, who typified the way many Mahafale experienced cultural change, the pastoralist way of life nowadays faces enormous challenges, with high inflation, corruption, and increased poverty topping the list of concerns.

*'Life before was good. Nowadays, it is difficult. For example, if one needs an ox-cart, it will cost lots of money. The price of living has gone up. In recent history, things had cost a lot less than they do today.'*<sup>11</sup> *This is not to say that our people in the past did not suffer. They did. They suffered, for example, from a lack of clothing. Can you imagine wearing bark*

clothing? Sometimes the man in the household acquired cloth (lamba) but the woman rarely did.<sup>12</sup> Nowadays, there are a lot more consumer goods but we lack the ability to buy them, like you vazaha can. In Madagascar, life is a life of suffering. Our manner of life, our subsistence (fivelona), is suffering. When our pastoral way of life was sufficient, we were able to raise many cattle worth lots of money. We do not raise cattle for money, like you do overseas, but to use mainly in ceremonies. We need cattle to appease a spirit, to survive famine, to incorporate our sons and daughters at our hazomanga, to marry, to purchase food that others grow, and to buy our clothing. In years past, we married by gifting the parents of the bride with a cow/calf pair (renimianake) and a zebu's hindquarters (vodin'aombe). Nowadays, the bridewealth includes all that, as well as selling at least one head of cattle to 'set up house' for the bride. We have to buy spoons and knives, cooking pots and plates, clothing, and maybe even a sewing machine.<sup>13</sup>

The future of pastoralism in the region looks bleak. In 1991, a minor drought occurred in the extreme south and southwest [Kaufmann n.d.(a)]. In Ampanihy district, which is the largest producer of cattle in Toliara province, the 1993 census figures, (Table 2) indicate the effects of the 1991 drought and a 25 per cent decline in cattle over a four year period.

In 1998, swarms of locusts swept through the Mahafale, eating every crop in their path. Four years later, in 2002–2003 a major drought, a killing drought or famine (*kere*), struck the area (Helisoa and Mahavoatsy 2003; Ra-beherifara 2003). Though approximate figures of stock losses from this famine were not yet available, the government expected a steep decline in the region's livestock sector (Ravoavy 2003). From early reports, the new millennium's killing drought appeared to have followed the same pattern as the infamous 1930 famine: hitting hardest the oldest and poorest residents, and those with the fewest head of cattle to 'cushion' the fall in sustenance (Kaufmann 2000; Helisoa 2003).<sup>14</sup>

Famine and pestilence, suffering and poverty, do not, in a poor country like Madagascar, affect all victims in the same manner.

'Hazomanga [*lit.* 'blue wood', the sacrificial hardwood pole designating a lineage] is a symbol of the ancestors, the same way that a flag is a symbol of a nation. It is a group's symbol. When we kill cattle to the hazo-

**Table 2**  
*Recent cattle numbers in Ampanihy District, Madagascar*

Year	1990	1993
Cattle	2,193,338	1,658,044
Percentage of change		-25

Source: Madagascar 1993: 51

manga, we kill 60, 70, 80, 100, 120, even 130 heads sometimes. There may be 100 cooking pots going. If the fires go out it means it is a bad day for being blessed. As our life has gotten harder, we have had to ask for more blessings from the ancestors. In this way all those slaughtered cattle are a sign of the tough times. According to 'gasy' [Malagasy] thinking, the hazomanga gives us access (miroborobo) to wealth, property, and riches. If people do not have a hazomanga, they are of no importance. They are not slaves but they are people who do not accomplish much in life. They do not have lots of kids, cattle, or the know how to do business. All they have is suffering. Wealth is from the Creator, the same as hazomanga and lots of cattle. If there are enough cattle, they can be inherited by the descendants.<sup>15</sup>

Though we lack statistics of the numbers of *hazomanga*-less people in the mahafale, we have observed numerous impoverished villagers. Our host families made a point of relating to us their plight. The very poor, without a *hazomanga* and the support of a lineage, are powerless in the face of tragedy. Their savoir-faire in a scourge may only be fetching forest products, stealing from neighbors, sending a daughter into prostitution in Toliara, moving the family to an urban ghetto, or, if their know-how runs out, dying.

The above environmental history demonstrates that numerous anthropogenic changes have occurred in southern Madagascar's spiny forest ecoregion. We turn next to the Linta River case study, which relates research near the river's mouth (the southern site) with research around the river's source (the northern site). This case study shows heterogeneous landscapes and their histories and demonstrates that there are differences in pastoralist strategies and in histories that affect forest cover.

### ***The Samata Forest***

The southern study site was located ten kilometres inland from the mouth of the Linta River, around the canton of Androka Vaovao (see Figure 1). This was the last bus stop on a slightly improved (widened) ox-cart trail one hundred kilometres off of National Route 10 at the district administrative town of Ampanihy. This site included the Samata forest, a large expanse of forested land on the coastal plain, with transhumant links to the Beahitse pasturage located one hundred kilometres north and forty kilometres west of Ejeda. Zebu herders have speckled the landscape with trees they call *samata* (*Euphorbia stenoclada*) or *samata foty* and *famata foty* in other Mahafale locations (Charles et al. 1991), and *arahaka* in Antandroy country to the east (Decorse 1901b). They favoured this tree because their livestock were able to eat the non-toxic coral-like xerophyte with its succulent, somewhat spiny, pencil-shaped branch segments. They used it as cattle browse and grass supplement for hundreds of years. In 1997, herders still fed it as supplemental fodder after

the grass season was over and before the rainy season. This landscape was widespread along the Mahafale coastal plain (Rabesandratana 1999). Table 3 provides a synopsis of the study site.

**Table 3**  
*Brief description of the Samata forest*

<b>Characteristic description</b>	
Location	Region of Androka Vaovao in the extreme southwest; north and south of Linta River in the coastal plain; between the Mozambique Channel and the Indian Ocean; on the main ox-cart trail linking Androka to Ampanihy and to National Route 10.
Altitude	100 m to the north (within viewing distance from Androka Vaovao) and 0 m to the south (ocean).
Relief	Gentle north-south slope interrupted twenty kilometres inland from the Linta delta by a large dune paralleling the shoreline; shallow but wide river valley.
Climate	Tropical arid influenced by rain shadow effect. Predominance of northwesterly monsoon winds mixed with southeasterly trade winds producing yearly rainfall of 350 mm (Lebigre and Reaud-Thomas 2001). Heaviest rains between December and March (monsoon season).
Soils	Unconsolidated sands.
Vegetation	Dry shrub and thorny thickets; anthropogenic forests of endemic species, especially <i>E. stenoclada</i> ; anthropogenic enclosures of introduced species, especially <i>Opuntia</i> sp., high endemism.
Dominant vegetation	Deciduous dry forests and spiny thickets; prickly pear cactus and agaves around human spaces.
Population	Mahafale comprised the predominant ethnic group and longest residents with Vezo Sara fishers (some of whom also farmed and herded livestock). Estimated average population density was <10 inhabitants/km <sup>2</sup> .
Subsistence strategy	Extensive zebu breeding in pastures associated with living fences of prickly pear cactus and cropped land planted with cassava, corn, sweet potatoes, beans, sorghum, and melons. Market crops: prickly pear, cassava, sweet potatoes, mangos, bananas, corn.
Administration	Androka Vaovao canton, which housed mayoral office, rural police, and post office, served the surrounding rural communes ( <i>fokonolona</i> ). The district offices were under the jurisdiction of Ampanihy regional administration, which in turn was under the jurisdiction of Toliara province.

**Source:** FTM 1981; Kaufmann 2004; Lebigre and Bellera 1997; Lebigre and Reaud-Thomas 2001.

Herders have turned some of the coastal plain, from Ampalaza near the mouth of the Menarandra River to Itampolo ninety kilometres north, into a 'samata landscape,' in which most other trees have been thinned, giving this useful, succulent tree more space to grow into the main tree in sight. The landscape resembled an expansive nursery of *E. stenoclada* trees evenly spaced across the spiny thicket. The *samata* were shaped into bushy-topped trees, a result of cutting the lower branches for their stock and slicing them for their cattle, or, in the case of young trees, letting cattle and goats pull the lower branches off themselves. Other trees and plants in the area included thick growths of toxic euphorbes, didierea, and aloes, short bushes, and prickly pear cactus plantations.

Mahafale residents on the coastal plain, *tandriake* (coastal people), subsisted with a transhumant economy. Part of the population around Androka Vaovao lived in sedentary settlements throughout the year, with only a fraction engaged full time in herding activities, which conformed to the classic definition of transhumant communities (Jones 2005). The transhumant communities in the *samata* forest sent all of the livestock with a portion of the population, on a yearly trek one hundred kilometres north to seasonal pastures near Beahitse, the 'great grass' growing in a band of unconsolidated sandy soil between the lower and upper Mahafale plateaus.

Unlike the majority of *renelime* Mahafale around Ejeda, most *tandriake* Mahafale were mixed farmers. They specialised in a hybrid production system of livestock herding, trading, and cultivation, with each of these contributing a third of their diet. Although most Mahafale around Androka Vaovao considered themselves pastoralists, cultivated foods provided one-third of their diet, with another third coming from livestock, mostly from curdled milk, and a final third from regional systems of exchange that supplied rice and fish. With the inclusion of cactus into their diet, mobility had become less diffuse and more concentrated into transhumance.

An intermittent band of cropped and fallow land paralleled the coastline for ninety kilometres, from Itampolo through Androka Vaovao to north of Ampalaza (Figure 1). Prickly pear cactus served as living fences around cropped lands, gardens, livestock corrals, trails, and hamlets (see Figure 3). The live fences protected small cropped fields and gardens of cassava, corn, beans, melons, and sweet potatoes against intruders. Herders singed off the thorns from the cactus cladodes (segments of several pads growing along a branch) and fed the watery food to their cattle for six months of the year. The people consumed large quantities of cactus fruits (*voandraketa*), which added to their main diet of curdled zebu milk (*abobo*), cassava (*balahazo*), corn (*tsako*), fish (*fia*), rice (*vary*), and sweet potatoes (*bageta*).

Herders in the *samata* forest used herd mobility to conserve graze and browse in a mosaic of pastures. They relied on several herding strategies depending on whether the conditions were wet or dry. They kept their herds closest to cacti during the dry season, and further away during the wet season.

Over the course of the year, they layed-in cactus fodder and used three grazing techniques: dry season daily rotations from the corral to nearby pastures of short fine grass; early wet season transhumance; and late wet season grazing around temporary cattle camps in pastures of tall coarse grass (see Table 4).

Cactus affected the timing of seasonal herd movements. In 'normal' non-drought years, when large cactus plantations thrived in and around the household corrals (where people lived most of the year), most herders stayed near home and fed their cattle this fodder until there was sufficient new grass in distant northern pastures for the cattle herds. Only then did they migrate to cattle pastures and camps (*toets'aombe* and *kialo*) in the north, in the slightly more humid inland steppe ecological zone of the Beahitse pasturage. Cactus contributed to the timing of the transhumant migration by allowing the herds to eat cactus fodder at a time when the pastures were unproductive (thin, short, and brown grass) and until the beginning of the rainy season. About a week after the rains had started in the northern transhumant pastures, herds and families began the five-day trek north. Families too poor to own an ox-cart carried their supplies on their heads and shoulders. The transhumants fed cactus to their cattle along the way.

That the timing of the transhumance did not occur in the dry season, as one might expect, but at the beginning of the wet season, was due to the availability of cactus fodder and the fact that the three ecological zones in the spiny forest ecoregion were more alike. The northern pastures received more rain

Figure 3

*The 'living fencing' of prickly pear cactus (Raketa) around Androka Vaovao*





**Table 4**  
*Fodder and graze by month (1996–1997)*

Season / (Herding strategy)	Malagasy name for season	Month	Food
Hot moist (laying-in fodder)	<i>lohatao</i>	November	Cactus
(transhumance)		December	cactus/grass
(transhumance)		January	grass/cactus
(grazing in mud pastures)	<i>asara</i>	February	Grass
(grazing in mud pastures)		March	Grass
(grazing in sand pastures)		April	Grass
Cool dry (grazing in sand pastures)	<i>asotry</i>	May	Grass
(grazing in sand pastures)		June	Grass
(grazing in sand pastures plus laying-in fodder)		July	grass / cactus
Warm dry (fodder plus some graze)	<i>faosa</i>	August	cactus/grass
(laying-in fodder)		September	Cactus
(laying-in fodder)		October	Cactus

and had more grass than the cactus zone closer to the sea, but they were still quite dry compared, for example, to the more humid savannas outside the rain shadow effect. The rainy season move to the ‘mud pastures’ (*toets’aombe fotake*) gave the cactus and ‘sand pastures’ (*toets’aombe fasike*) time to recover, and allowed the stock to regain some of the bulk they lost during the dry season.

*‘When we stay in the mud pastures, we need a group of people, including many strong-bodied men (vata lahy maro), because it is a lot of work. Sometimes there are thieves (dahalo) that rob the owners of their cattle (mandroba). . . We cannot stay at the mud pastures for long because the cattle are not accustomed to the cool wet weather when the monsoon rains set in. After the rains start, the herds have to return. If they stay too long, it might devastate the cattle (aombe). We stay just long enough to make the aombe strong again. Then we come home. Even if it does not rain near the coast, we have to come back anyway. The weather is too contrary at the mud pastures for the cattle from the sand pastures.’<sup>16</sup>*

Women did most of the planting in gardens, small-cropped fields near their households, and even in dry riverbeds. Their main task of preparing food for their household became more heedful before the harvest season (*asotry*). Curdled cow’s milk (*abobo*) and cactus pears (*voandraketa*) bridged most of the gap. They also collected fruits, berries, and nuts from the xerophytic vegetation. Throughout the year, women collected various roots, seeds, or fruit for household consumption. Though women generated some revenue from forest products, they considered these foods more important for home use.

Laying-in cactus fodder involved only limited herd movements. Most herders moved their cattle daily to living fences of cactus and prepared the fodder for them. Those who had access to an ox-cart carried loads of cactus fodder to their waiting cattle. Malagasy zebu stand eerily still for hours watching the familiar routine of cactus being processed into fodder. The herder makes sure that each animal received its daily share of around one hundred pounds of singed cactus fodder, an amount which also supplied about eight gallons of water (Thorner 1911). They layed-in cactus fodder twice a day over a period of four to six months of the year depending on the timing of the rains and the amount of available cactus.

From September to November, cowherds strained to keep the animals in their charge fed. A typical day consisted of three hours for preparation of the morning cactus feed, collecting an ox-cart load of brush for burning off the cactus thorns or a load of euphorbia fodder, then three hours more for preparing the evening cactus feed. At times, the men and strongest boys accelerated the process by spearing three to four large branches (cladodes) on the spiked end of their cactus spear (*jia*) and hanging an equal number and weight from the cutting end. They then carried the heavy loads numerous times from the cactus fence one hundred metres or more to the waiting herd, where they burned off the thorns and sliced the pads into smaller pieces for each animal.

If the rains proved deficient or lacking entirely, then the herds fed on cactus fodder at home until it gave out. When they depleted the cactus (which happens in a drought) they first chopped down certain species of trees for their stock to eat and then they migrated to areas still furnished with cacti. They never considered moving their herds out of the Mahafale region into, for example, pastures in Bara territory well to the north. This would imply, they said, the end of one's life work, for the herd in all certainty, to them, would be rustled away. They preferred taking their chances in the *samata* forest region, where prickly pear recovered quickly and at least a few heads from their original herd might survive the drought.

### ***The Fatrambey and Ankara Forests***

The northern study area was located near the source of the Linta River around the town of Ejeda (see Figure 1). One site was located in and around the township of Belafike, approximately twenty kilometres northeast of Ejeda, on secondary road 7 off of National Route 10. This site included a part of the Fatrambey forest. The Fatrambey was a large expanse of land in the heart of the Mahafale plateau that had been held until recently as a forested grazing reserve. What was once a contiguous forest is now a fragmented one due to immigrant farmers clear cutting the trees in the commons for swidden cropping (Figure 4). The second northern site was located in and around the villages of Ankazota and Sakoatovo, approximately twenty kilometres south of Ejeda, on an ox-cart trail off National Route 10. This site had grazing pastures in the

dense Ankara forest. Ankara, which literally means ‘the place of rocks,’ is the name of the area extending along the eastern edge of the lower Mahafale or limestone plateau. Table 5 gives a summary of the study site.

**Figure 4**

*A portion of the Fatrambey forest after immigrant farmers cleared trees for crops*



**Table 5**

*Brief description of Fatrambey and Ankara forests*

Characteristic description	
Location	Region of Ejeda; Road 7 and ox-cart trails off National Route 10 linking Toliara on west coast and Tolagnaro on east coast. Three sites in the vicinity of Ejeda: Belafika, in the Fatrambey; Ankazota and Sakoatovo, in the Ankara.
Altitude	400 m to the north (at the source of the Linta River) and 260 m to the south (villages of Ankazota and Sakoatovo).
Relief	Gentle north-south slope, hilly, shallow valleys.
Climate	Tropical semi-arid influenced by rain shadow effect. Predominance of northeasterly monsoon winds producing yearly rainfall of 750 mm. Heaviest rains between December and March (monsoon season).
Soils	Basement metamorphic crystalline rock in the north and limestone in the south with a narrow band of unconsolidated sands in-between.
Vegetation	Dry forests, shrub, and thorny thickets away from watercourses; deciduous trees in humid pockets. Some deforested areas exploited for dry land farming or for charcoal production. High endemism.
Dominant vegetation	Deciduous dry forests and spiny thickets (Dufils 2003).
Population	Mahafale comprised the predominant ethnic group and longest residents ( <i>renelimy</i> ); the main immigrant population consisted of coastal Mahafale ( <i>tandriake</i> ). Estimated average population density was <15 inhabitants/km <sup>2</sup> .
Subsistence strategy	Extensive zebu breeding with increasing cropped land planted with cassava, corn, sorghum, and sweet potatoes. Cash crops: sakoa nuts; market crops: mangos, cassava, sweet potatoes.

**Source:** FTM 1981; Phillipson 1996; Dufils 2003; Du Puy and Moat 2003.

Long time residents confirmed that the landscape around Ejeda was for a long time covered by vast intact spiny forests. Pastoralists cite the forest cover as the reason their ancestors chose the area as a pastoralist zone for their cattle herds. The Fatrambey and Ankara forests are diametrically opposite to each other running along a north-south axis. Since the early 1900s, they have been administered by the regional authority of Ampanihy. Each forest-pasturage was made recently distinct by human activity: one being a very large degraded forest; the other smaller and with intact forest cover. A system of production based on livestock pastoralism was the common characteristic between them.

We do not want to give the impression that cattle herders have done no harm to the Fatrambey and Ankara forests. As mentioned above, cattle first 'opened up' these forests to pastoralist endeavours. It is worth revisiting this subject at this time. Of the livestock taken into these forests, goats degraded the forest cover the most since they can eat most plant species in the forest. Some stockbreeders who were experiencing financial difficulty had chosen to raise goats since they reproduce quickly (every six months) and provided a fast source of money. The goat herds then shifted to cattle herding by selling goats to buy breeding zebu stock.

For Mahafale cattle raisers, the zebu symbolised money in the bank and the forest and pastures represented a sort of banking infrastructure (cf. Clutton-Brock 1989). Whenever a situation requiring money presented itself, the stockowner could choose to sell an animal. The forest and pastures were resources linked to their cattle. Pastures and grass were the first tier of resources; but when they gave out, the second tier of resources, the forest reserve, came into play. Pastoralists likened drawing resources from the forest reserve to foreigners' withdrawing money from their bank accounts. Yet, the ideal rule was not to withdraw all of their savings. Immigrant farmers did not share this rule. This view thus underscores the importance of the forest in this pastoralist society.

At least three factors have fueled the expansion of slash-and-burn agriculture (known locally as '*teteke*' and '*hatsake*' rather than '*tavy*' as it is called in eastern Madagascar) into these areas. We lack exact quantified data for immigration and increased slash-and-burn activities but rely on local sources that confirm the trend documented in the literature (Hoerner 1986a; Esoavelomandroso 1988). The first was the influx of immigrant farmers into forested land. The second was pastoralists who have been forced into farming when confronted with the recent difficulties of maintaining their pastoralist lifestyle. The third factor was conservation policies and a tripling in land set aside for conservation heritage that has turned more coastal farmers out of their lands and into 'undeveloped' pastoralist areas (Gaylord 2004). It is beyond the scope of this article to consider how conflicts between farmers and pastoralists have impacted the forest. But it is worth mentioning that boundary disputes and the destruction of livestock and cropped land have arisen after large tracts of the Fatrambey forest reserve were turned into farmland. Legal-

ity issues of farmers homesteading pastures held as commons need to be addressed in future studies.

Among local pastoralists, farming does not yet hold an important role but the situation is changing. Though we lack exact figures, a significant number of people have suffered from a severe reduction in their cattle herds. Official cattle censuses taken around Ankazota, for example, listed 1100 cattle in 1997 against 519 in 1998. A minority of the dispossessed herders have turned to farming. Some have become *Vezo* and fish for a living (Astuti 1995). Their way to becoming *Vezo* was opened by marriage alliances, joking kinship, blood brotherhood, or acceptance of the taboo on eating mutton (Marikandia 2001:159). Other pastoralists who have lost their cattle, mainly from Itampolo, Androka, and Ampanihy, have been forced to leave the area entirely and migrate to the urban centre of Toliara on the west coast (Hoerner 1986b, 1988, 1991a, 1991b; Koto 1991). As it has become more difficult to succeed at raising range fed cattle, high levels of inequality in stock ownership are returning. Before French colonisation, Mahafale royalty, especially the headmen, amassed large herds while the majority of the population owned very few heads of cattle.

Forest cover has played an important role in the society of pastoralists in the region. In the area where the forest in places has been clear-cut by farmers and cropped land developed as in the case of the Fatrambey forest, certain pastoralists still remembered the significant role of the forests and elucidated their former status as resource reserves (Esoavelomandroso 1988, 1989b; Esoavelomandroso 1991). Pastoralists from Sakoatovo and Ankazota, on the one hand, grazed their stock in the forest near the villages, in a section of the Ankara forest; while those from Belafike, on the other hand, grazed on recently degraded forested land. Mahafale pastoralists did not use fires to manage and maintain their pastures. They employed mobile pastoralist strategies involving the transfer of livestock from one grazing ground to another with the changing of seasons and pasture rotation dependant on the quality of grasses. The pastoralists of Sakoatovo, for example, used grazing areas in the Ankara forest designated as Eampane, Amoita, Esorognarivo, Emionga, Elohaose, Magnarilava and Bevava.

In the forested space used for pastures, a system of grazing rotation has been employed that positions livestock in areas that have healthy grasses and fodder plants. Grazing rotations were also used in the Fatrambey where the forest had shrunk. The pastoralists in the Ankara and the Fatrambey did not use brush or grass fires to maintain their pastures. By comparison, pastoralists in the highland grasslands around Tsiroanomandidy, west of the capital city of Antananarivo, used anthropogenic fire at the beginning of the rainy season to regenerate pastures with green grass (Kull 2004). Sometimes these fires get out of control. The Mahafale pastoralists around Ejeda were trying to keep forest destruction to a minimum, not only those portions they considered sacred ground but the wider forest on which their economic lives and wellbeing

depended. They did not clear-cut the forest but 'opened' it to grasses, leaving intact most of the trees and bushes.

For Mahafale pastoralists the forest had a quasi-sacred nature. Its sacred groves were their final resting places and the burial grounds of their ancestors. As such, it was forbidden to enter these sacred areas except at the time of body burial. The forest also played a significant role in the daily needs and the health of the people and animals as a plant reservoir for traditional ethnomedicine. Women customarily gave birth in the forest and residents used the shrubs and leaves and the area as an open-air toilet, thus attending to these needs away from the village since it was not considered proper to engage in such activities in the village or in their huts. Each activity had a separate location: the burial grounds were further in the forest west or north-west of the village, birthing areas were also west of the village but much closer, and the toilet areas were west and south of the village but further away.

The shrinking Fatrambey forest has engendered the disappearance of specialists in herbal medicine, thus worsening the situation for pastoralists. These losses have precipitated the need to seek help from sources able to stop the destruction such as traditional animal sacrifice or '*soro*'. The situation has also encouraged collaboration with NGOs such as WWF and the para-statal office of environmental management (ANGAP). Pastoralists sought help to deal with declining daily nutritional needs from the forest in the form of firewood to cook meals and wood for shelter. In the case of the Fatrambey where the forest has in places been degraded or replaced by cropped land, people travelled several kilometres in pursuit of forest resources. Forest cover was of great importance to pastoralists living near the two Mahafale forests. With pastoral activity on the decline for a minority of Mahafale near Ejeda, the result has been to engage increasingly in slash-and-burn agricultural practices.

To avoid forest land degradation and the encroachment of a large number of farmers coming from the coast who also use Ankara pasturages and who cultivate land in the same area, the people of Sakoatovo who are Mahafale '*renelime*' (the five mothers) were collaborating with non-governmental organisations such as SAGE (Système d'Appui à la Gestion de l'Environnement [Support System for Environmental Management]) and WWF (the dry forest project of the World Wide Fund for Nature) in order to define the boundaries of their forest. A majority population of pastoralists in the rural commune of Besakoa Liambositse (which forms part of the larger district of Ejeda) were collaborating with NGOs for the management of the Vohiava forest.

Forest destruction has impacted the lives of pastoralists in the northern Mahafale. Due to environmental devastation of the forest cover, pastoralism as a viable vocation and way of life is threatened. The demise of pastoralism is inevitable at Sakoatovo and Ankazota vis-à-vis the degradation of forest pasture areas and the inability of the forest to provide for the pastoralists' day-to-day needs. As already mentioned, the forest represented money in the bank in the form of zebu herds. Faced with the choice of becoming farmers or try-

ing out city life, certain pastoralists have migrated to the island's major urban centres: Toliara (southwest), Mahajanga (northwest), Antsiranana (north), and Antananarivo (central) in order to survive and make money. Their migration out of the forest is unprecedented, perhaps in the low double digits (cf. Horner 1988). Others have chosen to work in the gem stone industry (with sapphires in particular) in Ilakake, a rural commune of Ranohira under the regional authority of Ihosy and in other districts such as Sakaraha and Anka-zoabo. Migration during the dry season has become much more intensive as the southern part of the island experiences recurrent drought and famine conditions ('*mosare*,' '*kere*,' '*tane maike*').

### CONCLUSIONS

The relative state of forest cover around the Linta River, whether dense as in the Samata and Ankara forests or sparse as in the Fatrambey, is dependent on the complex interactions of both human and ecological processes. The geology and climate of the spiny forest ecoregion set broad constraints upon Mahafale inhabitants negotiating their living near the forests. Livestock herding and forest management have a long history in the region. Forest cover, not just grass, advances Mahafale lives in a dry land. The two case studies question the accuracy of some engrained assumptions toward pastoralist peoples, such as the naïve equation: cattle + pasture – forest = cattle pastoralist. Conventional wisdom on Malagasy forests assumes that '[deforestation] is a traditional strategy to appropriate and develop new agro-pastoral land' (Durbin et al. 2003:143). The cases analysed in this paper run counter to this received wisdom, in particular to the 'pastoral' side of the hyphenated 'agro-pastoral'. Forests and pastures are not mutually exclusive domains to Mahafale stock raisers. Rather, Mahafale have tried to maintain pastures within forests, not to clear-cut them, and to propagate trees, such as *samata*, that will help support their cattle in times of need. Forests are as important as pastures, then, to the well being of the long term residents and their stock along the Linta. The clearing of forest to encourage pasturage is thus not necessarily a Mahafale pastoralist endeavour.

We have also seen that a western-like conservation ethic, backed by strong convictions and integrity, was not held by Mahafale in the recent past. For a good price, Mahafale removed many rubber trees (*E. laro*) from the spiny forests. The encroachment of farmers into the Fatrambey forest has created new alliances between herder and conservationist stakeholders like WWF. Perhaps WWF personnel will be able to impart their deep conviction for conservation upon the pastoralists working with them. For now and maybe in the final analysis, Mahafale pastoralists are not model conservationists. Those with cattle and a *hazomanga* are livestock raisers first who satisfy their life with cattle. Some whose livestock have died in one of the recent scourges, have been forced to turn to agriculture and to caring for crops rather than cows. Some of

the most poor, with very little or no social network to fall back on, cannot afford to conserve anything.

Surviving in an environment of flux requires multiple resources, not a homogeneous grass-scape. A flux paradigm distances one from presentist scenarios of environmental change, from those that argue that what is done now was done likewise in the past. Powerful pressures on the spiny forests have come from outside Mahafale society, from institutions they have little control over such as state sanctioned *mise en valeur* land rights that encourage migrants to exploit forested land. Understanding conditions of change and terms such as land 'improvement' or 'degradation' must be seen in relation to the relevant social, institutional, and economic contexts (Kepe and Scoones 1999: 49; Edwards et al. Forthcoming). On an island-wide scale, recognising flux throughout the mosaic of Madagascar's environments should help in understanding the complicated and nuanced relationships that Malagasy have with nature. Anthropogenic changes to the environment are therefore not regionally uniform and general but particular and nuanced.

Ecological, not just human, contexts are dynamic in the spiny forest ecoregion. Various eco-zones comprise a mosaic of dry deciduous and xerophytic forests in three quite distinct vegetative-geologic zones. Climate under a rain-shadow effect, especially the rainy season, varies from year to year with droughts occurring more frequently than once per decade and a killing drought or famine occurring in each new generation of Mahafale. Pastoralism and mixed farming are thus the best subsistence strategies available to them in the semi-arid to arid climates.

In the relatively humid north (upper Mahafale plateau), mobile pastoralism worked well until recently at preserving the Fatrambey forest. Reductions to forest cover have resulted more from in-migrating farmers than from resident pastoralists. Immigrants moving up from the coast who cleared the land and turned the soil with their spades (*fangady*) have gained land rights away from pastoralists who treated the forest not as empty, unimproved, wild land but as a resource bank, as a source of multiple values. Their displacement has meant that they no longer have the Fatrambey forest to bank on. Displacement of some of these mobile pastoralists who are unaccustomed to a sedentary lifestyle therefore incurs a heavy toll on forest conservation. The same process is occurring to a lesser degree in the arable part of the lower Mahafale plateau, in the Ankara forest.

In the arid south, farming has had a different effect on the Samata forest. Here transhumant Mahafale treat the forest not only as a resource reserve but also as an anthropogenic one, as befits a mixed farming-pastoralist livelihood. They have made improvements to the forested land, not by clearing it for cultivation—the arid climate disallows extensive fields—but by creating food for their livestock in the forest of *samata* trees that complement their plantations of prickly pear cactus and the sparse grass. Prickly pear cactus and *samata* are aids to dwelling in a non-equilibrium environment and stretching resources be-



yond the limited grass. 'Cactus pastoralists' have created resource enclosures in the form of their living fences of cacti. Sedentarisation therefore can benefit forest growth and conservation, at least in the short term.

Sedentarisation and the concomitant intensification of resources have other consequences as well. Planting cactus and preferring a tree species for browse and fodder increased the carrying capacity of the land, a fact revealed in every occurrence of a drought turning into a killer famine. Success in increasing the carrying capacity of the land meets failure in the next famine (Perrier de la Bâthie 1934). The anthropogenic Samata forest and prickly pear landscape better one's chances of keeping a herd alive in the region, but not in resolving the problem of famines [Kaufmann n.d.(a)].

The human-induced factors analysed above, displacement and sedentarisation, affect indigenous forest conservation by inhibiting herd mobility. Moving livestock into fresh pastures sustains the animals and disabuses recently grazed grasses and browsed shrubs and trees. Pressures on mobility disturb the well being of a pastoralist way of life trying to engage an indigenous conservation ethic centred on the Malagasy belief that the land, as a link to their ancestor, has a quasi-sacred quality. Reductions in pastoralist mobility thus affects forest conservation.

The amount of forest cover in Madagascar is decreasing and the impact is considerable not just on lemurs—the icons of Western conservation in Madagascar. Forests play a significant role in the lives and livelihoods of Mahafale living around the Linta River. It would be wrong to think that pastoralists and transhumants among this population are, by their nature, destroying the forest (cf. Leach and Mearns 1996; Fairhead and Leach 1996). To some degree, they respect it for its sacredness and its bounty. Their dead leave the life of the living to live as ancestors spirits in the forest. Loss of forested land impacts pastoralist practices; the reduction in pastoralism is linked to shrinking forests. Both pastoralists and their herds are threatened by forest loss which could ultimately lead to the extinction of Malagasy zebu in the area rather than, as Bernard 1978) predicted, the expansion of a beef market economy among Mahafale herders. Bernard did not consider the environment as one in flux and so did not see the unlikelihood of his prediction coming true. Confronted with such environmental degradation it would therefore seem helpful to encourage collaborations between conservation organisations and local residents to develop protective measures for both grazing pastures and the remaining forest cover.

### Notes

- 1 In the Malagasy language, cattle rustling is referred to as *halatse añombe*, *asan-dahalo*, or *malaso*.
- 2 Some examples: *Didiera trollei* is known in Malagasy as *hazo horita* or 'octopus tree' for its thorned branches resembling octopus tentacles; *Euphorbia alluaudi* is called *hazo saosisy*

for its resemblance to a 'sausage tree'; and *Opuntia* spp. is called *raketa*—a Malagasy derivative from the French, who introduced it to the island in 1769 and named it *raquette*.

- 3 Malagasy's economic 'choices' are extremely limited over much of the island (Feeley-Harnik 1995). Madagascar is one of the poorest countries worldwide—lately thirteenth from the bottom, based on less than \$250 average annual income per person (Tudor 1999). Schools, hospitals, and roads—many of which were built during the colonial era—are crumbling and many of these are within the capital city itself, Antananarivo. In the countryside, the situation is far worse. It may be twenty years before a road grader covers the potholes and washboards on the so-called national highways (where in places it takes ten hours by *taxi brousse* to travel one hundred kilometers). Gendarmes do not receive their pay for months; hospitals are unstocked and considered by many Malagasy as the place one goes to die; schools have fallen into disrepair; civil servants other jobs on the side; and on and on. One gets the impression that the state has abandoned the bulk of the population to govern themselves. This situation worsened in 2002, with a presidential election tug of war between the victorious Ravalomanana and defeated incumbent Ratsiraka that turned violent and economically disastrous for the country (Quanbeck 2002a, 2002b, 2002c).
- 4 The fact that Mahafale pastoralists have eked out a living against the odds has endeared them to the land. Many resist emigrating to other areas where differences in climate, in humidity, in grass, in the wind, in the dust, in the smells and the sounds of a place, and, most importantly, in the ancestors confront their senses of being. The Mahafale consider their ancestors to impart a degree of sacredness to ancestral land. This is a pan-island belief among most autochthonous Malagasy people, with regional and ethnic differences in its expression (cf. van Gennepe 1904; Ruud 1960; Andriamampianina 1985). Ancestors create taboos and Mahafale inherit them patrilineally and affinally, applying to in-coming wives through marriage. Carved wooden images (*aloalo*) depicting various animals and events from the deceased's life—such as his wrestling a steer to the ground, or of her apical cow with beautifully curved horns and supple hump, or of a zebu fighting off a crocodile attack—adorn many tombs throughout the Mahafale region. Connections between ancestors and descendants, between the living and their dead ancestors, are maintained by observing taboos, acknowledging the ancestors, and respecting the land. All of these come together in the sacred groves that dot the landscape as delimited forests hiding ancestor's tombs that are off-limits to most people. Such tabooed places as sacred groves extend society's rules on the natural environment as an indigenous conservation ethic (Kaufmann n.d.(b)).
- 5 His earlier predissertation field research among Mahafale around Beza Mahafaly Special Reserve was done in 1986–1987 and again in 1988.
- 6 The Linta River was labelled the Masikoro river on French maps from the eighteenth century. The Masikoro people, who still have a large territory in the southeast, also immigrated north of the Onilahy river.
- 7 The effects of the rubber trade on the area's environmental history have yet to be studied. We do not have long-term data on forest structure and rubber tree populations or palynological data.
- 8 Conversation with Mampanadesamake, 17 July 1997, Androka Vaovao.
- 9 Conversation with Evelomatsimaisto, 27 October 1997, Antsimafaitse.
- 10 More detailed accounts of raising cattle on plantations of thorned prickly pear cactus can be found in Kaufmann 1998, 2001, 2003, 2004.
- 11 The International Monetary Fund (IMF) gained increasing control of the Malagasy economy in the 1980s and 1990s. In the 1990s, the currency was devalued three times as inflation skyrocketed (Vérin 2003).
- 12 For a detailed discussion of *lamba*, see Feeley-Harnik 2003.
- 13 Conversation with Evelomatsimaisto, 27 October 1997, Antsimafaitse.
- 14 Famines occurred in disturbing consistency from 1913, 1921, 1930, to 1943, then again in 1991 [Kaufmann n.d.(a)]. The same pattern, though unreported, may have continued in the decades after 1943 to 1991.

- 15 Conversation with Evelomatsimaitso, 26 October 1997, Antsimafaitse.  
 16 Conversation with Imene, daughter of a renown oral historian, 14 October 1997, Ankilimanitse.

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