VULNERABILITY AND WELLBEING IN THE BAINTAO LAVA, ‘THE LONG WOUNDED YEAR’: ENVIRONMENTAL POLICY, LIVELIHOODS, AND HUMAN HEALTH AMONG MIKEA OF SOUTHWEST MADAGASCAR

by

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(Under the Direction of Bram T. Tucker)

ABSTRACT

Human biology and notions of health and wellbeing are deeply social and historical phenomena, and political and socio-economic processes that cross spatial and temporal scales contribute to observable variation in human welfare. This dissertation examines the production of human health and wellbeing among Mikea people living in southwestern Madagascar as broad social changes, including new forms of regional environmental governance and the gradual establishment of a new protected area influence changing relationships among subsistence producers, the state and national society, and the biophysical environment. Primary research participants live in three villages in the northern and central Mikea Forest region and share a degree of common history and kinship. At the same time, the geographic distribution of field sites reflects regional variation in local ecology, subsistence and lifestyle, exposure to environmental policies, and access to infrastructure. In order to understand associations between changing access to social, political, and environmental resources and relative wellbeing
among Mikea, this dissertation examines the production of regional environmental discourses and environmental policies that restrict livelihoods and induce resource scarcity, variation in nutritional status, perceived health and morbidity, and patterns of healthcare decision-making. I find that environmental discourses, including the discourse of Mikea indigeneity, that figure prominently in regional environmental policies exacerbate regional inequalities and have entrenched institutional biases against subsistence producers in general and against Mikea people in particular. Mikea act to manage risk and cope with insecurities related to subsistence and long-standing social and economic inequalities, but exposure to social shocks and environmental policies that restrict or criminalize subsistence activities and can overburden coping abilities, creating vulnerabilities. Vulnerabilities manifest as significant site-wise and gendered disparities in the nutritional status of adults and children, in perceived health and morbidity, and in access to healthcare resources in the Mikea Forest region. By inducing resource scarcity, new forms of environmental governance alter access to resources that sustain livelihoods and traditional modes of medical practice among Mikea, while opportunities to access markets, technology, medicine, and public health resources is not increasing to satisfy emergent social and material needs.

INDEX WORDS: Economic anthropology, Environmental policy, Conservation, Human health, Healthcare strategies, Inequality, Livelihoods, Madagascar, Mikea, Nutritional status, Political ecology of health, Protected areas, Subsistence, Vulnerability, Wellbeing
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CHAPTER 1
National and regional contexts, theoretical introduction, and overview of research design

1.1 Introduction: Overview of research

This dissertation seeks a contextualized and comprehensive understanding of relationships among political economy, livelihoods, security and human health in the northern Mikea Forest region of southwestern Madagascar (Figure 1.1). Generally framed as a study in the political ecology of health and wellbeing (Baer 1996; Leatherman 2005; Mayer 1996), this dissertation asks important questions about the production of human health and wellbeing among Mikea people living in the Mikea Forest region of southwestern Madagascar as new forms of regional environmental governance, particularly the establishment of a new protected area (PA), Parc National Mikea, influence changing relationships among subsistence producers, the state and broader national society, and the biophysical environment.

This research grew out of a personal interest in relationships between social change, rural poverty and human health, and the ways in which political and economic systems operating across spatial and temporal scales contribute to observable variation in relative human welfare (King 2010; Nguyen and Peschard 2003). It also draws on an interest in the processes by which so-called marginal peoples—often poor, rural, insecure, non-literate people or people lacking education—challenge significant, constraining structural forces, including “official” representations of local people, history, and environment (Anderson 1983a, 1983b; Scott 1985, 2009). This project is influenced as well by a dissatisfaction with long-challenged yet persistent, dominant explanations for environmental change, disparities in opportunity, and variation in
human welfare that are routinely stated as moral-philosophical justification for neoliberal projects of economic development and environmental governance, and for the frequent perpetuation of exploitive and violent political-economic relations (Brockington and Duffy 2010; Bryant 1998: 80; Dove 2006:196; Guyer and Richards 1996:6; Harvey 1974:257; Klein 2004; McCarthy and Prudham 2004; Watts 1991), including contested explanatory narratives that serve as driving moral and scientific justification for the expanding regime of environmental governance in Madagascar (Feeley-Harnik 1995; Jarosz 1993,2003; Klein 2004; Kull 2000).

Primary participants in this project live in three rural villages in the northern and central Mikea Forest region of southwestern Madagascar and share a degree of common history and kinship. At the same time, the geographic distribution of the field sites reflects regional variation in local ecology, subsistence, and lifestyle. Other participants in this project come from diverse backgrounds and are employed by national environmental and extractive agencies, non-governmental organizations, private companies, and local, regional, and foreign governments, and have offered insight into the intentions of public policies and the political dynamics of social, economic and environmental interventions that are currently being deployed in the region.

In examining the contextualized and subjective experience of social change, this research asks important questions about how historical-cultural processes have conditioned contemporary relations among people, the state, and the environment in three primary domains: (1) the production of regionally-specific environmental discourses and environmental policies, (2) the production of social and economic vulnerabilities, and (3) the production of human health and wellbeing. I argue that practice related to the production and dissemination of official truths about Mikea people in environmental policy shapes both representations of and possibilities for people and environment in the Mikea Forest region in ways that may be ultimately undesirable
for policymakers, regional administrators and locals. Second, I argue that Mikea people purposively act to manage risk and cope with insecurities related to subsistence and long-standing social and economic inequalities, but different degrees of exposure to environmental hazards (including environmental policies that restrict or criminalize subsistence activities) and abrupt social shocks can overburden people’s abilities to cope, creating what can be understood in terms of a “space of vulnerability” (Leatherman 2005; Watts and Bohle 1993) that can be identified socio-politically and spatially. And third, I demonstrate significant site-wise and gendered disparities in nutrition, in perceived health, and in access to healthcare resources in the Mikea Forest region and argue that new forms of environmental governance are altering access to health-sustaining resources (especially resources that sustain livelihoods and traditional modes of medical practice) while opportunities to access markets, agricultural technology, biomedicine, potable water sources, and other public health resources is not increasing. Because of gendered disparities in health, gendered accessibility of biomedical care, and gendered patterns of health seeking behavior, these processes may disproportionately impact women’s ability to treat health problems, with dire implications for both women’s and children’s health in the future.

1.2 Madagascar: People, history, and politics

Madagascar, the fourth-largest island in the world with an area of about 590,000 square kilometers (about the size of Texas or France), is located in the Indian Ocean approximately 400 kilometers east of the African mainland. With a population of about twenty-one million in 2009, roughly seventy-one percent of Malagasy people live in rural areas, and half of the country’s population earns less than $2 USD income per day (World Factbook 2009). Almost three-quarters of all Malagasy people derive primary support (in terms of subsistence and/or income) from agriculture, growing rice, maize, manioc, pulses, and vegetables and rearing livestock...
(especially cattle) for home consumption, for sale in domestic markets, and for export (Dorosh and Haggblade 1993; Minten and Barrett 2008).

Rice is culturally and economically significant to Malagasy. Rice dominates agricultural production nationally, even though there is significant variation in the varieties of rice produced, traditional cultivation methods, technologies employed, social norms governing production, and access to infrastructure (including proximity to markets, access to irrigation, transportation, and agricultural extension services) (Dorosh and Haggblade 1993; Minten and Barrett 2008). Madagascar is the second largest producer of rice in the Africa-Indian Ocean region, with only Egypt producing more rice regionally. According to popular convention, Malagasy people are said to consume more rice per capita than people living in any other country in the world (see, for example, Hume 2006: 288, Norris 2006: 962, and Wright 1994: 12). This is refuted by the United Nations Food and Agriculture Organization (FAO) (2002) and by the International Rice Research Institute (IRRI) (2004), but Malagasy people do consume more rice per capita than people in any other African country with approximately 91 kilograms on average consumed per person in 1999 (in this, Madagascar is most closely followed by Egypt with a consumption rate of 41 kilograms per person) (FAO 2002; IRRI 2004). The most common agricultural exports produced in Madagascar include livestock feed crops such as maize, raw materials such as cotton and raffia, and export luxury crops including vanilla, cocoa, cloves, and coffee (Minten and Barrett 2008).

In contrast to rural areas, the majority of people living in large cities like Antananarivo or Fianarantsoa make a living by non-agricultural wage labor, with nearly seventy percent of urban Malagasy working for wages in formal or informal markets (Glick and Roubaud 2006). Most urban Malagasy men and women work for family enterprises in the service sector, which
includes all forms of commerce, hotel and restaurant work, domestic and security employment, public works and administration, tourism, and highly skilled or professional positions in banking, telecommunications, education and healthcare. Service sector employment is followed most closely by industrial sector employment, including manufacturing, mining, construction, and agro-industrial work (Stifel et al. 2007).

Madagascar is an island country of significant cultural and ecological diversity and dynamism (Dewar and Wright 1993; Southall 1971). Madagascar’s economic and demographic history is associated with its location along Indian Ocean trade routes (Beaujard 2005), and contemporary Malagasy culture, language, and genes reflect African, Arab, Indian, Indonesian, East Asian, and European influences (Burney 2004: 35; Dewar and Wright 1993: 418; Razafindrazaka et al. 2010). According to Dewar and Wright (1993: 418), there is considerable “unity” in contemporary Malagasy language, despite significant variation in dialects across the island, and despite a broad range of cultural influences. Convention describes 18-20 different groups peopling Madagascar, variously referred to as ethnicities, cultures, tribes, or races. However, almost all of these have roots in political consolidation movements of the pre-colonial and colonial periods (Southall 1971). Many of the ethnonyms are regional ecological descriptions, or refer to broad regional political groupings rather than ethnic identity. As Eggert (1986: 322-327) finds in the course of research among Mahafaly in southern Madagascar, official ethnic or tribal divisions may not be as substantively meaningful to people who are labeled than other forms of social and cultural identity, including household identity, identity as a member of inclusive kin groups, clan (firazaña) and clan branch (tariha) membership, and geographically-based social identities.
As a result of its diversity and dynamism, Madagascar has long fascinated social scientists and natural historians with a broad range of disciplinary interests. This can be traced to two primary and related aspects of its natural and cultural history: long isolation from continental Africa, and the relatively late arrival of permanent human settlers. Madagascar has been geologically isolated from the African mainland Madagascar for the past 75-100 million years. This has resulted in significant ecological uniqueness and a high incidence of endemic plant, animal and bird species and unique habitats. Consequently, Madagascar has been named one of the “hottest of the Earth’s biodiversity hotspots” (Ganzhorn et al. 2001; Hannah et al. 1998; Myers et al. 2000: 855-856; Norris 2006:961), and has become a geographic focus for externally funded conservation projects.

Madagascar was the last large landmass to be permanently settled by humans, beginning approximately 2000 years BP (Burney 1999: 154). For much of the twentieth century, a driving force in Malagachisant cultural research was “to ‘crack’ the Malagasy origins” (Kent 1970:3), the quest to develop a tenable settlement chronology for the island’s people. This is related to a broader interest of researchers in reconstructing migrations involved in the prehistoric Austronesian diaspora in the Indian Ocean region (Fitzpatrick and Callaghan 2008: 47) and has been pursued in Madagascar using oral history and archaeological data (Dewar 1995; Vérin 1979), comparative linguistic analysis and glottochronology (Birkeli 1920, 1939; Blench 2008; Blench and Dendo 2006; Dahl 1951), genetics (Ricaut et al. 2009; Razifindrazaka et al. 2010) and hematology (Pigache 1970), comparison of cultural traits and rituals (Dewar 1995; Hurles et al. 2005; Pawley and Ross 1993), computer modeling of Indian Ocean sea voyages (Fitzpatrick and Callaghan 2008), remote sensing (Clarke et al. 1998), and landscape paleoecology (Burney 1999: 146; Burney et al. 2004).
Despite the intensity and scope of this search, a precise chronology describing the timing and origins of waves of human settlers to Madagascar remains elusive. We know from landscape paleoecology that a long process of human settlement began with iron-age settlers approximately 2000 years ago in southwestern coastal sites, spread to other coastal areas, and finally to the central highlands region (Burney 1999: 154; Burney 2004: 26). Almost nothing is known about how or why early settlers came to Madagascar, how they lived, and how people from distant parts of the Indian Ocean blended and interacted with subsequent waves of people to become “uniquely Malagasy” (Burney 2004: 26). Results of recent mitochondrial DNA analyses (Razafindrazaka et al. 2010; Ricaut et al. 2009) have been inconclusive, and have in fact shown that the human history of Madagascar is more complex than previously thought.

Many researchers have considered Madagascar an ideal place to study social and political transformations, including the fluidity of ethnic categories (Astuti 1995; Eggert 1986; Graeber 1999, 2007a), pre-state social organization (Dewar and Wright 1993; Kent 1970; Parker-Pearson 1997; Vérin 1986; Wright 1986; Wright and Rakotoarisoa 2003) and processes of indigenous or pre-colonial state formation (Berg 1981, 1985; Campbell 1991a, 1991b; Kottak 1971). In pre-Colonial times, Madagascar was home to many indigenous kingdoms, the ruling dynasties of which became empowered between the fifteenth and seventeenth centuries (Kent 1970). One of these powerful dynasties, that of the Merina living in the Imerina region of the central highlands (currently Antananarivo Province) went on, like the Sakalava to the west, to head a pre-colonial oligarchy. With the support of English allies, what became a pre-colonial Merina state ruled conquered portions of the island from about 1810 until 1896 when the French Colonial Period began. According to Cole and Middleton (2001: 5), a diverse range of political forms existed at the inception of the French Colonial Period in Madagascar, ranging from the centralized and
hierarchical states and proto-states including Merina geographically centered in the central highlands (Berg 1981: 289, 1985: 262) and Sakalava whose dynasty controlled much of the west and northwest of the island (Wilson 1992: 145); decentralized but hierarchical polities such as Betsimisaraka (Cole 2001: 36-37) and Karembola (Middleton 1999:223); and explicitly non-hierarchical or egalitarian like Vezo (Astuti 1995: 475-76) and Tsimihety (Wilson 1971: 194, 1992:92-93).

The French Colonial (1896-1960) and post-Colonial periods in Madagascar have proved compelling for researchers as well, especially those interested in cultural and material struggles under colonialism and relationships between culture, history, power, and identity. According to Cole and Middleton (2001:7), the French Colonial administration established a “classic, dominant and dependent colonial economy” and formally established a number of economically specialized regions. Through the structure of indirect rule, by which local elites served as appointed agents of the colonial administration and loyal Malagasy partisans and military were empowered to enforce laws and collect taxes locally, the French administration penetrated, at least symbolically, even the most rural regions of Madagascar (Tucker 2001: 78, 2003: 211; Yount et al. 2001: 279).

In 1960, Madagascar gained its independence and became recognized as a sovereign state, the First Malagasy Republic, although it retained strong economic ties with France until the 1970s. In 1972, Didier Ratsiraka’s election to the presidency ushered in the Second Republic, a period of state socialism characterized by economic isolationism, nationalization of natural resources.

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resources and industries, and gradual economic decline punctuated by periods of political instability (Cole 1998; Sodikoff 2007). By the 1980s, Madagascar’s economic deterioration was internationally perceived as a severe crisis, and a new period of liberalization was ushered in as foreign investment in resources and industry was once again encouraged and structural adjustment programs were put in place (Horning 2006).

In the 1990s, Ratsiraka lost power and Madagascar entered a neoliberal period that is referred to as the Third Malagasy Republic. This period is characterized by a shift in the locus of policy production and governance from the central Malagasy state to complex de-territorialized networks of non-governmental organizations (NGOs), private companies, donors, and international financial institutions (Duffy 2006: 732), as well as the state. These shifts have been accompanied by the rhetoric of democratization, liberalization, and national economic development (Duffy 2006; Igoe et al. 2008), and an emphasis on the necessity of the interdependence of development goals and environmental preservation (USAID 2010). A fluorescence of multilateral conservation-focused research and action in the past thirty years has been matched by researchers seeking insight into the structure and politics of neoliberal environmental governance and development activities in Madagascar, the effectiveness of particular regimes in meeting stated goals of environmental protection and human development, and relationships among environment, human welfare, society, and livelihoods.

In 2009, following a period of popular discontent with President Marc Ravalomanana, Madagascar entered a national economic and political crisis. A High Transitional Authority was

established under opposition leader Andry Rajoelina and Ravalomanana went into exile. The short-term results have included episodic political violence, a significant loss of aid from the United States, the United Nations, and the African Union, and a demotion in favored trade status with the United States. As the political crisis has continued, many Malagasy have suffered. Worsening drought, urban food insecurity, a loss of funding for some development projects, and loss of employment opportunities have had a synergistic effect on people’s livelihoods and the incidence of illegal activity on the island, including highway banditry, wildlife poaching, and the illegal harvest of hardwoods from PAs.

1.3 The Mikea Forest Region: Landscape, identity, and environmental policy in the rural southwest

The rural Mikea Forest region lies in central Toliara Province in the northern part of a region historically known as the Fihereña. City dwellers refer to this region, along with most of Madagascar, as Ambani’vohitse (below the hills), a term without geographic specificity denoting extreme isolation from city centers and state infrastructure. The Fihereña region contains the Mikea Forest, an expanse of dry deciduous and spiny forest occurring on unconsolidated sands just east of the Mozambique Channel between the cities of Toliara and Morombe. The regional landscape is heterogeneous and highly anthropogenic, composed of coastal dunes and mudflats, limestone flats, mangroves, and spiny xerophytic scrub on the western coast; forested dunes, dense and viny dry deciduous forest, rain-fed wetlands, riparian forest, and dry, spiny scrubland in the Mikea Forest between the coast and the eastern savanna; and woodland, woody savanna, spring-fed irrigated rice fields (tanimbary) and savanna grassland to the east of the Mikea Forest.

Regionally, three primary cultural identities are associated with different ecological niches and primary livelihood activities. Mikea self-identity, and are identified by their
neighbors, as people of the Mikea Forest, or Alamikea, who subsist on small-scale farming and wild forest products including several types of tuber (ovy [Discorea acuminata], babo [Discorea bemandry], moky [?]), wild fruits (lamote [Flacourtia indica], and varieties of jujube locally called tsinefo and konazy [Zizyphus vulgaris; Z. indica; Z. Mauritania]), honey, three varieties of tenrec or African hedgehog (Setifer setosus; Echinops telifairi; Tenrec ecaudatus), lambo or wild bush pig (Potamochorus larvatus), wild birds including guinea fowl (Numida meleagris), duck (Dendrocygna viduata), and freshwater fish including introduced Chinese Snakehead fish (Chinna striata), and members of the genus Paratilapia. Mikea often sell wild hunted and gathered foods that tend to fetch high prices at rural markets. Vezo describe themselves as olo andriake, “people of the sea,” who fish for shark and finfish with lines, nets and spears, and forage sea cucumber, shellfish, octopus and other sea life on the rich reefs that hug the west coast of Madagascar. Masikoro describe themselves as people of the savanna to the east of the Mikea Forest, specializing in farming, especially irrigated rice and maize, but also growing manioc, sugarcane, legumes and vegetables, and raising cattle and other livestock. People identifying as Mahafaly, Tandroy, Tanosy, and Tesaka also live in the region, practice similar livelihoods, and often live in settlements that are considered to be historically Mikea, Vezo, or Masikoro. These “immigrant” identities are associated with migration into the region in the colonial and post-colonial periods in response to political and ecological factors, and in response to market demand for specific agricultural products.

Despite local norms associating Vezo, Mikea, and Masikoro identities with ecologically specialized lifestyles, members of all three groups are highly mobile and practice a broad range of subsistence and market activities depending on seasonality, skill, and market demand. In any given village residents are likely to practice a shifting combination of horticulture, animal
husbandry, freshwater fishing, forest foraging, marine foraging, manufacturing, market commerce, and wage labor (Tucker 2001). Even though many activities require cooperation among individuals living in a family, household or village (for example, shark fishing, charcoal production, mobile retailing, and large-scale rice farming), most livelihood portfolios in the region are diversified on an individual level. This allows individuals in family units to meet the subsistence needs of the family, earn cash income, and buffer productive portfolios against often synergistically constituted environmental shocks like drought and pestilence, socio-political shocks including land conflicts and violence, and economic shocks including banditry and market busts.

In the past several years the Mikea Forest has come to the attention of multiple national and international actors. This interest has been stimulated by increasing social and economic power among cooperating regimes of conservation and development, what Hanson (2009) and other authors (Luke 1999:121; Rutherford 2007; Watts 2002) call “green governmentality.” Environmental action is justified citing a significant reduction in forest cover since the 1970s due to forest cutting and burning for pasturage, charcoal production, and especially for hatsake, swidden maize production (Aubry and Ramaromisy 2003; Blanc-Pamard 2002, 2009; Blanc-Pamard et al. 2005; Du Puy and Moat 1998: 15; Durbin et al. 2006: 55; Eaux et Forets 2003, 2004; LePrun et al. 2009: 529; Milleville et al. 2001; ANGAP 2003; WWF 2003; Seddon et al. 2000).

Although many residents have managed to avoid direct conflict with authorities over use of resources, the gradual introduction of increasingly strict environmental policies in the region has contributed to increasing insecurities in three fundamentally related domains: livelihood insecurity (including food insecurity), vulnerability to violence and theft, and vulnerability to
exploitation. These increased regional insecurities have resulted from a complex set of factors, including limiting policy information available to rural residents, limiting local representation in policy processes, imposing restrictions on rural livelihoods, and unevenly enforcing rules related to resource use. At the same time, many residents are similarly concerned about plans for titanium and oil mining in the region.

1.4 Overview of theory

1.4.1 Ecological crisis, discourse and representation

In Madagascar, protected forests are sites of local, national and international interest, “transnational” (Ferguson and Gupta 2002) locales where cultural discourses and material struggles meet. Development efforts and environmental protection center on what Reardon and Vosti (1997) term a “critical triangle” of sustainable development that includes economic growth, poverty alleviation, and environmental sustainability. Madagascar’s forests are presented by different powerful groups as global goods in crisis (Ganzhorn et al. 1999; Ganzhorn et al. 2001; Harper et al. 2007; Myers 1992), wild natural spaces harboring rare species of plants and animals (Mittermeier 1986: 147; Myers et al. 2000), suppliers of ecosystem services (Bodin et al. 2006; Laurance 1999), ecotourism destinations (Gossling 1999; Maille and Mendelsohn 1993), and reserves of resources like oil, titanium, and sequestered carbon that will facilitate national economic development and poverty alleviation if they are managed sustainably (Blanc-Pamard 2009; Ferguson 2009; Norris 2006; Reyneke and Wallmach 2007).

Despite notable differences, these competing narratives do share commonalities. The first commonality is related to their cultural production; they are all produced within the same institutional context, a the network of governance that includes state ministries, non-governmental organizations (NGOs), private companies, donors, and international financial
institutions (Duffy 2006:732) that has supplanted the Malagasy state as the primary locus of national environmental policy production. Second, despite apparent contradictions between goals of environmental preservation and environmentally destructive extractive activities, and instances of vocal opposition to mining projects by environmentalists working in Madagascar, competing regimes rely on powerful messages of sustainability to persuade distant observers that environments can be directed and environmental problems solved through the application of technology and expert management (Bridge and McManus 2000; Luke 1999). Sustainability messages gain wide support due to the package of cultural values to which they are attached, including values related to socio-economic equity, future or long-term benefits, scientific authority, and environmental management (Preston-Whyte 1996). A third commonality relates to the way that these narratives are deployed. Knowledge is disseminated publicly in scholarly publications and media products, and is formalized in national environmental and development policy. In this way, the deployment and formalization of knowledge about the environment and activities that work upon it establishes the expertise, authority and right of professional managers to manage (Hein 2006).

A final, very important commonality lies in the structure of crisis messages. These presentations contain two basic tropes: statements of value associated with preservation, progress, and social integration, and statements of threat that associate environmental harm and impending crisis with an essentialized rurality. Descriptions of ecological crisis in Madagascar most often attribute the cause of environmental degradation (most frequently deforestation and associated erosion) to rural Malagasy subsistence farmers, and call for immediate and continued environmental action in order to preserve increasingly fragmented forests and habitat for endangered species (Ganzhorn et al. 2001; Myers et al. 2000; Coe 1998; Smith et al. 1997).
In the nineteenth and early twentieth centuries, travelling naturalists popularized the idea that prior to human settlement Madagascar was nearly covered by dense forests that have been gradually lost to cutting, burning and erosion (Humbert 1927; Perrier de la Bâthie 1921). Deforestation on Madagascar is portrayed as a continuous and unilinear process that began with human settlement and has steadily increased with the growth of a rural population practicing destructive shifting cultivation (Hannah et al. 1998). This neo-Malthusian “demographic tragedy of the commons” narrative deterministically blames rural people for land degradation as poverty pushes them to cultivate marginal “commons” without proper agricultural inputs (Reardon and Vosti 1995). In this scenario:

…Farmers…push their land to the limit without using enough fertilizer, manure and compost, or without protecting the land with terraces and bunds, or…push their farming out into the commons to survive…In turn, the degradation is reducing land productivity and increasing food insecurity. This growing poverty then results in higher birth rates, and the cycle is perpetuated.

Clay and Reardon 1998:1

The story is ubiquitous in cross-disciplinary discussions of forest loss and land degradation in Madagascar, in research articles and editorials published by conservation biologists, and in pleas for increased funding for protected areas and development projects. Unrestrained population growth, inefficient cultivation, fuel wood collection, and charcoal production by poor rural people are seen as the primary causes of the loss of over 70 percent of Madagascar’s primary forest cover and resultant “habitat loss” of over 90 percent (Ganzhorn et al. 2001; Myers et al. 2000; Coe 1998; Pryor 1988).
Paleo- and historical-ecological researchers have produced a more nuanced understanding of the complex and non-linear nature of pre- and post-settlement ecological and demographic change in Madagascar (Burney 1987, 1997, 2003; Burney et al. 1997; Ingram and Dawson 2005; Jarosz 1993; Matsumoto and Burney 1994; Kull 2000; Sussman et al. 2004; Wright and Rakotoarisoa 1997). For example, Burney (1999, 2004) has proposed a dynamic “synergy hypothesis” to explain human-environmental interaction in Madagascar and has used paleo-ecological data to demonstrate that, while human activities have contributed to extinctions and environmental change, the processes by which this has occurred in Madagascar defy the linearity of dominant assumptions. The extent of human impacts varies in diverse regions, and sometimes-synergistic relationships among factors, including “background climatic change” (Burney 1999: 147), have at times amplified affects. Jarosz (1993: 366) criticizes the neo-Malthusian framing of environmental problems, stating that simplistic cause-effect scenarios involving linear relationships among population, shifting cultivation, and environmental degradation ignore large-scale cultural processes and political economy. Jarosz demonstrates that the period between 1900 and 1940 saw the highest rates ever of deforestation in Madagascar, and coincided with a period of population stagnation and decline, both of which Jarosz (1993: 376) attributes largely to colonial policies that destabilized patterns of subsistence, increased cash cropping and commercial timber extraction. Despite the rigorous challenges posed by these and other authors, classic and compelling “degradation myths” (Kull 2000:423) continue to “[shape] the discursive field within which policy occurs” (Kull 2000:428).

What Duffy (2005:830) and Marcus and Kull (1999:1) have called the conservation “boom” in Madagascar began in the 1990s, with the establishment of a three-phase National Environmental Action Plan (NEAP). Raik (2007) calls the period from 1992 to the present the
“NEAP Era” in Madagascar. Particular types of policy action, and specific approaches to conservation characterized each of the three NEAP phases. Much action and spending has been focused on the gradual establishment of new PAs that cover many of the island’s forested areas. The central missions of Malagasy forest PAs are quite similar—to limit the “destructive” use of forest resources by poor Malagasy living in or near forested areas, and especially to decrease rates of forest cutting and burning associated with swidden cultivation of rice and maize (tavy; hatsake). According to Raik (2007: 9), “despite the rhetoric of local empowerment… governance arrangements are substantially controlled” by non-local stakeholders.

Although Malagasy and International NGOs have worked to establish micro-development and “alternative livelihood” projects, mostly focusing on ecotourism and other activities near many protected areas in Madagascar, fundamental problems remain. First, the practice of inducing people who produce primarily for subsistence to replace diversified (primarily food-oriented) livelihood strategies with market strategies is extremely risky for project participants. In Madagascar, such projects usually involve the production of specialty goods for tourists or export markets, but markets for these goods are often very small or highly unstable. Second, inducing agricultural intensification or crop substitutions is problematic. Shifting to intensive production can pose significant agronomic challenges, and can be hindered by legal and financial barriers. These barriers include the prohibitive cost of agricultural inputs, and a lack of access to means of securing formal land title (Feeley-Harnik 1995; Ferraro 2002; Fritz-Vietta and Stoll-Kleeman 2008; Kull et al. 2007; Mulligan 1999; Tucker 2007; Scott 1976).

As social and material challenges are managed by people living in the Mikea Forest region, powerful communities of scholars, bureaucrats, representatives of non-governmental organizations, and corporate representatives (a diverse group of local and non-local stakeholders
that are nevertheless seen to comprise a powerful and collusive community by many rural Malagasy) are engaging in discussions that shape possibilities for human and environmental futures. Although the environmental policy in Madagascar has in recent years adopted an inclusive rhetoric and language that acknowledges the rights and knowledge of local people, the dominant degradation discourse continues to influence national legislation and thereby shape the governance structure of local management programs (Klein 2004:21). This contributes to significant gaps among prescribed policy, realized legislation, and local-scale conservation and development practice. In order to understand the ways in which possibilities and opportunities are produced by a plurality of actors, associations between the production of knowledge (especially dominant discourses of rurality, indigeneity, rights, and environment) and changing socio-environmental relationships must be considered.

In the case of Parc National Mikea, increasingly strict environmental policy action is supported by powerful discourses of indigeneity and rurality, important cultural phenomena that functionally exclude many rural villagers from processes of policy production and from the dissemination of relevant policy information. Mikea people are often represented as a population of indigenous, culturally and materially primitive forest hunter-gatherers. Their neighbors and kin, rural Masikoro, Vezo, Tandroy, Mahafale and others, are represented in policy documents and conservation literature in terms evoking the imagery of invasive species, impoverished and irrational resource users who are seen to make environmentally destructive choices. Framed in this way, locals (“indigenous” as well as “invasive”) are officially rendered incapable of contributing to policy, and their livelihoods become morally subordinate to the values of forest preservation and national economic development. “Local” voices that are heard are invariably
those of elite regional administrators and politicians whose interests and experiences contrast sharply with those of people who live in or derive primary benefits from the Mikea Forest.

Mikea Forest protection policies center around reducing deforestation associated with swidden maize production (*hatsake*) and wood harvesting. Most people affected by the new protected area are aware of its existence in an abstract sense, but are frustrated by the lack of specific information available to rural villagers, uneven enforcement of rules, and lack of access to legal protection against exploitation. Ultimately processes of exclusion leave rural resource users more vulnerable to crime, including armed banditry, cattle theft, and extortion of bribes by those claiming state authority, and less able to legally cope with economic and environmental shocks, including those related to prolonged national political crisis and drought.

In a practical sense, and regardless of inclusive or participatory policy rhetoric, the establishment of restrictive PAs to protect biodiversity by excluding human activities has continued with the gradual establishment of *Parc National Mikea*. This occurs despite limitations inherent in the current practice of environmental protection in Madagascar, and despite the fact that there is no consistent body of research supporting the contention that restrictive parks are successful in achieving protection goals or necessary to protect biodiversity (Agrawal and Redford 2007; Hayes 2006; Hufty and Muttenzer 2002; Oliver-Smith 2009).

1.4.2 Accessibility of resources, livelihoods and vulnerability to food insecurity and poor nutritional status

Vulnerability is a powerful analytic concept that is broadly used by researchers and policy professionals as a tool for describing a social or ecological system’s susceptibility to harm due to a lack of resilience or ability to cope with exposure to stressors or perturbations (Adger 2006: 268). Vulnerability is closely associated with the concept of risk, and with processes of
adaptation and resilience in the context of social and environmental change (Adger 2000; Nelson et al. 2007). Vulnerability operates and may be examined at different social, spatial, and temporal scales (Clay and Olson 2009: 144). Although particular definitions vary based on research context and scale of focus, vulnerability is generally defined based on a set of common key parameters: exposure to contingencies and stressors, difficulty coping with exposure with contingencies and stressors, and risk of harmful consequences for an individual, a group, or a social-ecological system (Adger 2000, 2006; Bohle et al. 1994; Chambers 1989:1; Yaro 2004).

The broad relevance of the vulnerability concept to scholars and policy professionals is reflected in contemporary interdisciplinary discussions of global environmental change (Adger et al. 2009; Janssen and Ostrum 2006); natural hazards and the mediation and management of risk (Few 2007; Little et al. 2001; Smit and Wandel 2006; Vogel et al. 2007), and research on entitlements in relation to livelihoods, human development and poverty (Blaikie et al. 1994; Bohle et al. 1994; Chambers 1989; Leach et al. 1999; Paavola 2008; Sen 1981; Swift 2006[1989]). Vulnerability research owes much to intellectual traditions in (and cross-disciplinary dialogs among) the social and natural sciences, including political economy, ecological anthropology, geography, and ecology (Adger 2006; Clay and Olson 2009; Eakin and Luers 2006; O’Brien et al. 2007). Eakin and Luers (2006) group these intellectual traditions into three lineages that have led to different methodological approaches, units of analysis, and differing disciplinary norms regarding the study of vulnerability. These lineages include, “…(a) studies that draw heavily from risk/hazard or biophysical approaches, (b) the application of political-ecological and/or political-economic frameworks, and (c) recent research on vulnerability inspired by the concept of resilience in ecology” (Eakin and Luers 2006: 367).

In the context of research on climate variability and change, O’Brien and colleagues
(2005, 2007) and Kelly and Adger (2000) identify two primary interpretations of vulnerability in the existing literature that stem from different ways of conceptualizing and framing social and environmental change and adaptation. Outcome vulnerability views vulnerability as the “end-point of a sequence of analyses” (Kelly and Adger 2000: 327), which includes projections of risk and the identification of adaptive options. As an outcome or end-point, vulnerability represents the net residual negative effects of a stressor or perturbation after accounting for adaptation, or the “linear result of the projected impacts of…[a stressor] on a particular [biophysical or social] exposure unit” (O’Brien et al. 2007: 75). In contrast, contextual vulnerability considers vulnerability as a starting point for analysis, as present inability to cope with stressors or change. From the contextual standpoint, vulnerability is not something that happens as the end result of a linear process, but is a fundamental characteristic of socio-ecological systems, and is generated by multiple factors and processes. Context is comprised of social, political, economic, and institutional structures and changes, and influences exposure to stressors as well as potential adaptive action or coping responses. Responses are conditioned by and in turn influence context and vulnerability (Adger et al. 2006: 274; O’Brien et al. 2007: 76).

According to Bohle and colleagues (1994: 37-38), working in the entitlements tradition, vulnerability is “best defined as an aggregate measure of human welfare that integrates environmental, social, economic, and political exposure to a range of potential harmful perturbations.” In an entitlement-oriented approach, vulnerability is a contextual characteristic of linked institutional and economic arrangements that affect people’s ability to act in order to cope with social-environmental change (Adger 2006; O’Brien et al. 2007). Vulnerability is produced when people have insufficient access to income, wealth, or other social or material resources, and this insufficiency is accompanied by a breakdown of other previously held endowments that
are identified as critical to coping with and adapting to risk (Eakin and Luers 2006; Sen 1981; Tiwari 2007). On a local or regional scale, social relationships and institutional arrangements define what Adger (2006: 273) terms “vulnerability of place.” Vulnerability is reproduced within social systems through deep structural elements and, consequently, the social realm of institutions, wellbeing, class, status and gender are important variables to understanding variation in exposure to perturbations relative to variation in people’s capacities to cope (Adger 2006; Bolin 2006; Erikson et al. 2005). Marginality, social differentiation (reflecting differences in relative political and economic power), agency, issues of representation, and the politics of scale are of central importance to examining contextual vulnerability (Clay and Olson 2009: 145).

As described in many studies of livelihood diversity in sub-Saharan Africa, the flexibility and diversity of livelihood portfolios allow people dependent on natural resources in the Mikea Forest region to provide subsistence to their families, to decrease environmental and political risk, and to engage opportunistically with markets without becoming market dependent (Shipton 1990). In discussing the diversification of livelihoods in the region, it is important to consider not only various sources of income, but also the role of social networks through which people derive material and non-material resources critical to sustaining and facilitating portfolios, and institutions that govern and interpret rights and obligations of individuals, families, and communities, and access to (or exclusion from) the physical and social infrastructure provided by the state and extra-local non-state actors such as non-governmental organizations (NGOs) and missions (Ellis 1998).

In the past decade changing markets, increased population and competition for resources due to immigration, prolonged drought, rising prices for purchased goods, and the gradual deployment of new policies aimed at conserving and regulating the use of natural resources in
the region have resulted in a diverse and innovative range of practiced livelihood strategies among rural people living in and near the Mikea Forest. According to Batterbury (2001: 483), “productive bricolage” strategies are manifestations of processes of adaptive decision-making and intentional diversification, reflecting the multitude of ways that rural individuals and households combine agricultural, non-agricultural, subsistence and market-oriented activities, that occur at the intersection of the realms of natural environment, the human body, production processes, social relationships and contextualized meaning. These strategies depend on the ability of individuals and social groups (household; village; clan, etc.) to individually and collectively negotiate environmental and institutional constraints that increase risk to material livelihoods, nutritional health, security and wellbeing. Constraints are embodied in increasing competition for finite resources such as land, wood, and water; an increased incidence of banditry and cattle theft; and an increased incidence of fines and extortion by representatives of state agencies or by people claiming to represent the state.

If Mikea Forest environmental policies are contributing to increased contextual vulnerability by limiting access to resources upon which productive livelihoods depend, then people who are more dependent on forest-based natural resources may have less diversified livelihood strategies, and may experience higher rates of food insecurity, stress, and poorer nutritional status than people who are less dependant on forest-based natural resources or who experience fewer restrictions. Among participants in this research project, security, adequate subsistence, cash income, and individual and group identity are contingent to varying degrees on access to forest resources, and participants’ ability to actively and sufficiently cope with drastic social and environmental change depends on flexible resource access. Of all of the users of natural resources in the region, rural and relatively asset-poor Malagasy are least likely to be able
to forego the immediate returns and long-term benefits derived from these resources without negative global (social, economic, psychological, and biological) consequences for wellbeing (Oliver-Smith 1996; UNDP 2006; Marcus and Kull 1999). With a sometimes absolute paucity of functioning infrastructure such as roads, reliable or improved water sources, public schools, health centers, and trustworthy civil defense personnel in the region, rural resource users have become increasingly vulnerable to harmful consequences despite creative coping strategies. Local social processes and public policies that restrict accessibility to resources increase risk of insecure livelihoods, food insecurity, and exposure to violence and exploitation.

One possible explanation for this is that where livelihood options are increasingly limited, vulnerability, and its associated characteristics, is increased. A livelihoods approach recognizes that poverty and wellbeing are complex states, comprised of elements (some of which can be conceptualized or operationalized as different types of capital) that cross multiple domains of human life that may include food security, the ability to maintain one’s health, access to education and cultural institutions, access to social network resources and social support, and the ability to provision one’s family in culturally appropriate ways, as well as the ability to access markets and earn income (Bebbington 1999; Becker 1962, 1993[1964]; Chambers 1995; Cleaver 2005; Ellis 1998, 2000; Field 2003; Lin et al. 2001; Maxwell 1996; Maxwell and Wiebe 1998; May and Norton 1997; Quandt et al. 2001).

1.4.3 Wellbeing: Relationships among inequality, stress, and perceived health

Broadly stated, this dissertation research is framed in terms of the political ecology of wellbeing and health. Wellbeing is a dynamic and open concept, useful as a unifying concept in the development of frameworks for the comparative study of phenomena related to health across social, cultural, and economic contexts (Deneulin and McGregor 2009). While lacking a single,
standardized definition the concept of wellbeing is widely used by social scientists examining physical, social and psychological aspects of human functioning (Cronin de Chavez et al. 2005). White (2009:3) suggests that wellbeing is difficult to define because it is subjective, meaning different things to different people. According to Camfield and colleagues (2009: 6), researchers have used the term “wellbeing” in a number of related ways. These include references to wellbeing as (1) a subjective experience or state of being (Diener 1984), (2) processes that underlie happiness (Diener 1999), (3) as an ideal “space” where wellbeing can occur (Sen 1992), and (4) as a function of the “livability” of the environment (broadly conceived) and the “life ability” of the person (Veenhoven 2000: 4-5). In the face of such diversity, McAllister (2005:2, quoted in Camfield et al. 2009: 6) points to shared or implicit understandings among researchers employing the term: wellbeing is portrayed as “more than the absence of illness or pathology […] with] subjective (self-assessed) dimensions and objective (ascribed) dimensions; it can be measured at the level of individuals or society; it accounts for elements of life satisfaction that cannot be defined, explained or primarily influenced by economic growth.”

Over the past several years, researchers participating in the Wellbeing in Developing Countries Research Group (WeD), an ongoing research group based at the University of Bath and funded by the UK Economic and Social Research Council (ERSC), have developed a framework for studying human wellbeing in developing countries that is “positive, holistic, and person-centered,” with the goal of exploring the extent to which people can achieve a state of “being with others, where human needs are met, where one can act meaningfully to pursue one’s goals, and where one enjoys a satisfactory quality of life” (WeD 2007: 1-2). The WeD framework considers human wellbeing to be both a state of being and a process. As a state, wellbeing is highly contextualized, but viewed as a process, power and politics are central
concerns because they are cross-scalar phenomena related simultaneously to contextualized local perspectives, the availability of and access to social, cultural and material resources that sustain a satisfying life, and the ability of people to engage opportunities and meaningfully pursue goals.

In terms of methodologies for evaluating wellbeing, WeD’s perspective encourages researchers to combine literatures and methodologies to explore how wellbeing is grounded in and mediated by social, cultural and political structures and processes (Camfield et al. 2009). It embraces mixed methods (in data collection as well as analysis and interpretation) and allows for a tension between universalizing and local perspectives (WeD 2007: 4). While wellbeing is essentially understood as meaningful functioning and feeling well within a specific context, wellbeing is produced by having resources, capabilities, and opportunities which go beyond the “local.” Ethnography is particularly valuable as a means to integrate the ways that people think and feel about what they have and do into a research design, acknowledging what Camfield and colleagues (2009:8) term the “interpersonal and recursive,” or how people experience and evaluate their lives, and how people’s lives are shaped by their perceptions of the environment and themselves in the context of what they value and aspire to (Tiwari 2009). At the same time, questionnaires and survey instruments can collect important information about needs, access to various types of resources, locally salient insecurities and inequalities, income and means of subsistence. Ethnography is also seen as a way to achieve a less structured and less hierarchical engagement between researcher and participant, and a means to enhance the explanatory power of quantitative research instruments (Camfield et al. 2009).

In this dissertation, I adopt Baer and colleagues’ (1986: 95) critical definition of health as “access to and control over the basic material and non-material resources that sustain and promote life at a high level of satisfaction,” along with the fundamental understanding that
biology, the human body, and contextualized notions of health, illness and wellbeing are deeply socialized and historicized (Levins and Lewontin 1985; Morgan 1987; Turshen 1977, 1984). Human-environment relationships, cultural struggles related to environmental and social resources, and issues of scale are fundamental aspects of political-economic analyses of variation in health because access to these resources and institutions satisfy people’s needs and allow people to maintain health and wellbeing (Leatherman 2005; Mayer 1996; Nguyen and Peschard 2003; Panelli and Tipa 2007; Richmond et al. 2005). Furthermore, such analyses must consider ways in which affected bodies, minds and internal biologies influence social life and social relationships (Goodman and Leatherman 1998: 5).

Biocultural anthropologists and medical geographers working within this framework have, since the late 1990s, begun to produce a body of empirical research that illuminates pathways by which culture, human environments, and human health are mutually influenced. Some of the most notable studies have addressed issues of environmental quality, including lead pollution (Hachette 2008; Renfrew 2007; Schell 1997) and air quality (Grineski 2006; Harper 2004); political violence and refugeeism (Kalipeni and Oppong 1998; Oppong and Harold 2009); subsistence, land use, dietary transitions, and nutrition (Collins 2001; Crooks 1998; Finnis 2006, 2007, 2008); and changing household economy and subjective health (Leatherman 1996).

A complementary theoretical approach in social epidemiology is the ecosocial approach to human health. Elaborated by Krieger (1994, 2001), ecosocial theory developed in reaction to critique of “biomedical individualism” (Krieger 1994: 887) and to a tendency within epidemiology to focus on modeling complex relationships among “risk factors” rather than understanding the origins and processes of risk and their implications for public health practice. This approach seeks to understand the ways that people biologically incorporate the material and
social world in which they live through pathways formed by social processes and biological possibilities and constraints (Krieger 2001; 2005). Like political-economic and political-ecological approaches to health, ecosocial theory centers on the idea that both health sciences and human health are fundamentally social and historical.

Social epidemiologists have observed that within societies there is considerable variation in health according to socio-economic position, a social group’s placement in an ordinal social hierarchy based on variables such as income, wealth, educational attainment, status and occupation (Williams and Collins 1995; Trostle and Summerfield 1996; Kelly et al. 1997; Deaton 2003; Nguyen and Peschard 2003; Charlton and White 1995). In wealthier industrialized regions of the world, higher socioeconomic position is generally associated with longer life and lower mortality rates, and a health gradient tends to apply across all economic strata from lowest to highest (Charlton and White 1995). Because social inequality itself is associated with reduced social cohesion and is directly associated with increased mortality (Kawachi et al. 1997; Kawachi et al. 2005), inequality can be seen as a proxy for social stratification and the inequitable distribution of public goods and health-supporting resources.

One pathway by which inequality impacts health may be psychosocial stress, exposure to which is influenced by the quality of an individual’s or groups’s social relations, which may be determined by the magnitude of a society’s inequalities (Elstad 1998). Stressors are experienced or anticipated stimuli that elicit a physical, behavioral or emotional response in the form of resistance, cognitive appraisal, or coping behavior, and push an organism away from a condition of homeostasis (Lazarus 1966; Brown 1981; Nichter 1981; Parsons and Wakeley 1991; Aneshensel 1992; Dressler and Bindon 1997; Dressler 1999, 2007; Stewart 2006; Ice and James
Individuals and groups who are socio-economically disadvantaged tend to have increased exposure to health hazards and psychosocial stress relative to other groups.

Social inequality is, of course, not the only stress-focusing phenomenon that can affect human health and wellbeing; psychosocial stress is fundamentally about the costs and benefits of living in society, and in politically or economically marginalized communities coping with processes of rapid change, such costs are often particularly high (Pike and Williams 2006). In their everyday lives, people may experience stress related to nutrition and food insecurity (Bentley et al. 1999; Frongillo 1997), enacting social roles (Parsons and Wakeley 1991), family environment (Flinn and England 1995, 1997), or related to the pressures of “development” and market transitions (Dressler 1999).

Stressors may be categorized in various ways as acute, seasonal or chronic; physical, environmental or psychosocial; and may vary significantly in intensity. Various “markers” used to measure stress have included emotional or behavioral responses, including “idioms of distress” (Nichter 1981; Parsons and Wakeley 1991; Pike and Williams 2006), hormonal variation (Pollard 1995; Flinn and England 1995, 1997; Kelly et al. 1997; Decker 2000), and physiological change (changes in cardiovascular function or immune function) (Dressler and Bindon 1997; McDade et al. 2000; Ice and James 2007). Dressler (2007) has identified several potential pathways by which culture influences stress processes: cultural context influences the meaning and patterning of stressors, as well as the availability of coping resources. Schell (1997) states that culture (through social stratification and the related distribution of hazards and stressors) can be seen to allocate risk disproportionately among individuals in a society. Individuals and groups who are socially and economically disadvantaged are more likely to be exposed to environmental toxins, occupational hazards (both of which are culturally produced
environmental hazards), and psychosocial stress, and are less likely to have access to education and health care systems.

This research employs an “idioms of distress” framework and asks whether experienced local and regional social and economic inequalities are a significant cause of psychosocial stress among people living in the Mikea Forest region, and whether or not inequality and psychosocial stress are exacerbated by processes that alter people’s access to social and environmental resources, and if inequality is associated with the frequency and severity of people’s experienced health problems. An important task of contextualized health research is to determine how different individual and group experiences with different types of culturally defined stressors may affect individual health (Dressler 2007; Pike and Williams 2006). Such analyses must be linked the question of how risk of harm can be embedded in large-scale structures and processes, and the key to addressing such problems is an understanding of local realities in global contexts (Farmer 2004; Goodman and Leatherman 1998).

1.5 Notes on research design

This research project pursued three primary research questions. The first, concerned with regional environmental policies and environmental governance practice, asks how the production of knowledge, including authoritative discourses regarding Mikea people and the Mikea Forest environment, is associated with changing social and environmental relationships in the Mikea Forest Region. The second question asks if new modes of regional environmental governance, and particularly the creation of Parc National Mikea, are associated with increased insecurities (in terms of livelihoods, food insecurity, and nutritional status) among Mikea? And third, how do Mikea conceptualize and manage human health and wellbeing in this context?
I found that discursive representations of people and human-environment relationships in Mikea Forest environmental policies and resource management practices have, since the 1990s, increasingly contributed to the reproduction of unequal social relations in the region and have worked to entrench institutional biases against subsistence producers. This has occurred indirectly through processes of political and geographic exclusion that are justified by narratives regarding indigeneity and primitivism of so-called “true Mikea” and the environmental destructiveness of those who do not qualify as indigenous. These cultural transformations related to identity and relative political power, through processes of exclusion, have affected regional insecurities in three primary but related spheres: livelihoods, vulnerability to violence, and vulnerability to exploitation.

I also found that in 2009, residents of all three focal field sites were challenged by drought, widespread socioeconomic insecurity, and prohibitions on resource use. But Mikea forager-bricoleurs living within boundaries of Parc National Mikea face the greatest difficulty coping with these challenges compared to participants living outside or near PA boundaries. High food insecurity and relatively high rates of underweight among women, and undernutrition, stunting, and wasting among children living within PA boundaries may be a recent phenomenon associated with PA policies and exacerbated by prolonged drought.

Finally, I observed gendered and village-wise disparities in perceived health and village-wise disparities in perceived morbidity. Village-wise disparities in perceived health and morbidity are associated with livelihood diversity, access to health sustaining resources through opportunistic market participation, and with the availability of social support. Gendered disparities in health are most likely due to a combination of factors, including gendered inequalities in income, patterns of labor and mobility, and gendered access to public health
services. Because of PA policies, access to forest resources that sustain traditional modes of
diagnosis and healing may significantly decrease as access to protected forestland is restricted to
all but a few. At the same time, the accessibility of public health services is not improving.
Because of gendered disparities in access to biomedical care and gendered patterns of health
seeking behavior, this may disproportionately affect women’s ability to treat health problems in
the future.
Figure 1.1 A map of the Mikea Forest region with field sites indicated. Adapted with permission from a map by Bram Tucker; forest extent from 1994 landsat images processed by James Yount.
CHAPTER 2
Preparation, overview of data collection and analysis, and description of field sites

2.1 Project design: Research questions, sampling, and research methods

As discussed in Chapter 1, this dissertation, framed in terms of the political ecology of health and wellbeing (Baer 1996; Leatherman 2005; Mayer 1996), seeks an empirical understanding of relationships among political economy, livelihoods, security and human health among Mikea people living in three villages in southwestern Madagascar. In my research and in this dissertation I address questions about historical-cultural processes of knowledge production, about changing relations among people, the state, and the environment, and about the social production of health and wellbeing. This dissertation is organized to answer three primary research questions.

2.1.1 Research questions

Field sites, sampling procedures, primary data collection instruments, and data analysis procedures were chosen to address the following research questions.

Question 1: How is the production of knowledge, including authoritative discourses regarding Mikea people and the Mikea Forest environment, associated with changing social and environmental relationships in the Mikea Forest Region?

• How do “official truths” that guide environmental policy shape representations of and possibilities for people and environments in the Mikea Forest region?

• How is policy information disseminated to people who are expected to comply with it? How are policies enforced?
• What types of knowledge and institutions can villagers access to participate in or influence the production of policies that alter their ability to access natural resources?

**Question 2:** Are new modes of regional environmental governance, and particularly the creation of *Parc National Mikea*, associated with increased insecurities (in terms of livelihoods, food insecurity, and nutritional status) among Mikea?

• How do people perceive and manage insecurities?

• How do social, economic and demographic factors affect regional (in)securities, and how do affects vary among field sites?

• Are livelihoods security, food security/insecurity and nutritional security associated with exposure to PA policies?

**Question 3:** How do Mikea conceptualize and manage human health and wellbeing amidst ongoing processes of social and environmental change?

• How are endogenous and exogenous socio-cultural factors associated with human health?

• What are locally salient models of health and wellbeing?

• How do local models of health and wellbeing differ from those of policymakers, conservation and development practitioners, and healthcare providers who are working in the region?

• How are problems in the domains of health and wellbeing perceived, assessed, and acted upon?

• Are local or regional social and economic inequalities significantly associated with perceived health and wellbeing?
2.1.2 Sampling

Research sites, which are introduced in detail below, were selected in order to ensure sensitivity to regional variation in subsistence practices and local ecologies. Andalambezo is a small coastal village that is heavily dependent on small-scale farming, marine foraging, and the presence of a small Catholic mission. Ampijilova is a small permanent village located in the Namonte region of the Mikea Forest within the boundaries of Parc National Mikea, where residents rely on foraging, hunting, and extensive horticulture. Mañono is a large coastal farming village on the northern boundary of Parc National Mikea, where residents rely on agriculture, and particularly irrigated riziculture, animal husbandry, and market commerce in the nearby city of Morombe.

The sampling plan for each field site was based on an initial census performed in each field site prior to the commencement of data collection. According to this census, Andalambezo (pop. 135) and Ampijilova (pop. 112) were small enough to allow exhaustive sampling within the time frame afforded by the research schedule. That is, research assistants and I were able to collect data among all individuals that were willing to participate. Because of its relatively large size (pop. 651), exhaustive sampling was not feasible in Mañono. There, we used judgment sampling (Bernard 2000:176-178), and limited our sample to all voluntary participants who lived in households with children. Other participants, including regional officials and conservation and development practitioners, were identified by their affiliation with regional government or by employment.

2.1.3 Overview of data collection and analysis

The majority of data collection occurred over two seasonal periods (January-March 2009 and June-August 2009) in order to control for variation that is a direct result of natural seasonal
environmental variation. This section outlines methods of data collection and analysis that occurred during Season 1 and Season 2. In order to avoid redundancy, more detailed descriptions of instrument design, data collection procedures and methods of analysis are presented in subsequent chapters. All qualitative and quantitative data are contextualized by ethnographic experience, including daily unstructured interviewing, and observation (Bernard 2000).

Appendix A summarizes methods of qualitative and quantitative data collection. Qualitative methods of data collection included focus groups, oral histories, and structured, semi-structured and unstructured interviews with residents of Andalambezo, Ampijilova and Mañono and with regional administrators (affiliated with the regional public health system, and with national park management), employees of environmental NGOs, and employees of state agencies operating in the region. Quantitative instruments, or instruments that collected both quantitative and qualitative data but were coded for statistical analysis include a seasonal psychosocial stress survey that was developed for this project based on an “idioms of distress” methodology (Pike and Williams 2006), a seasonal questionnaire that collected data on food insecurity, material assets, social support, subsistence and income, a seasonal health survey that assessed perceived health and morbidity, and seasonal anthropometric measurements used to calculate nutritional status of adults and children (Frisancho 1990), A trained research team affiliated with the Université de Toliara assisted data collection.

*Focus groups and developing psychosocial stress surveys*

Prior to beginning data collection, I conducted gender-segregated focus groups with adult men and women in order to guide the development of a seasonal psychosocial stress survey. My goal was to identify culturally defined (Dressler 2007) and context-specific stressors that Mikea
are likely to encounter. According to Nichter (1981), experiences of distress may be expressed in the form of culturally specific idioms, or “idioms of distress,” that may be verbal expressions or may be related to somatic manifestations of distress. Pike and Williams (2006) have found that among Turkana women of Kenya, self-reported “idioms of distress” may reliably represent experienced psychosocial stress. These focus group questions (Appendix B) were pre-formulated in order to gain specific information related to distressing events and situations that people in each field site experience. A research assistant of the same gender as the focus group participants refereed each focus group, and recorded responses. Cookies and coffee were served to participants. Following Cohen and colleagues (1995) and Morgan (1996: 134), focus group responses were used to test the validity of concepts and make final adjustments to the psychosocial stress survey (n=341 for Seasons 1 and 2; Appendix D) that was employed in focal sites in Season 1 and Season 2. Aside from these initial focus groups, which were conducted in each site only in Season 1, data collection procedures did not vary significantly between Season 1 and 2.

*Interviews*

Oral life history interviews (n=30; 5 males and 5 females in each field site) collected information from elder adult participants about important events that they have experienced throughout their lives, which included resettlement, livelihood transitions, family events, experiences of violence, and illness experiences. Information from oral histories is important to understanding processes of social and environmental change, especially in a context in which few written records exist.
Semi-structured interviews and unstructured daily interviews (n=>50) were conducted with regional officials, conservation and development practitioners, and people living in focal field sites throughout the course of the project. Regional appointed and elected officials (n=>10), employees of conservation and development organizations (including employees of the World Wildlife Fund (WWF) (n=2) and the Wildlife Conservation Society (WCS) (n=2)), and Malagasy government employees whose work relates to conservation and development in the region (n=4) were interviewed opportunistically throughout all phases of the project, but most often between seasons of data collection. These interviews focused on public policy and the regulation of resource use and residence related to the new national park and mining concessions from the formal institutional perspective. Interviews with villagers living in rural field sites (n=>40) focused on livelihoods, knowledge about regional conservation policies, policy enforcement, compliance with enforced regulation of resource use, health and healing, and sources of stress. These interviews also covered other topics, including access to markets, rates of crime (cattle theft and banditry), exploitation, drought, and the ways that these factors were affecting people’s economic opportunities and quality of life.

Interviews were conducted in Malagasy, French or English, depending on the preference of the participant. For the sake of accuracy in translation, oral history and other interviews that were conducted in Malagasy were transcribed and translated to French by a research assistant fluent in regional dialects of Malagasy and in French. Other interviews were conducted in French or English. I completed all translations of French to English.
**Questionnaire**

A comprehensive food insecurity and livelihoods questionnaire (n=427 for Seasons 1 and 2; field tested in the Mikea Forest region in 2006 and 2007; Appendix C) was iterated seasonally to collect information about food insecurity (Perez-Escamilla 2004), integration into labor and commercial markets (Godoy et al. 2004; Godoy et al. 2005); access to social capital and social support (Bourdieu 1986; Hulme and Shepherd 2003); material assets and income; livelihoods diversity (Ellis 1998); dietary diversity (Ruel 2003), and hunger. The questionnaire was administered among men and women who self-identified as the male and female heads of their household. Questionnaire data was entered and coded in Microsoft Excel, and was analyzed in Microsoft Excel and STATA 10 statistical analysis software (StataCorp 2007).

**Anthropometric data**

Standard seasonal anthropometric data (n=1,044 adults, adolescents, and children for Seasons 1 and 2) (Frisancho 1990) was recorded to analyze variation in nutritional status among individuals, households, and field sites throughout the year. Measurements and tools differed for adults and children. Among adult participants (n=364 for Seasons 1 and 2), measurements included stature (in centimeters), weight (in kilograms), and waist and hip circumference (both in centimeters). For children and adolescents aged 36 months to 20 years (n=680 for Seasons 1 and 2), measurements included skinfolds (triceps, biceps, subscapular and suprailiac skinfolds in millimeters) with Lange calipers, stature, mid-upper arm, waist and hip circumference (in centimeters), and weight (in kilograms). The stature of all participants aged over 36 months was measured using a stadiometer, and waist, hip, and arm circumference were measures using a flexible tape measure. Weight was measured with a Tanita solar digital scale.
These measurements were used to calculate nutritional status for individuals using Epi Info epidemiologic analysis software using CDC 2000 references. These calculations were further analyzed using Microsoft Excel and STATA 10, and were used to compare variation in nutritional status across the two seasons of data collection, to estimate participants’ burden of current nutritional stress (undernutrition; wasting), to estimate the frequency of past events of nutritional stress (stunting); and future health risk resulting from poor nutrition.

Health surveys

Seasonal self-report health surveys (n=341 for Seasons 1 and 2; Appendix E) asked participants about their health status at the time of data collection, to recall health problems experienced by themselves or by members of their household in the preceding season, to explain health problems that are frequently experienced by people living in their community, and to discuss severity and etiology of specific health problems. Participants were also asked to recall health-seeking action that they had taken during the previous season. Individual responses were coded in Excel, and analyzed in STATA 10. During Season 1, I conducted opportunistic interviews with several women (n=20) concurrently with the collection of health survey data. During these brief and relatively unstructured interviews, I asked women why they chose particular health-seeking actions over other options, and whether or not they thought that others in their village would make the same choices under similar circumstances. These data, along with interview data collected in 2007, were used to construct a preliminary ethnographic model of health care decision-making.
2.1.4 Methodological limitations

Throughout this dissertation I seek to emphasize that human-environment interactions, variation in health and wellbeing, and salient concepts related to health and wellness are not static nor pre-determined, but are mediated by a complex and shifting confluence of social, cultural, and bio-physical interactions. With this in mind, I would like to acknowledge that the health data collected and ideas and feelings shared with me by participants represent a series of snapshots taken in the midst of what was a very challenging year across the Mikea Forest region. Because my research is particularly concerned with contextualized and subjective aspects of health and wellbeing, particular results, especially those heavily drawing on oral history, subjective measures of health, and psychosocial stress may reflect self-report bias. As I lack longitudinal data, results cannot speak to precise patterns of development across the life course or predict precisely what will happen in the future. However, I can infer possible consequences based on empirical investigation of conditions observed at the time of research.

2.2 Logistic considerations

2.2.1 Preparation and funding

I began dissertation research in November 2008 after obtaining approval of my research protocol from the Institutional Review Board at the University of Georgia (Project number 2008-10811-0). This project was made possible with a National Science Foundation Graduate Research Fellowship, and was directly funded by a Doctoral Dissertation Improvement Grant (DDIG) and supplemental funds from the National Science Foundation (Award number NSF BCS 0817261) and by a grant from the Fulbright Institute of International Education (IIE).

In 2006 and 2007, I assisted my advisor, Dr. Bram Tucker, in analysis of focus group and questionnaire data collected in the Mikea Forest region as a pilot project for a yearlong research
project focusing on economic decision-making in rural southwestern Madagascar (“Subsistence decision-making in southwestern Madagascar: Coping with poverty or social learning?” [NSF BSC 0650412, Dr. Bram Tucker, PI]). This familiarized me with attitudes about poverty and wealth in the region, as well as patterns of subsistence among rural Vezo, Mikea, and Masikoro villagers (Tucker et al. in press).

I was greatly aided in planning this project by three months of pre-dissertation research (May-August 2007) in the Mikea Forest Region, concurrent with my participation in the first season of data collection on the aforementioned yearlong research project. During my pre-dissertation research, I established institutional affiliation with the Université de Toliara, Madagascar and its associated oral history center, the Centre de Documentation et Recherche sur l'Art et les Traditions Orals à Madagascar (CeDRATOM). I identified potential research assistants and a field guide for my dissertation project. I also collected information from l’Association Nationale pour la Gestion des Aires Protégées (ANGAP), which has since been renamed Madagascar National Parks (MNP) on the “Complexe Mikea” the protected area then set to contain Parc National Mikea.

I completed a 12-day preliminary survey of regional health care resources. Aided by Phillipe Rabemahafaly, a medical geographer with the Université de Toliara, I interviewed mayors of towns located along Route National 9 and the coastal highway (n=6), regional public health administrators working with the Service de Santé Publique de District de Morombé (n=2), clinicians employed in public and private clinics and dispensaries (pharmacies) around the region (n=8), and practitioners of traditional Malagasy healing (tromba spirit mediums, ambiasa diviner-healers, and matron midwives) (n=5). In addition, I made brief trips to many towns, villages and foraging camps in the region, and spent several weeks living in the Mikea village of
Ankililale and the Masikoro village of Andranodehoke. During my time in these two villages, I practiced the Malagasy language and, with the assistance of students from l'Université de Toliara, completed gender-segregated focus groups on the topics of local healthcare strategies and resources. I also conducted opportunistic unstructured and semi-structured interviews with villagers on topics related to subsistence decision-making, health and health care, and domestic life.

2.2.2 Dissertation research schedule

The majority of data collection was carried out in three phases between December 2008 and October 2009 (Table 2.1). The goals of the relatively brief first phase of research, which lasted from December 1 through December 15, 2008, were (1) to identify focal field sites through visits to several villages that met initial criteria related to site history, geographic location and subsistence strategies (described below), and (2) conduct a preliminary survey of the region that involved informal interviews with villagers in the potential field sites that we visited, and informal interviews with mayors and other regional government officials, and with employees of conservation organizations.

Because of marked seasonality in the Mikea Forest region (Table 2.2), the second phase of data collection is subdivided into two seasonal periods. Season 1 lasted from January 4 until March 1, 2009 and roughly spanned the season called Litsake, normally the hot, wet season in southwestern Madagascar. Season 2 lasted from June 10 until August 4, 2009 and spanned Asotre, the cool, dry season. Aside from initial focus groups (Figure 2.1; Appendix B), which were only conducted prior to Season 1 data collection, data collection for Season 1 and Season 2 employed the same research instruments in the three field sites: a livelihoods and food insecurity
questionnaire (Appendix C); a psychosocial stress survey (Appendix D); structured health surveys (Appendix E); anthropometry, and oral life histories.

Due to a disruption in funding related to national political events in 2009, I was not present during Season 2 data collection. Beginning in January of 2009, while conducting Season 1 data collection in Andalambezo, news of political unrest in the national capital of Antananarivo began to reach the research team. The unrest continued through the season, and soon after our return to Toliara in March President Marc Ravalomanana was forced from office and opposition leader Andry Rajoelina took office as leader of the High Transitional Authority.

Consequences of the political unrest included responses from the international community. Madagascar was suspended from the African Union, and lost much of its non-humanitarian international aid. As the United States Embassy prepared to close, Peace Corps volunteers were withdrawn and Fulbright scholars and researchers (who are funded by the US State Department) were evacuated as their funding was suspended. Since I was at the time dependent on Fulbright funds, I was compelled to return to the US with hopes that a détente would soon be reached and funding would be reinstated as political relations between the US and Madagascar returned to normal. In consultation with the research team, we decided that they would begin Season 2 data collection in my absence with hopes that I could join them in the field within a couple of months. During my absence I communicated with the Malagasy research team frequently via telephone, and Patricia Hajasoa and Roland Lahiniriko of the Université de Toliara oversaw data collection. Thanks to supplemental funds granted by the National Science Foundation, I was finally able to return to Madagascar in August 2009.

In addition to my absence during Season 2 data collection, consequences of my unanticipated early departure from Madagascar included the forfeiture of plans for an
“institutional phase” of research during which I planned to conduct extensive interviews with employees of government departments, quasi-private agencies, international corporations, and local and international non-governmental organizations involved in the planning and implementation of development policy and environmental policy in the southwest. These were to take place over approximately three months (early March through late May 2009) between Season 1 and Season 2 data collection. Forfeiture of the institutional phase of data collection means that heterogeneity and plurality that exists among those directly involved in regional planning and policy implementation is not adequately represented in this dissertation, as I had to rely on data collected in fewer such interviews and analyses of published policy documents. My absence from focal field sites during Season 2 data collection means that I am lacking some of the ethnographic experience I had hoped to gain, and that my data on healthcare decision-making is incomplete. I plan to address these limitations in the course of future research.

The final phase of data collection comprised relatively brief follow-up visits to focal sites and to other rural villages in the region that lasted August through October 2009. In this phase, I conducted focus groups (Appendix F) and interviews in several sites in the region in order to collect information on how locals had responded to drought and other challenges in the previous year, and about how events related to the ongoing national political and economic crises had affected rural life.

2.2.3 Composition and qualifications of the research team

Members of the research team included two Malagasy research assistants (one male and one female), an experienced field guide, a driver-mechanic, and a field cook. Patricia Hajasoa and Roland Lahiniriko are graduate students at l’Université de Toliara in Toliara, Madagascar, and both previously worked with my main Advisor, Dr. Bram Tucker, as research assistants.
They assisted with the preparation of research instruments, data collection throughout the project, and on-the-ground project management in my absence during Season 2. I met both Hajasoa and Lahiniriko, and in fact all members of the 2008-2009 research team, during pre-dissertation fieldwork in 2007. Jean-Claude Alhayess, a resident of Toliara as well, previously worked with Tucker as a driver and mechanic, and worked as driver and mechanic on the 2008-2009 project as well. Gervais Tanteley, a native of Vorehe, is an experienced field guide with incredible knowledge of the geography, kinship networks, and history of the Mikea Forest region. Théodore Ramanovontsoa oversaw food procurement and preparation for the team. Tanteley and Ramanovontsoa are both natives of Vorehe, a large village on the eastern edge of the Mikea Forest. In addition to their respective primary responsibilities as field guide, driver-mechanic and cook, Tanteley, Alhayess and Ramanovontsoa were also excellent cultural brokers in the field sites and are due credit for their significant contributions to the quality of the research. Three senior Malagasy scholars, Barthelemy Manjakahery, Tsiazonera, and Jaovola Tombo, based at l’Université de Toliara served as advisors over the course of fieldwork.

2.3 Description of field sites

In selecting field sites, I sought to identify three villages with a degree of shared history but differing in both regional micro-geography, primary subsistence and market activities, and experience different degrees of exposure to PA policies. This sampling allowed me to understand how people who share history and culture cope with different regional ecology and livelihood options in the Mikea Forest region. Following the initial site identification survey and consultation the research team and with senior scholars at the Université de Toliara, I selected three field sites. Andalambezo is a coastal settlement that is heavily dependent on marine activities and the presence of a small Catholic mission. Andalambezo is known as a Vezo-Mikea
village because residents’ histories are intimately linked to forest and terrestrial foraging, but contemporary livelihoods are heavily dependent on marine foraging. Mañono is a coastal savanna village that relies on agriculture, animal husbandry, and market commerce. Mañono is a Masikoro-Mikea village, because, while residents today practice riziculture and animal husbandry, the founding of Mañono is associated with Mikea migrations from the Namonte Basin in the Colonial period. Ampijilova is a Mikea forest settlement in which residents rely on foraging, hunting, and extensive horticulture. Table 2.3 presents environmental characteristics of each site in terms of sanitation, water sources, and access to technological infrastructure and public health resources.

2.3.1 Andalambezo

The founding of the present village of Andalambezo (Figure 2.2) is connected to the expansion of the Catholic mission based in the coastal town Andavadoake in the early post-Colonial period. Before the 1960s and the establishment of mission there, the current site of Andalambezo (which means literally “on the road to Vezo”) was a rest stop on the rocky “Vezo road” that connected marine foragers living on the Mozambique Channel to the western Mikea Forest and eastern savanna villages. The site was primarily used as a stop for travelling mobile retailers, offering the ample shade of several large tamarind trees, *kily* (*Tamarindus indica*), and seasonal rain-fed pools of fresh water. Even before the site was permanently settled, oxen would drink and browse while their drivers rested and bathed after the slow trip from the coastal settlements of Bevohitse and Ampandrivotse. The first nearby settlements were called Ankotika or Antanolo, where many of the current residents of Andalambezo claim prior habitation or ancestral habitation during the Colonial period. According to oral histories of people currently
living in Andalambezo, during the Ankotika/Antanolo period there were no people who permanently lived in the present site.

In 1962, the Catholic mission based in the coastal village of Andavadoake began to expand, establishing private primary schools in many sites along the southern Vezo coast to further the process of religious sensibilisation among rural southwestern Malagasy. In Madagascar, the term sensibilisation generally refers to government-sponsored awareness programs. These programs include public health initiatives to promote breastfeeding or vaccination, environmental education, and literacy programs, but in the context of missionization it also refers to the proselytizing mission of the church. According to Andalambezo’s priest, or Monpera, an expatriate missionary originally from Switzerland who has based there since the 1960s, the Fathers favored the establishment of schools over churches, believing that indoctrination to church values from a young age is the best way to build long-term capacity, rather than trying to convince reticent adults to convert to Christianity. The first private schools were established in Andavadoake, Befandefa and Lamboara. By 1967, ten schools had been established, and mission teachers and priests travelled between them by oxcart and laka outrigger canoe.

Andalambezo was established in 1964 as what the Priest there called a “school beneath the trees” and a tiny mission that distributed food (dried beans, maize, rice, and milk powder), and fripperie (used clothing) at no cost to the families of students, most of whom lived in Ankotika/Antanolo. As a “neutral” space with no permanent residents, the Fathers in Andavadoake considered it an ideal spot to establish the mission. As more people were attracted by the mission’s gifts, the road was widened from a narrow oxcart path to allow the mission’s
new truck to bring larger loads of supplies. The large chunks of pocked limestone that texture the landscape were cleared. A deep well was dug, and a mission village was established.

Much of the oral history of Andalambezo, like other sites, deals with historical migrations and the movement of people (Figure 2.4). According to three elder men at Andalambezo (most women we spoke with claimed to have little knowledge of clan and village histories as most had moved there only as adults) interviewed in early 2009, many residents trace their ancestry to members of the Tohaombe clan who, during the Pre-Colonial Period, transitioned from a lifestyle based primarily on pastoralism, forest foraging and small-scale cropping to a semi-settled lifestyle in a village called Andraboba. According to informants, when their ancestors were living in small camps they were preoccupied by the search for food and fresh water. When they found the site that was to become Andraboba, where fresh water and horticultural/pastoral opportunities seemed plentiful, many decided to settle there with their families but continued to forage for tubers, fruits, and honey to supplement their lifestyle.

After some time passed, a noble member of the regionally powerful Andrevola clan named Repaike took a Tohaombe wife from Andraboba, and through that marriage Andraboba became fully incorporated into the pre-Colonial power structure of the Fihereña. Although some saw benefits to being a loyal, tithe-paying village, many people felt too constrained by economic and social obligations that Andrevola loyalty entailed. Additionally, constant political troubles and raiding had pushed many from larger villages and towns to migrate into the relatively isolated coastal-forest hinterland where their cattle could browse and people could farm and forage with significantly less risk of cattle theft and slave raiding. In addition to local political unease, many felt that the in-migration of the newcomers threatened to deplete water and the productivity of livelihoods. This period is discussed as a time of population flux and pestilence,
when many people migrated to the less populated Namonte Basin region and elsewhere, and many who remained in Andraboba died from famine and disease.

When Andraboba failed, probably between 1900 and 1930, some of its residents settled in Ampolova to fish and forage in the ocean; others who wanted to build farming lifestyles went to Avatoavo. Others who had previously emigrated from larger towns moved into forest camps where they could find sufficient browse for their cattle. The ancestors of Tohaombe, Tsimamorike, Mañindrano, and Mahafaly clan members living in Andalambezo today moved to Ankotika, also remembered as Antanolo, and attempted to pursue a lifestyle based on fishing, mangrove foraging (especially for crab), and extensive farming. However, people at Ankotika were plagued by many of the same problems that had been experienced at Andraboba; there were insufficient livelihood opportunities and people continued to die of general weakness and diseases from bad water.

For many at Ankotika the advent of the Catholic mission at Andalambezo represented security and potential relief from chronic suffering. The periodic gifts of food and clothing from the mission were significant inducements to relocate there. It was not far from Ankotika, which meant that people could continue mangrove foraging and gardening with less food insecurity as diets could be supplemented with beans, maize, and rice from the mission. Many became baptized and began to attend Catholic services, but most continued to practice traditional Malagasy religion despite the priest’s disapproval.

Today, most households keep chickens, turkeys, and goats, and a few well-off households own several head of cattle. Almost all households include somebody who practices marine foraging and somebody who practices cultivation. The mission’s gifts of food have become cups of beans and rice sold at market price by the cash-strapped mission to hungry villagers. Many
people, especially young women, continue to hunt crab in the mangroves, and many young men forage for honey, tubers, and other forest products periodically for sale or home consumption. Most men and women travel regularly to the nearby coastal villages of Bevohitse and Ampandrivotse to practice marine foraging, renting expensive equipment in these villages.

Household gardens are common and many people maintain fields away from the village where they grow small-scale crops. Because of the rocky landscape and poor soil, fields have to be carefully developed. Fields, fenced by thorny interwoven lengths of soño (“Octopus tree” [Didiera madagascariensis]), are established by making a round, concave surface in the earth that is lined with porous materials, and is then filled with dirt and livestock manure. During the wet season these fields flood. As the water evaporates and drains into the ground, the layered construction traps moisture beneath the surface to nourish small crops of maize, sweet potato and watermelon into the dry season. People in Andalambezo would prefer to farm more to be more economically independent, but drought and poor soil have caused crops to wither and yields to be insufficient over the past few years. This has made villagers more dependent on marine foraging for income, and more dependent on purchased staple foods sold by the mission and by mobile retailers from the eastern savanna. Several women told us that the town is unhealthy, that women who live there suffer chronic candidiasis and other reproductive health problems, and that too many otherwise healthy adults get sick and die, but people are reticent to move away because of the security from banditry and exploitation offered by the mission and because Andalambezo has become their home, the a place where their ancestors lived.

Men and women in Andalambezo often describe themselves as “becoming Vezo”. That is, desiring to become skilled fishers and marine foragers whose livelihoods and lifestyle are sea-based. According to several male and female informants, this transition is desirable primarily
because of the high cash income that can be earned by skilled marine exploitation. The process of identity-transition also involves trade-offs that may include increased geographic and social distance from clans and other kinship groups. As one woman told us after admitting that she and many people, but especially women, living in Andalambezo do not know to which clan they belong, “It is good to be Vezo and to have a good livelihood. Vezo can make a lot of money. But, when you become Vezo, you forget things; you forget your ancestors and your history.”

2.3.2 Ampijilova

Ampijilova (Figure 2.3) is a permanent village located in the Namonte Basin of the northern Mikea Forest, a region of deep historical and symbolic value to Mikea. The Namonte region begins approximately five kilometers east of the Mozambique Channel, and is geographically quite isolated by high dunes of unconsolidated sand dotted with soño (“Octopus tree” [Didiera madagascariensis]) and xerophytic deciduous trees and scrub to the west and northwest, and thorny and sandy, dry deciduous thicket and forest to the south and east. The main fresh water source in the Namonte region is a series of rain-fed finger-lakes that fill in the rainy season, but some generally retain water through the annual dry season even in drought years. Dry lakebeds and grassy expanses are punctuated by sand dunes on which small, permanent villages are established.

In and near villages, residents grow manioc (Manihot esculenta) and sweet potato (Ipomoea batatas), harvest wild or cultivated fruits, forage for honey and tubers, and hunt small game. Very occasionally, men hunt lambo, a type of bush pig (Potamochoerus larvatus), with the aid of trained dogs. Men and women fish the freshwater lakes with line and trotline for members of the Paratilapia genus and the predatory vangalopake, Chinese snakehead fish (Channa striata), which were introduced in the last ten years to the Namonte lakes from the
Mangoky River to the north. At Ampijilova, a few households raise chickens for sale or graze goats with larger herds away from the village, but other livestock are conspicuously absent.

People living outside of the region tend to think of forest-based Mikea, or “Mikea forestier,” as a unique population of elusive and primitive foragers who shun modernity and contact with non-Mikea. However, people living in Ampijilova and other Namonte Basin villages are highly integrated into both formal and informal regional economies and maintain extensive social networks of kin and kindred in areas far from their home villages. Unless they have recently given birth, are ill or very old, men and women are very mobile and frequently farm and forage far from the village, either as a normal seasonal strategy to supplement diets, or as a response to shortages brought on by prolonged drought, such as the region was experiencing in 2008 and 2009.

Long-term social and economic relationships with other people and villages in the region are very important to Mikea at Ampijilova. Although Ampijilova is a permanent village, residents maintain houses in other villages and camps, and also break up into small groups to practice mobile foraging, locally called mihemotse, when local food supplies dwindle. For example, about one-fourth of adults who live at Ampijilova grow maize and manioc at the Masikoro-Mikea village of Ankiliabo located on the forest-savanna ecotone. Ovy (Dioscorea acuminata) is the most important wild tuber for people living in the Mikea Forest, but is not plentiful in the Namonte Basin. Mikea living in Ampijilova forage for ovy and small game to the south and east of their village in the dry season, and grow maize and other crops for home consumption and export sale in forest maize plots (Figure 2.4) called hatsaky, hatsabao, monka, or mondra depending on one’s level of specificity (hatsaky is a general term) and the age of the particular plot (for example, a hatsabao is a new hatsaky; a monka is an old hatsaky; a mondra is
Much of what is foraged and grown by residents of Ampijilova is consumed by the household, but some is sold at weekly marketplaces, especially at the forest-edge town of Vorehe where tubers like *ovy* and *babo* (*Dioscorea bemandry*), tenrec (“African hedgehogs”; *Setifer setosus, Echinops telfairi*, and *Tenrec ecaudatus*), and varieties of wild fowl are considered superior in taste and quality compared to many agricultural products and sell for a relatively high price. Mikea sell such products at weekly markets and purchase small amounts of sugar, tobacco, coffee, soap, nails, cloth, and tools with the proceeds.

Because of the deep, loose sands and the density of brush, the Namonte region is difficult to access by motor vehicle, although it is crossed by narrow trails cut through the forest for oil exploration since the 1950s. Merchants crossing the forest by oxcart use some of these trails; people travelling on foot also use them, as well as the rare 4x4 aided by axe. This relative geographic isolation, as well as plentiful fresh water and forage for cattle were likely appealing to the apical “Mikea” of Namonte, who were members of Ndrambalà, Tsimamorike, and Tohaombe clans and migrated from Andraboba and other coastal villages in search of security and pasturage for cattle, probably as early as the eighteenth century. The next wave of Pre-Colonial settlers to the Namonte region included members of Marofoty and Tsimitihà clans who moved into the forest from Masikoro villages located in the Mangoky and Iovy River floodplains to the north and east. These later Masikoro migrants mingled with the pastoralists, and together they founded some of the major Mikea villages of the nineteenth century, Namonte (which was relocated several times in the nineteenth century), Vondrobe, Andomotiabo, and Amboroke (Tucker 2003: 208-209). Powerful *ambisa*, diviners and wizards, controlled permanent Mikea villages in the Namonte Basin and in other parts of the northern forest. Although ambisa today primarily work as diviners and healers, in the Pre-Colonial and Colonial periods, powerful
ambiasa leaders provided security and protection to villagers, and later served as brokers between villagers and Colonial authorities. According to Tucker (2003), while the security of ambiasa leaders’ sorcery (aoly) was a draw to some migrants who settled in forest villages, others who were put off by their authority and chose to live independently in smaller forest camps.

Over the course of this project, people interviewed at Ampijilova tended to express a strong pride in their lifestyle, primarily citing security from bandits and state authority offered by the geography of the Namonte Basin, as well as the sufficiency of their very diversified economic-subsistence strategy to fulfill long-term nutritional and material needs. Elder Mikea men and two elder women at Ampijilova were especially insistent that through small-scale farming, knowledge and use of the forest environment, and the ability to be mobile in times of hardship one might be hungry sometimes but would never be hungry for long. However, younger women at Ampijilova, especially those nursing young infants, were more likely than elders to say that they felt pressed down by having too many children, by being hungry, by a lack of cash for items such as coffee, sugar, antibiotics, and tobacco, and geographic distance from markets and kin.

In 2008 and 2009, elders’ optimism was expressed despite widespread immediate hunger in the village due to drought in this “long wounded year” or baintao lava. Crops of maize and many wild foods failed to thrive and many people subsisted for days on end eating honey mixed with hot water (a meal that makes one feel full but ultimately leaves one weak and causes stomach pain) and the occasional snakehead fish. In the dry season of 2009, most households at Ampijilova were motivated to break away from the village and resort to mobile foraging or mihemotse in small groups in other parts of the forest to meet subsistence needs, or to join kin in
agricultural savanna woodland villages such as Ankiliabo where rain, manioc and maize were more plentiful.

2.3.3 Mañono

Many of the residents of Mañono (Figure 2.5) share deep history with people living in the Namonte Basin region, and in fact, people there trace migration histories through Vondrobe, a Namonte Basin village most likely founded in the early nineteenth century, and later through the village of Namonte. Mañono is a true “Mikea Diaspora” community, established as an officially chartered village in the early Colonial period when the French colonial government sought to render legible and tractable highly mobile subsistence-oriented rural Malagasy by compelling rural people to settle in permanent villages and integrate into the formal market economy.

Mañono is located at the northern terminus of the Mikea Forest, about fifteen kilometers southeast of the large seaside town of Morombe, which was a major port city from the 1950s-1980s. Mañono is the largest village that participated in the research project described in this dissertation, pocketed between high red dunes and coastal forest amidst a lace-work of hand-dug irrigation canals, sugar cane and manioc fields, and rice paddies at various stages of cultivation. Mañono has a Catholic church, a private school, and a family planning clinic, but lacks wells, a regular physician or nurse, and access to good roads. Residents travel on foot or by oxcart between Mañono, Morombe, and other villages on a deep, sandy track with oxcart-loads of charcoal, agricultural products and manufactured goods to sell at market.

Mañono shares Namonte Basin Mikea history, although most people who live there identify primarily as Masikoro or Masikoro-Mikea because of lifestyle and livelihood. Mañono’s economy is highly diversified; residents satisfy subsistence needs through farming rice, manioc
and maize while producing enough surpluses of these and vegetables like tomatoes and leafy greens, and fruits like bananas and mango for market sale in the permanent marketplace at Morombe. Cattle, chickens, turkey, and pigs are plentiful. Charcoal production, wood harvesting, and the production of local rum are major sources of cash for several households at Mañono, and professional laborers skilled in carpentry, tool repair, sewing, and oxcart baggage transport are common. The village has two well-stocked, free-standing shops that sell everyday items like soap, shampoo, batteries, candy, noodles, steel wool scrubbers, prophylactics, and antibiotics, as well as privately-owned buildings for large celebrations, a rice-threshing machine that locals pay to use, and a large electric generator (the latter two have not functioned for over a year because of a lack of mechanical parts for the generator). Women make small amounts of money by preparing coffee, selling milk, cooking breakfast snacks (primarily mokary rice cakes), weaving mats and baskets, and performing small chores for rich neighbors. A few women at Mañono own cattle and earn significant income by renting cattle for agricultural work or to pull oxcarts. Children and adults supplement diets with foraged fruits, tubers, and animals, but to a lesser extent than people living at either Andalambezo or Ampijilova.

As a large village, Mañono has much wealth and prosperity. It also has a relatively high level of economic inequality. Sharecropping relations are common, as a few men control much of the agricultural land, and most families living in the village consider themselves to live in relative poverty. Cattle renting is likewise lucrative for the wealthy and necessary for people who wish to farm but do not own their own livestock (as cattle are necessary to till rice fields). The wealthiest members of town own the shops, oxcarts fitted with struts and automobile tires, as well as the automatic threshing machine and generator, so make profits by renting out equipment
to other villagers. Likewise, the wealthy pay many of the less well-off small wages for unskilled household work, agricultural labor and cattle guarding.

Despite the high quality of soil and spring fed irrigation canals surrounding Mañono, residents have been significantly affected by drought and rising food prices. Different people have been affected in different ways. While many complain of hunger, a lack of dietary diversity, and an inability to sell produce (especially tomatoes) in the permanent marketplace at Morombe, others have profited greatly by strategic hoarding and selling of stored maize, manioc, and rice in the period of urban food shortage following the beginning of the national political crisis in 2009. Despite increased potential profits, residents are reticent to travel to market on the long road to Morombe without an armed group because the incidence of banditry and theft has increased significantly with the rise in food prices and urban food insecurity.
### Chapter 2 Tables

Table 2.1 Research schedule with research activities.

**Research schedule**

<table>
<thead>
<tr>
<th>Research phase</th>
<th>Dates</th>
<th>Research activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 1</strong></td>
<td>December 1, 2008-</td>
<td>Field site identification; Informal interviews with elected officials; Informal</td>
</tr>
<tr>
<td></td>
<td>December 15, 2008</td>
<td>interviews with employees of Madagascar National Parks (MNP)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consultation with senior scholars in Toliara; opportunistic and scheduled</td>
</tr>
<tr>
<td></td>
<td></td>
<td>interviews with conservation and development workers based in Toliara.</td>
</tr>
<tr>
<td><strong>Season 1</strong></td>
<td>January 4, 2009-</td>
<td>Focus groups; Major seasonal data collection</td>
</tr>
<tr>
<td></td>
<td>March 1, 2009</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Season 1 data entry; consultation with senior scholars in Toliara; Interviews with</td>
</tr>
<tr>
<td></td>
<td></td>
<td>director of MNP in Toliara.</td>
</tr>
<tr>
<td><strong>Phase 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Season 2</strong></td>
<td>June 10, 2009-</td>
<td>Major seasonal data collection</td>
</tr>
<tr>
<td></td>
<td>August 4, 2009</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data cleaning and preliminary analyses of Season 1 data.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Supplemental funding sought.</td>
</tr>
<tr>
<td><strong>Phase 3</strong></td>
<td>August 20, 2009-</td>
<td>Follow-up site visits and focus groups; interviews with elected officials;</td>
</tr>
<tr>
<td></td>
<td>October 1, 2009</td>
<td>interviews with director of MNP, Ministry of Mines, and representatives of mining</td>
</tr>
<tr>
<td></td>
<td></td>
<td>companies in Antananarivo.</td>
</tr>
</tbody>
</table>
Table 2.2 Seasonality in the Mikea Forest region.

Major seasons and transitional periods in the Mikea Forest Region

<table>
<thead>
<tr>
<th>Season (Malagasy name)</th>
<th>Corresponding months</th>
<th>Temperature range</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Litsake</strong></td>
<td>December, January, February</td>
<td>30°-42° C/86°-108° F</td>
<td>The hot, rainy season. The first substantial rains bring the new year (lohatao). Cyclones are frequent. Insects and animals are active. Trees and vines leaf.</td>
</tr>
<tr>
<td><strong>Fararano</strong></td>
<td>March, April, May</td>
<td>30°-42° C/86°-108° F</td>
<td>Not a true season, but a transitional period that follows the rainy season. Heavy rains cease and trees and plants become dry and drop leaves. Animals and insects remain active.</td>
</tr>
<tr>
<td><strong>Asotre/Asotsy</strong></td>
<td>June, July, August</td>
<td>25°-36° C/77°-97° F</td>
<td>The cool, dry season. Many insects and animals become dormant. Trees are generally bare. Precipitation is rare.</td>
</tr>
<tr>
<td><strong>Faosa</strong></td>
<td>September, October, November</td>
<td>30°-42° C/86°-108° F</td>
<td>Very hot, dry transitional period following the cool, dry season. People await the coming of the rains that signal the start of the agricultural year.</td>
</tr>
</tbody>
</table>
Table 2.3 Population, environmental characteristics, access to utilities and healthcare resources by site.

**Environmental characteristics and health care resources by site**

<table>
<thead>
<tr>
<th></th>
<th>Andalambezo</th>
<th>Ampijilova</th>
<th>Mañono</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>135</td>
<td>112</td>
<td>651</td>
</tr>
<tr>
<td>Electricity (municipal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity (generator)</td>
<td>Mission only</td>
<td>Broken</td>
<td></td>
</tr>
<tr>
<td>Piped (running) water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shored in-ground well</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shallow (hand-dug) well</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigation canal, spring-fed</td>
<td></td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Latrines or pit toilet</td>
<td>Mission only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Designated waste areas</td>
<td>forest</td>
<td>forest</td>
<td>forest</td>
</tr>
<tr>
<td>Shower stall</td>
<td>common</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shop/dokany</td>
<td>mission</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Weekly market</td>
<td>&gt; 15 km</td>
<td>&gt; 15 km</td>
<td>~10 km</td>
</tr>
<tr>
<td>Centre de santé de base I</td>
<td></td>
<td></td>
<td>local: family planning</td>
</tr>
<tr>
<td>Centre de santé de base II</td>
<td>&gt; 15 km</td>
<td>&gt; 15 km</td>
<td>~10 km</td>
</tr>
<tr>
<td>other biomedical</td>
<td>&gt; 15 km</td>
<td>&gt; 15 km</td>
<td>~10 km</td>
</tr>
<tr>
<td>Traditional healers</td>
<td>2</td>
<td>1</td>
<td>&gt; 15</td>
</tr>
<tr>
<td>Near main road</td>
<td>yes</td>
<td></td>
<td>yes</td>
</tr>
</tbody>
</table>
Chapter 2 Figures

Figure 2.1 Men participate in a focus group led by Roland Lahiniriko in Andalambezo in January 2009.

Figure 2.2 Houses in Andalambezo in early January of 2009.
Figure 2.3 Ampijilova at mid-day in February of 2009.

Figure 2.4 Maize growing in a Mikea Forest *hatsaky* in the late 1990s. Photo courtesy of Bram Tucker.
Figure 2.5 An afternoon view of Mañono in December of 2008.
CHAPTER 3
Regional history, and norms of identity and economy

3.1 Introduction: Significance of history and context

Context is crucial to understanding processes of social change, and to understanding the factors that motivate social practice among groups of individuals (Bourdieu 1990:54-57). As Comaroff and Comaroff (1992:98) explain, no social world can be properly understood without reference to its internal historicity and unfolding relationship with its wider context. This is perhaps especially true for people like the participants in this study who forage, or whose ancestors used to forage, or who are otherwise stereotyped as primitive. Despite decades of broad-ranging debate and critique within anthropology (Gupta and Ferguson 1992; Headland and Reid 1989; Kent 1992; Lee 1984; Lee and Hitchcock 2001; Sahlins 1968, 1972; Wilmsen 1989), people who hunt and gather for a degree of subsistence are still frequently represented as “contemporary ancestors” who embody “some essence of the human condition unadulterated by ‘complications and accretions brought about by agriculture, urbanization, advanced technology, class and national conflict’” (Lee 1984: 169; Suzman 2004:201).

In this chapter, I briefly introduce regional history, with a discussion of Pre-colonial, Colonial and Post-colonial history of southwestern Madagascar. I draw from oral history, published accounts of travelers, and published scholarship to discuss broad historical processes that have affected the Mikea Forest region, and in which residents of the region at different times in history have participated. Afterward, I will provide some ethnographic background, discussing contemporary norms of identity and economy in the Mikea Forest region. Among
research participants, history, identity, and livelihoods are linked domains through which people situate themselves relative to others in space and in temporal continuity. The chapter concludes with a brief note of various forms of social and environmental change in process in the regional production of insecurities and uncertainties.

Dualistic representations of people as, for example, primitive versus civilized, indigenous versus invasive; irrational peasant versus good citizen, and linear assumptions about progressive social evolution characterize dominant discourses of rural life and ethnicity in Madagascar. History, identity and rural life are simplified and essentialized in these discourses, resulting in popular representations of people, social life, and human-environmental relationships that are fundamentally flawed because they bear little resemblance to lived reality. In demonstrating the historicity and dynamism of rural society I hope to counter tropes of primitivism, irrational traditionalism, and environmental “predation” (Ranaivoson 2001: 50) that categorize rural peoples as variably pristine or invasive. When these discourses inform policy (including conservation and development policies), they significantly affect the ability of individuals, households, and sometimes-larger groups of people to creatively cope with daily social and environmental challenges, meet subsistence needs, and live life as they choose. Social-environmental policies based on flawed assumptions about rural people’s psychological motivation, behavior, and needs are unlikely to produce expected results in terms of environmental preservation.

3.2 Regional history

What is known about the Pre-colonial history of the Mikea Forest region, and of southwestern Madagascar in general, has been reconstructed using primary sources, oral histories, and limited archaeological research. With of a lack of local Pre-colonial written
sources, Malagasy oral histories collected by Fagereng (1950, 1981), Tsiazonera (Yount et al. 2001), Tucker (2003), and others have been invaluable sources for reconstructing historical migrations, regional political history and cultural transformations in the region. Observations of travelers like Luis Mariano (discussed in Dina 2001; Grandidier and Grandidier 1908), a Portuguese seafarer who describes settlement patterns, regional political structures, and conflict in the early 1600s; the writings of expatriate bureaucrats such as Étienne de Flacourt (1658) who was French East India Company’s appointed governor of Madagascar from 1648-1655; and the diary of Robert Drury (1890 [1729]), an English mariner who was shipwrecked on Madagascar in the early 1700s and lived for fifteen years among various groups in the Antandroy, Fihereña, and Menabe regions have been immensely valuable in retrospectively examining historical transformations in the southwest concurrent with the establishment of a European presence in these areas. Archaeology has offered significant insights into the timing and nature of political consolidation movements and the expansion of Pre-colonial Malagasy dynasties, social stratification, and settlement patterns prior to and during the early period of European interest in these regions (Parker Pearson 1997; Dewar and Wright 1993).

3.2.1 Early trends in political consolidation in southern and western Madagascar

Scholars describe two major trends in political consolidation that pre-date significant or persistent European presence in Madagascar: the rise of small chiefdoms, followed by the gradual consolidation of chiefdoms into strong regional polities governed by members of royal castes. The first of these occurred between the thirteenth and fifteenth centuries CE, and was characterized by the rise of small chiefdoms throughout Madagascar (Dewar and Wright 1993; Kent 1970; Tucker 2003). These small chiefdoms grew from early coastal and river-valley settlements, many of which show archaeological evidence of subsistence specialization (marine
exploitation; rice and tuber cultivation), participation in inter-regional trade networks, and varying degrees of socio-economic differentiation as early as the eleventh century CE (Wright and Rakotoarisoa 2003). With the rise of chiefdoms, settlements show evidence of participation in Indian Ocean trade networks, significant socio-economic differentiation within and between settlements, and the emergence of large trading centers on bays and river mouths (Wright and Rakotoarisoa 2003: 113-115).

The second marked trend in political consolidation occurred between the fifteenth and seventeenth centuries, when small chiefdoms gradually merged into larger polities that were laterally governed by hereditary nobility based in different villages. This was a period of sporadic inter-polity warfare, cattle- and slave-raiding, punctuated by periods of relative peace. Members of noble clans collaborated to incorporate less-powerful groups, to resist incorporation and subjugation by rivals, to conduct slave and cattle raids, and to maintain loyalty among settlements who had no locally resident nobility but paid tribute to regionally powerful clan heads (Parker Pearson 1997; Tucker 2003).

This period is also characterized by ethnogenesis in the form of meta-group identity formation through political incorporation. Diverse groups of people became linked by incorporation into regionally powerful dynasties (many of which continue to be included in lists of Madagascar’s supposed “tribes”) (Linton 1928). For example, members of the noble Maroseraña clan came to control much of the western and northwestern Menabe and Mahafaly areas, and rule people who came to be collectively (and respectively) called Sakalava and Mahafaly; the Andriamañaare clan ruled people collectively called Tandroy in the Antandroy region in the extreme south; and the Andriana emerged as the ruling clan of Imerina in the
central highlands. The Mikea Forest was part of the region controlled by Andrevola, the royal clan of the Fihéreña region.

Based on archaeological evidence and oral histories, Parker Pearson (1997:414) concludes that these political transformations pre-date the arrival of European traders in the arid southern regions, and suggests that they may have been set in motion as Islamicized Malagasy nobility encroached from the southeast in the sixteenth-century. In fact, shifting settlement patterns during this period may reflect a long process of turning “away from the outside world” as many large river valley settlements and trading centers were abandoned (Parker Pearson 1997: 413). Population concentration shifted to fortified settlements on previously sparsely inhabited interior plains (Parker Pearson 1997).

3.2.2 The Pre-colonial Period

Today, the area known as the Fihéreña stretches from the Mangoky River in the north to the Onilahy River in the south, and from the Mozambique Channel in the west to the Mikobo ke mountains of Ibara in the East (Marikandia 2001; Yount et al. 2001). In the seventeenth century, the Fihéreña Polity was vast, stretching as far east as Isalo (Tucker, Tsiazonera, personal communication). Parker Pearson (1997) suggests that the consolidation of the Fihéreña under the Andrevola dynasty occurred in resistance to antagonistic pressure from the powerful Sakalava to the north and Mahafaly and Tandroy to the south (Figure 3.1).

Much of the information in the following paragraphs is adopted from Tucker (2003), who provides one of the most thorough reviews of political factors influencing intra-regional migrations and the origin of Mikea identity in the Pre-colonial period. In the Pre-colonial period, some residents, including those living in the Fihéreña, were compelled to periodically abandon productive agricultural land because of warfare and famine. Flacourt (1661) describes the
Fihereña as “a very fertile land abandoned and ruined by the wars” (translation from Tucker 2003). When Drury (1890[1729]) visited the Fihereña some fifty years later, he witnessed the effects of agricultural collapse and depopulation due to warfare with Sakalava to the north and Mahafaly to the south following a prolonged period of relative peace and prosperity. He describes most of the residents as either having migrated north to join Sakalava settlements, or fleeing into the forest, which served then as a refuge and source of food as it does for residents of the region today.

Other residents of the Fihereña sought to avoid incorporation into polities by fleeing or remaining outside of political and economic governance structures established by ruling clans. Among these groups were Vezo and people who became Vezo, who avoided incorporation through mobility, marine subsistence, and strategic re-definition of their own identity (Astuti 1995: 477). This placed them outside of governing structures and the royal historical narratives that defined people as subjects through ancestral relationships (Astuti 1995:476-77). Also among people resisting or fleeing royal-period political control and violence were ancestors of contemporary Mikea, who took refuge in the dry Mikea Forest (Tucker 2003; Yount et al. 2001).

Between the sixteenth and early eighteenth centuries, Portuguese, Dutch, English and French traders seeking to establish trade relations with southern Malagasy describe locals as suspicious and resistant to forming lasting trade relationships with Europeans. Robert Drury (1890[1729]) describes widespread distrust of Europeans by Malagasy borne of negative encounters. While the arrival of guns, the most prestigious of trade goods, post-dates processes of political consolidation and slavery on Madagascar, they significantly contributed to an increase in slave raiding and warfare, and to a socio-political environment conducive to tenuous royal absolutism (Parker Pearson 1997).
The Andrevola dynasty maintained unified control of the Fihereña until the late 1840s, when it divided into four smaller territories with capitals located in Tsiloakarivo, the Mangoky Delta, Antanamieva and Manombo. This fragmentation of the kingdom coincided with the attempted expansion of the Merina kingdom into the Fihereña during the reign of reactionary Merina Queen Ranavalona I who sought to achieve centralized control of Madagascar by controlling what had become important coastal centers of European-Malagasy commerce on the southwestern coast. In 1888, the Merina army invaded Toliara and set up a provincial governor. According to royal documents, the Merina monarchy conquered the city of Toliara and all of the Fihereña, but only ever had substantive power in places where they could maintain tax collection and the threat of force with an active military presence—the ports of Toliara, Sarodrano, Saint-Augustine, Nosy-Be, and Salary. Because of local resistance and a disorganized Merina military presence, the monarchy was never able to fully exert control over the politically fragmented Fihereña on the eve of the French colonial period (Esoavelomandroso 1981).

3.2.3 The French Colonial Period

Throughout the French Colonial period, which lasted from 1896 until 1960, administrators worked to create a classic, “dominant and dependent” colonial economy with a variety of specializations based on region (Cole and Middleton 2001: 7-8). This period was politically characterized by a set of governing practices aimed to maximize the agricultural and extractive productivity of Madagascar through the control of resources, especially human labor. In Madagascar, a three-pronged process consisting of planned underdevelopment, biological warfare, and forced resettlement and sedentization maintained the massive colonial-period labor pool for plantations, low-wage urban jobs, and public works, and facilitated taxation. As Feeley-Harnik (1984:2) notes, the transformation of labor relations is inseparable from transformations
of political power and authority. Colonial plantations relied on locals who had been dispossessed of ancestral lands for cheap farm labor. Arid southern regions where few colonists chose to settle served as reserves for unskilled urban, agricultural, and corvée labor pools.

As in much of colonial Africa, imposed tribalism was a powerful tool of governance (Esoavelomandroso 1989). French administrators readily adopted the schema of ethnic difference in Madagascar that had been developed and formalized in the mid- to late nineteenth century. The formalization of ethnic difference was a technology of governance and control used by the expanding Merina monarchy aided by foreign scholars and advisors. Dina (2001) notes that French colonial authorities exacerbated existing antagonisms based on difference and formally institutionalized racism as part of the rationale of colonial governance. The social-evolutionary schema by which Malagasy peoples were categorically ranked into regionally situated ethnicities significantly influenced colonial education policies and the concentration of schools, and access to state services in different regions (Cole and Middleton 2001: 9).

The French colonial government also attempted to relocate rural Malagasy (pastoralists and others) into chartered villages integrated into the colonial bureaucratic power structures under a system of indirect rule. This spatial reorganization of people was a means of reorganizing behavior and mental attitudes of the governed (Feeley-Harnik 1984:8), and was motivated by a desire to facilitate taxation and corvée labor recruitment, and to compel people to transition from forest residence and rural subsistence-oriented production to intensive market-oriented agricultural production with full integration into cash markets and the global political economy. Members of the colonial military and Malagasy partisans (agents loyal to the colonial government) bullied rural people into relocating to chartered villages that were governed through
a hierarchy of appointed officials, *chefs*, on the levels of village, canton, and district (Tucker 2001: 78-79).

Another colonial-era process with lasting effects was the planned eradication of *raketa*, Malagasy prickly pear cactus (*Opuntia monacantha*). *Raketa* was introduced to Madagascar by way of Réunion in 1769 in order to grow defensive hedges to protect the French East India Company’s interests at Fort Dauphin on the southeastern coast (Kaufmann 2001: 89). *Raketa* was adopted by Malagasy pastoralists and came to be the basis of traditional transhumant pastoralism in southern Madagascar before the 1920s, especially among Tandroy and Mahafaly (Figure 3.2) (Kaufmann 1998, 1999, 2006; Marcus 2007). In 1924, after more than two decades of failed effort to settle nomadic and semi-nomadic pastoralists by various means, cochineal insects (*Dactylopius tomentosus*) were released near the city of Toliara in order to eradicate the cactus “pest” (Cole and Middleton 2001; Kaufmann 2001; Middleton 1999). The “biological war” to eradicate Malagasy *raketa* ushered in a period of “killing famine” in the south and southwest (Kaufmann 2000: 143-144). Well into the 1930s, severe episodes of famine killed millions of cattle and caused massive depopulation as tens of thousands of people died or became refugees. As many could no longer maintain their subsistence as transhumant pastoralists, people fled to forests, to cities or to sea in search of productive livelihoods (Cole and Middleton 2001; Kaufmann 2000; Middleton 1999). Some of those affected fled north (Kaufmann 1998:132).

Among Mikea, elder oral historians in Andalambezo and Mañono recall (respectively) famine and population pressure resulting from an influx in migrants into the Mikea Forest region during this period. Although *raketa* was not the basis of pastoralism in the northern Fihoreña, and it is not possible at this time to more precisely date these recollections, it is possible that the
rapid influx of a high volume of refugees into the region contributed to the memory of suffering due to overpopulation and insufficiency of subsistence production during this period.

As much as these disruptive and often violent colonial policies affected rural Malagasy, people were not passively colonized. Some Malagasy chose to become *partisans*, loyal advocates of the colonial authorities, who often exercised coercive power in the name of state authority. Likewise, in practicing indirect rule, French administrators sought to take advantage of traditional social hierarchies. Many clan leaders, including leaders of noble clans, were willingly incorporated into the low ranks of the colonial administration (Cole and Middleton 2001: 25). Many people in the Mikea Forest region (and elsewhere in Madagascar) relied on long-practiced strategies of resisting authoritarian structures through intentional avoidance, as well as feigned compliance and other “ordinary means of class struggle” (Scott 1986:37) or “everyday forms of resistance” (Scott 1987).

In cultural memory, *vazaha* (foreigners, but also non-locals and government employees who are considered agents of external or foreign power) are associated with armed violence, forced labor, dispossession of land, and political power. Contemporary attitudes and behaviors of rural Malagasy often reflect distrust of relatively powerful outsiders and a preference for autarky, but a willingness to opportunistically engage with non-local political and economic structures.

Regional trade and commerce between Europeans and rural Malagasy occurred long before the advent of French colonialism in Madagascar. Hoerner (1981) traces the origins of the *formal* market economy in the southwest to the beginning of the twentieth century, when colonial regulation of ports and formal taxation (*impôt*) schemes were organized. The French *impôt* policy levied taxes on people, cattle, houses, and agricultural goods sold at market. While rural southwestern Malagasy had long engaged with global economic structures through trade,
taxation policies mandated legibility in order to conduct most types of commerce in economic centers such as Nosy Ve, Toliara and Morombe and many rural producers were drawn into official markets.

Throughout the twentieth century, rural southwestern Malagasy have responded ambitiously to market booms for butterbeans (kabaro) in the interwar period and the 1960s, silk (kohoke) harvesting and processing in the 1920s and again in the early 2000s, cotton (hasy) and maize (tsako) from the 1970s to the early 2000s (Blanc-Pamard 2009; Ottino 1963; Tucker 2001; Hoerner 1981, 1987). At the same time, for most people the majority of production has remained very diversified and subsistence-oriented or oriented toward regional urban markets. This is due to a combination of social, environmental, and economic factors, including stochasticity of rainfall, poor infrastructure resulting in high transport costs, dependency on relationships with brokers (often Karany, Malagasy Indo-Pakistani) who buy bulk produce at very low prices and sell high, the exploitive social relations of sharecropping, and the high debt-risk incurred by intensive export-oriented production (see Ottino 1963 for early description).

3.3 Patterns of descent and norms of identity: Family, culture, livelihood, and land

At least two primary systems of collective identity operate simultaneously in the Mikea Forest region (Goedefroit 1998; Yount et al. 2001). These are firazaña and karaza. Raza refers to one’s ancestors, and firazaña refers specifically to clan. Karaza, means “a type.” There are karaza of all sorts of things: fruits (mangoes, oranges), animals (species), crops (varieties), and peoples (ethnicity). When speaking of people, karaza refers most often refers to cultural identity, lifestyle and normative practice. Sometimes so-called “hyphenated identities” emerge, representing a cultural reconciliation when karaza and firazaña identities conflict or shift. This may be considered a third system of identity, or it may be considered a strategic, culturally
sensible resolution to the conflicts inherent in migration or other forms of rapid social change that separate people from ancestral land or accustomed lifestyle. These identities most often emerge when groups, whole villages, or clans divide and resettle, and current lifestyle becomes discontinuous with social memory and ancestral practice (fombon’draza), or when an individual or group wishes to make simultaneous cultural and historical claims. In the Mikea Forest region the most frequently occurring hyphenated identities include Vezompotake, or “mud Vezo”, Vezo-Mikea, and Masikoro-Mikea, though I have encountered many others.

3.3.1 Longo (kin), raza (ancestors) and firazaña (clan): Kinship, descent, historical continuity and entitlements

The term longo refers to kin, who may be related by blood, marriage, blood brotherhood (fatidrá), or through various other social obligations and affinities. Raza are one’s ancestors. For an individual, kinship or kindred is reckoned bilaterally, or traced through both the father and the mother, and the term raza can refer simply to an individual’s forbearers (Astuti 1993; Keesing 1975:147). Raza is the root word of firazaña, which specifically refers to the patrilineal clan, which is a fundamental category by which people establish similarity and difference in terms of individual and group identity. Yount and colleagues (2001:269) observe that clans are more likely to be exchanged than names when strangers meet in order to establish social connections. Over the course of my research, I frequently met people who were more likely to discuss their clan membership than they were to give their individual name.

In southwestern Madagascar, clans are patrilineal descent groups that trace descent from a common male ancestor who is associated with a particular village or territory. Living clan members are often separated from founding members of clans by so great an amount of time that precise ties of kinship between living members and ancestors who are clan founders cannot be
recalled. Clan is the central unit of local-scale social and political organization, and is at the center of social and ceremonial activity that involves invocation of ancestors (Yount et al. 2001: 271). Clans are associated with particular places, with particular pre-colonial castes\textsuperscript{4}, with particular migration histories, and are essential to traditional jural and entitlement systems. 

*Tariha* are clan branches, which can be understood as lineages within clans. New *tariha* form when geographic migration or internal conflict results in segmentation or fission within clans (Marikandia 2001: 161). Like clans, membership in *tariha* is reckoned through the patriline. Also like clans, the founding of clan branches is associated with particular people, places, events, and historical migrations. Unlike clans, *tariha* have usually been founded recently enough that living members of clan branches can often recall their precise genealogical ties to founding members (Eggert 1986: 324).

The fundamental organizing principle of clan membership is a claim of descent. When a child reaches the age of about six months, she or he becomes an acknowledged member of her mother’s *firazaña* (normally this is the mother’s father’s clan), endowed with the most fundamental entitlement of clan membership, the right to be buried with one’s ancestors. This is in effect a social acknowledgement of one’s association with history and soil, and guarantor of one’s right to become an ancestor oneself upon death. Among Vezo, Mikea and Masikoro, children typically belong to their mother’s clan until the father’s family performs rites of

\textsuperscript{3} Anthropologists classically distinguish clan-based systems of descent from similar lineage systems in that members of clans often cannot demonstrate descent from founding members, while members of lineages can (Keesing 1975).

\textsuperscript{4} According to Fagereng (1950: 141) and Lavondes (1967: 121-125), clans in this region are categorized into at least three castes. *Andriana* is a royal caste, while *Vohitse* are freemen clans and *Andevo* clans are slave clans. While the social institution of caste has lost its Pre-colonial significance, most Masikoro, Mikea and Vezo know which caste to which their clan belongs (Tucker et al. In press).
filiation, *soron’ânake* (meaning something akin to “invocation for children”). In *soron’ânake*, the mother’s ancestors are informed that the child no longer belongs to the mother’s lineage and ideally a zebu is offered as sacrifice (Yount et al. 2001).

As a system of descent, clan or *firazaña* is ubiquitous in the Mikea Forest region. However, that is not to say that all people participate in the system in the same manner. Generally, if a *soron’ânake* is performed a person will thereafter claim primary membership in their father’s clan, but exceptions exist and people may opportunistically identify with a maternal or grandparental clan in various social situations (Tucker 2001). In recent history Mikea increasingly claim membership in maternal lineages because the cost of zebu for sacrifice is prohibitive for many.

*Firazaña* is the system of signification by which people are most tightly bound in historical continuity to kin, to communities, and to place. Importance of ancestors and clan to an individual’s position in the continuity of history and kinship can be seen in the observance of taboos (*faly*), especially those prohibiting particular foods and behaviors, that are passed down in a patriline and eventually accumulate in clans over generations. Whether strictly followed or not, a person’s awareness of *faly* in daily practice and atonement for deviating from lineage norms maintains ancestral memory and, by extension, identity as part of a descent group that has been constructed by one’s forbearers in historical context (Ruud 1960).

Ties of *firazaña* to history, community and place can be seen in detailed oral histories of clan migrations that are associated with founders of clan branches, and in historical events surrounding the founding of villages (see Tucker 2003). These ties can also be seen in the significance of *faly* spaces and aspects of the landscape in and near settlements. These landscape *faly* most commonly involve particular tamarind trees (*kily*), wells (*vovo*), and forested spaces.
(ala) that, like clans themselves, accumulate taboos (eating; dancing; habitation; bathing; or resource extraction, for example) over generations. These links are also evident in the symbolic significance of ceremonial hazomanga (literally “blue” [sacred] wood) or hazomboto (penis wood or boy wood) posts among Mikea and Masikoro, and jiny, clan relics or sacred objects kept and guarded by the head of a clan, Mpito’kazomanga. The village in which Mpito’kazomanga lives is the focal center of ceremonial activity for a clan, the site of major ceremonies including savatse circumcisions and soron’anake rites of filiation in which the ceremonial wooden posts are erected and anointed with the blood of a sacrifice to ancestors (Dina 2001).

Some southwestern Malagasy do not know to which clan their mother, father, or they themselves belong. This may happen for various reasons, but is likely the result of orphanhood, abandonment and wardship, or migration—situations in which someone is isolated from networks of kin and associated norms of behavior. Among a sample of 206 adults living in the villages of Andalambezo, Ampijilova, and Magnono in 2008 and 2009, 10.2 percent did not know to which clan their mother belonged, and 8.3 percent had no knowledge of their father’s or their own clan. This was expressed in terms of ignorance, “tsy haiko” (I do not know), or in terms of lack “tsy mana” (I do not have), and was sometimes expressed with reticence. In such situations, people may adopt some of the faly of clans that are dominant in the villages in which they live or have lived, and may rely to an extent on networks of in-laws, grown children, fictive kin, friends, and neighbors for socially-governed resources (for example, access to plots of farm land or to mobilize labor) that others may derive to varying extents as lineage members.

Clan is essential to local jural and entitlement systems. That is, to determining rights, obligations and exclusions in matters of property, inheritance, and resource access in specific areas. This can be illustrated with the example of land tenure, especially among more intensive
agriculturalists. Although land may be bought, sold, and formally titled, customary systems continue to thrive in many areas (Elmqvist et al. 2007:7). These systems involve inheritance, collective clan ownership and labor organization, and sharecropping arrangements. Recent migrants can also make land claims by clearing, fencing, or planting trees on marginal or abandoned lands. When there is a risk of conflict with previous claimants, social alliances may be established according to customary practices that include marriage and blood brotherhood, or fatidrà (Blanc-Pamard 2009: 5).

Claims to arable land, productive forest wood lots, and pasture (whether grass or forest) are inherited within a clan. In a given year, an individual living in proximity to it may control the use of a block or patches of inherited land, but a dimension of ownership may be collective as well. Productive labor is often mobilized from within the controlling clan. Part of the harvest may be shared among workers to meet subsistence needs, or the harvest may be kept or sold by the individual who organized labor for a given season or year. In other situations, plots of arable land are divided among lineage members living in proximity for household subsistence use. In these situations, the land may be considered individually “owned” in terms of usufruct rights but is still considered as collective clan property. In sharecropping arrangements, an individual or group of individuals that controls large blocks of land rent parcels for cultivation at high rates of interest against the future harvests.

This is significant to patterns of migration, and to the strategic use of descent claims. For example, if a household oriented toward agricultural production makes the decision to move from one village to another where a customary lineage-based land tenure system is intact and functioning, part of the decision of whether or not to allow the migration rests with elder members of the lineage controlling the majority of land. Decisions are made based on the
quantity and quality of land, as well as considerations of demand, population density, and claims of descent in the owning clan. In situations in which a small number of individuals control a majority of land, labor organization and sharecropping arrangements engender significant profits (in cash or surplus) for the few while potentially increasing the vulnerability of those without controlling claims to acute social and environmental shocks.

3.3.2 Karaza: Lifestyle and broad categories of cultural identity

Karaza is a broader grouping than raza or firazaña, and is generally considered to be a grouping on the level of ethnicity or cultural identity. Vezo, Mikea, and Masikoro are all karaza in a general sense, and particular clans crosscut all three groups. Stiles (1991; 1998: 258) has claimed that clans are specific to particular karaza, and that when “Masikoro” or “Vezo” clans are observed among Mikea, they “take the name of Vezo or Masikoro clans” without legitimate claim of descent. Stiles also claims that some clans—Marofoty, Ndrabalà, and Mangedrano [sic.] are found regionally only among Mikea (1998:132). In the course of my research, I have found both of these claims to be unsupported, as have Tucker (2001; 2003) and Yount and colleagues (2001). In conversation with an informant, one might refer to a “Mikea clan” but this typically is not an exclusive statement and more often alludes to clans or clan branches (tariha) that have led migrations or otherwise played important roles in the founding of Mikea Forest villages.

As opposed to raza as a system of identity based on unilineal descent, karaza can be broadly seen as “a kind of person” (Yount et al. 2001), and as a category that people use to define themselves in relation others in terms of where people live and what they do (Astuti 1995). In the Mikea Forest region, the dominant karaza are Vezo, Mikea and Masikoro, each commonly associated with a particular geospatial niche and primary livelihood strategy (velomanpò). Vezo are people who live on the western coast and practice line and net fishing and
marine foraging in the Mozambique Channel. Mikea are people who live in the Mikea Forest where they forage and practice extensive horticulture. Masikoro are people who live in savanna and savanna woodland to the east of the Mikea forest where they herd cattle and grow crops, especially maize (tsako), manioc (balahazo) and several varieties of irrigated paddy rice (vary).

Karaza are often employed as exclusive meta-categories by people in ways that emphasize difference among groups, sometimes in ways that are derogatory and sometimes by essentializing or mocking clothing styles, ascribed behaviors, differences in dialect, or particular aspects of velomanpò different from their own. For example, one evening in 2007, an elder fisherman at Andavadoake jokingly discussed differences in attitudes about wealth among Vezo, Mikea and Masikoro by stating that, “We Vezo, for us wealth is to make money. We sell what we catch, and make money so we can have good things. Mikea don’t have anything. Mikea don’t have money. For Mikea, wealth is finding a lot of honey.” In 2009 a Vezo woman operating an épicerie in the regional capital of Toliara commented on the style and dark color of my shawl and use of Masikoro dialect by saying, “this woman might be a cattle thief,” an association frequently expressed by non-Masikoro.

Karaza are also employed by people as an inter-subjective category on the village level, implying a level of collective fomba, or customary behavior. Men identifying as Vezo in the seaside village Bevohitse and the large coastal town of Andavadoake told me that people who live on the sea must learn to build and travel in laka (outrigger canoes), learn to catch fish with lines and nets, learn to repair equipment, and learn to swim, dive, and forage on the reefs. When asked, “What makes someone Mikea?” elder men living in Ampijilova, an historically Mikea village, said that Mikea people live in the forest for security and livelihoods, and have special knowledge of the forest and foraging, especially foraging for tubers (ovy, babo, moky) and honey
(tantely). Then one of the men reached for a *kapila* (Figure 3.3), a carved wooden honey pot that was hanging from a house post and said, “This is Mikea stuff. We know how to make *kapila* and how to find the honey that goes inside.” When asked, “What type of people live here?” a young woman at Andranodehoke, a small village south of Lake Ihotry near the eastern edge of the Mikea Forest responded “We are Masikoro. Our livelihoods (*velomanpô*) here are Masiokoro. We have irrigated rice paddies (*tanimbary*). Everyone here works the rice fields.” Similarly at Tsiloakarivo, when I asked the same question to women washing clothes in the river they nodded toward the group of about twenty cattle being guided across the water by two young boys a hundred yards upstream. “*Eh! Masikoro!*”

### 3.3.3 Hyphenated identities: Complexity in transformation and synthesis

A dialectical approach to identity is necessary to understand what some authors have termed “hyphenated identities” that are employed by individuals and villages under varying circumstances (Yount et al. 2001; Tucker, personal communication). The phenomenon of complex or “hyphenated” identities helps to underscore the interplay of livelihood, diversification, and history in regional concepts of identity. Despite prevailing notions of ethnicity, *karaza* categories are not fixed in space and time, nor are they normally seen as fixed or immutable qualities of individuals (Yount et al. 2001). Group identity is linked to economic activities, but flexibly so, and it is also linked to economic and social opportunities and historical transformations.

In part, this flexibility is related to mobility and the general diversity of livelihoods portfolios in the region. Farming, terrestrial and marine foraging and fishing, freshwater fishing and market activity comprise a shifting pattern of resource use in the region. People identifying as one *karaza* frequently practice economic and subsistence activities popularly associated with
other karaza. For example, Vezo are thought of as “people of the sea” (olo andriake) and Masikoro as farmers of the savanna, but members of both groups practice terrestrial foraging and derive large material and nutritional benefits from nearby forests by harvesting wood for cooking fuel, housing, coffin and laka construction, collecting medicinal plants and plant foods (especially tubers and fruits), and by hunting and trapping. Mikea identity is strongly associated with forest and foraging, but Mikea subsistence also depends on raising livestock (cattle, goats, and fowl), growing maize, manioc, sweet potatoes, and other crops, and selling goods at market. Many Masikoro and Mikea, especially women who have relatives living in Vezo villages, periodically “behave Vezo” by making special trips to coastal villages to fish and practice mihaky, reef flat foraging, and return to their home villages with smoked or dried fish, shellfish, and dried octopus for sale or household consumption.

Shifts in identity are also linked to “push” and “pull” factors (Ellis 1998) that include seasonality, individual mobility, market demands for specific products, ecological and politico-ecological concerns (including frequency of rainfall, local resource access and competition, and health-related issues such as water quality), local politics, and proximity to markets and state and non-state infrastructure (Poyer and Kelly 2000).

Complex and hyphenated identities are not easy to define. When individuals and groups move to new areas and found villages or establish new clan branches (tariha) social life changes in many ways. People move into spaces with new and challenging social and environmental characteristics and must adapt to new socio-political realities and economic challenges. Integration into new areas is not a simple matter of setting up households in a habitable area, and most frequently involves establishing legitimacy and negotiating a shared space with people who are already settled. Engagement in markets for produced goods, local politics, available niches of
exploitation, and competition for resources all must be negotiated. New individual and group identities emerge and reflect these negotiations and historical and genealogical ties to other areas and other groups.

Someone who identifies as Vezompotake (“Mud Vezo”) living in the provincial capital of Toliara may highlight their Vezo cultural heritage, but at a distance from fomban’draza (ancestral values and practice), razany (ancestral land) and practical and empirical knowledge of the sea, while pursuing jobs in government, education or commerce (Marikandia 2001); such Vezo sometimes comically refer to themselves as “paper-Vezo, or Vezontaratasy. In contrast, people living in the rural Afeza claim that they are Vezompotake but practice largely “Masikoro” farming livelihoods and have historical ties to the “Mikea” Namonte Basin region. People living in the Vezompotake village of Ankilimalinike have historical ties to coastal Ampasilava, and practice farming and marine livelihoods. What it means to be Vezo-Mikea in Ankindranoke with current sea-focused livelihoods and strong historical and genealogical ties to the settlement and history of the Namonte Basin is very different from what it means to be Vezo-Mikea living in Andalambezo where people practice marine foraging and some farming but are largely dependent on the presence of a local mission and have distinctly different historical relationships to forest and foraging.

The phenomenon of hyphenated identity clearly illustrates the living, shifting nature of identity in the Mikea Forest region because in many ways these identities defy generalization and static representations of what it means to be “a people.” Identities like Vezo, Mikea, and Masikoro are superficially easier to define than Vezompotake, Vezo-Mikea and Masikoro-Mikea because they relate to schematic norms of identity in relation to territory and livelihood. To an extent, hyphenated identities reflect relatively recent migration histories of particular groups of
people, and accompanying political, ecological and cultural negotiations and processes of place-making (see Gupta and Ferguson 1997). They also represent a cultural process by which people establish contemporary cultural legitimacies while maintaining ties to ancestors and *fomba* when current lifestyle and history diverge.

3.4 The regional economy: Subsistence, markets, and strategies of diversification and mobility

The Mikea Forest region is characterized by extreme seasonality, stochastic interspatial and interannual rainfall, and ecological heterogeneity. Rural householders are heavily oriented towards subsistence production, but engagement in markets is an important aspect of economic life. The formal and informal economy is dominated by inland agricultural production and coastal marine exploitation, but households and individuals maintain diversified portfolios that include subsistence- and market-oriented farming, freshwater and marine fishing, animal husbandry, forest and marine foraging, and commercial activities (production of charcoal [*charbon*] or local rum [*galeoke; toake gasy*]; transporting baggage by oxcart [*manday enta*]; weaving [*mandrary*]; wood harvesting for construction or firewood [*mila hazo; mamaky hazo*]; operating shops [*doka*] or preparing food and coffee for sale) that take advantage of markets and exploit different regional micro-ecologies. A combination of factors contributes to the composition of individual livelihood portfolios. These factors include local geography and ecology; mobility; individual learned skills; access to productive capital such as land, tools, and oxcarts; proximity to infrastructure such as roads and regional market centers in large towns and cities; local marketing opportunities; social networks and social obligations; market booms (especially those driven by export demands); and local patterns of property ownership.
3.4.1 Farming: Subsistence and commerce

The most important crops in the region are starchy staple foods such as manioc (balahazo), maize (tsako), irrigated paddy rice (vary), and sweet potato (belè), sugarcane for local rum production (fisiky), and several varieties of pulse, the most widely consumed and sold being butterbean (kabaró). Other important foods are grown in fields and in fenced gardens, including several varieties of leafy green, squash and watermelon, onion (tongolo), garlic (tongolo lay), peanuts (kapiky), and tomatoes (tamatesy). The most intensified regional staple crop production occurs in savanna and savanna woodland areas to the east and north of the Mikea Forest, in the Iovy and Mangoky River flood plains. These are areas with rich soil and sufficient water from rain, spring-fed wells, and rivers to maintain small-scale irrigation schemes throughout most of the year. Less intensive crop production is also practiced in the Mikea Forest, in cleared hatsaky swidden plots or in fenced gardens. Maize is the most common crop grown in hatsaky, but hatsaky may also used to grow melon, manioc, sweet potato, and other foods. Fenced gardens, sometimes bucket-irrigated, are also common in some coastal areas.

The majority of agricultural products are consumed in the home, but there is significant variability in the ratio of home consumption to market sale based on intensity of production, proximity of markets, access to transport technology, and individual mobility. Among people living in relatively small rural villages, produce that is not consumed in the home is sold in various venues, the choice of which varies on the basis of transport costs, distance and profitability. People living near large cities or towns (such as Morombe, Ankililoake, and Befandrea) with permanent daily marketplaces (bazary) are likely to engage in more frequent market commerce than those living at greater distances, or who lack ox carts. In addition to bringing bulk staples (rice, maize, manioc, pulses) to sell to individuals or wholesalers at market,
people in close proximity to these centers and outposts of commerce are also more likely to grow special vegetable crops (especially greens, tomatoes, cucumbers, onions, garlic, and sometimes herbs) specifically for sale in towns and cities where there is high volume demand and demand for variety. In more rural or less populous areas, surplus produce and lucrative wild foraged foods are available at weekly markets comprised primarily of local sellers and mobile retailers from around the region.

3.4.2 Mobile retailing and local petit commerce

Mobile retailing, called kinanga or kasave, is a lucrative practice in which products are taken from an area where they are plentiful and fetch a low price to an area where they are relatively scarce and fetch a high price. The most common route for mobile retailers in the Mikea Forest region is one that takes them east-west across the forest from savanna, carrying agricultural products, to the Vezo coast where they fetch a high price in cash or kind. On the coast, where there is a high demand for starchy staples and beans but marine foods are plentiful, a mobile retailer sells or trades agricultural products for marine products such as smoked or sun-dried fish, seashells for local cement manufacture, and sun-dried octopus which will then be sold inland for a high price. Mobile retailing can be a cooperative enterprise in which many individuals coordinate to move goods across the region and monopolize their distribution in specific areas. This can be seen in coastal villages where relatively permanent and cooperative “Masikoro markets” (Figure 3.4) control a great deal of local agricultural commerce.

Lively village economies also contribute to livelihood portfolios. Even relatively small villages generally have at least one or two resident specialists, people who are skilled at woodworking, sewing, or smithing. Larger villages usually have one or two small shops (dokany) (Figure 3.5), which are small shops selling cooking oil, soap and shampoo, packaged
food (candy, cookies, dried noodles, drink mix, soda) or prepared food (fried dough, rice cakes), uncooked rice, beans, flour, and peanuts, prophylactics, batteries, pharmaceuticals, hair accessories, tobacco, and sometimes small toys. *Dokany* may be freestanding, brightly colored structures with signs and advertisements, but in smaller villages *dokany* are more likely to be “in the house” (*antrano*), with little or no advertisement. Women (and to a lesser extent men) often operate *dokany* and *dokany antrano*, and supplement income with other small-scale local commercial activities such as preparing snack foods and coffee, selling milk or homemade rum, processing or pounding maize or rice, weaving baskets and grass mats from palm fiber or hardy grasses.

Most villages have at least a small demand for both skilled and unskilled wage labor. Skilled labor or labor that requires special tools can be quite lucrative. Skilled forms of labor include house construction, painting buildings or oxcarts (the latter of which can be quite elaborate [Figure 3.6]), plowing with a tractor or a steel plow, which requires both a plow and healthy oxen, and baggage transport, which requires healthy oxen and an oxcart with shocks and rubber tires (*sarety pinomatiky*) for efficiency.

### 3.4.3 Marine fishing and marine foraging

In many coastal communities, marine fishing and foraging is primarily oriented toward trade and sale. Increasingly since the 1970s, individuals living in many coastal villages have sold most of their catch to exporters or regional merchants, and have consumed increasing amounts of purchased food, both regionally produced (especially manioc, maize and pulses) as well as imported (cookies, ramen noodles). *Vezondriake* (Sea-Vezo) exploit a diversity of marine microenvironments. Fringing reefs, barrier reefs, lagoons, and islands, as well as distant or remote seasonal fishing areas satisfy demands of export markets for finfish and shark, octopus,
and sea cucumber. Local and regional markets are also important; shrimp, crab, conch, lobster, squid, octopus and finfish supply restaurants in cities through merchants with means to transport products, and local demand for high-quality dietary protein via trans-regional networks of *kinanga* and *kasave* (Iida 2005; Langley 2006).

### 3.4.4 Forest hunting and gathering

Forest foraging, though not practiced on as large a scale as agriculture and marine exploitation, is critically important to the subsistence of many people, especially in lean times of year, times of economic upset, or general agricultural failure. Mikea are the only people whose identity is explicitly linked to the *habitus* of a forest-based foraging lifestyle, but people of all backgrounds in the region regularly or periodically rely on wild hunted and foraged goods for food, medicine, and income. For people with extensive knowledge related to hunting and harvesting forest resources, this can also be an important source of cash income. Medicinal plants and woods that grow in the forest are important to traditional healers who use them to make pharmaceuticals and charms. Certain hardwoods are valued for particular properties in house construction and furniture manufacture. Honey (*tantely; tsiboka*), fruits such as governor’s plum (*lamote* [*Flacourtia indica*]) and jujube (*konazy* [*Zizyphus indica*]; *tsinefo* [*Zizyphus vulgaris*]), some wild tubers (*ovy* [*Discorea acuminata*]; *babo* [*Discorea bemandry*]), forest animals and birds such as tenrecs (*tandrake* [*Tenrec ecaudatus*], *soro* [*Setifer setosus*], *tambotrike* [*Echinops telifairi*]), wild guinea fowl (*akanga* [*Numida meleagris*]), and wild duck (*vivy* [*Dendrocygna viduata*]) are all flavorful wild foods that sell for relatively high prices at market. Introduced Chinese snake-head fish (*vangalopake* [*Channa striata*]) are caught by trotline in the rain-fed lakes of the Namonte Basin and are eaten locally and sold. Other forest fauna such as bushpig (*lambo* [*Potamochoerus larvatus*]), small lemurs (*tily* [*Microcebus*]...
murinus], titihy [Chierogaleus medius]) and feral cat (tsaka [Felis cattus]) are sometimes hunted and eaten but are not sold because of rarity (bushpig) or undesirability (feral cat; lemur) (Tucker 2001).

3.4.5 Animal husbandry

Among livestock, hardy zebu cattle (Bos indicus) are fundamentally important to Malagasy identity and economy. The value of cattle in Madagascar is economic, social and symbolic, conforming among some groups to Herskovits’s concept of the East African Cattle Complex (1926; Tucker et al. in press). Cattle are an important self-reproducing means by which wealth is stored, and are also important to building kinship networks as bridewealth payments, and as sacrifice in social ceremonies including rites of filiation (soron’anake), circumcision (savatse), healing (soro), and social healing ceremonies (bilo). Cattle are necessary for rice farming, to fertilize as well as till, and to transport bulk goods to market by oxcart. In the Mikea Forest region, Masikoro identity is most closely associated with cattle ownership, but cattle are important for Mikea and Vezo as well.

Goats and sheep are also economically important. They are occasionally used in sacrifice, though less frequently than cattle, and they lack the cultural valence of zebu. Chickens (akoho), turkeys (pipy), and ducks (dokiste; gana-gana) are among the most common poultry kept, and the most frequently sold because they are fast breeders and cheap as whole, live animals compared to all other domesticates.

3.5 Regional environmental governance and uncertainties

In the past several years the Mikea Forest region, and especially the dry spiny and deciduous forest, has come to the attention of multiple national and international actors. This interest has been stimulated by increasing social and economic power among cooperating

Although many residents have managed to avoid direct conflict with authorities over use of resources, the gradual introduction of increasingly strict environmental policies in the region has contributed to increasing regional insecurities in three related domains: livelihoods (including food insecurity), vulnerability to violence and theft, and vulnerability to exploitation. These increased regional insecurities are the result of synergy among a complex set of factors related to policy and governance, changing markets, and climatic unpredictability. With little or no policy information available to rural residents, a lack of local representation in regional policy processes, the imposition of restrictions on rural livelihoods, and uneven enforcement rules related to resource use, insecurity is compounded by uncertainty about the future.
Figure 3.1 Madagascar ethnic regions (adapted from CIA 1973). Courtesy of Perry-Castañeda Library Map Collection, the University of Texas, Austin.
Figure 3.2 Map showing the progressive spread of the cochineal insect (*Dactylopius tomentosus* Lam.) in southern Madagascar from 1924-1929. Adapted from Frappa (1932).
Figure 3.3 A Mikea man living in Andalambezo demonstrates *kapila* manufacture.
Figure 3.4 The permanent “Masikoro market” or Tsena Masikoro in the coastal village of Bevohitse.

Figure 3.5 A well-stocked dokany in Mañono.
Figure 3.6 A freshly painted *sarety pinomatiky* in the woodland Masikoro village of Andranodehoke.
CHAPTER 4

Indigeneity and rurality in environmental policy: Representing people and transforming power in Mikea Forest governance

4.1 Introduction

In Madagascar, protected forests are spaces where cultural discourses and material struggles meet. Madagascar’s forests are presented by different powerful groups as global goods in crisis (Ganzhorn et al. 1999; Ganzhorn et al. 2001; Harper et al. 2007; Myers 1992), wild natural spaces teeming with diverse species of plants and animals on the brink of extinction (Mittermeier 1986: 147; Myers et al. 2000; Wilson 1986:10), endangered suppliers of valuable ecosystem services (Bodin et al. 2006; Laurance 1999) and reserves of oil, titanium, and sequestered carbon that will facilitate national economic development and poverty alleviation if they are managed sustainably (Blanc-Pamard 2009; Ferguson 2009; Norris 2006; Reyneke and Wallmach 2007).

Despite their breadth and diversity, a very important commonality lies in the structure of these crisis messages. These presentations contain two basic tropes: statements of value associated with preservation, progress, and social integration, and statements of threat that associate environmental harm and impending crisis with essentialized rurality. Narratives of rurality center on ecological crisis engendered by poverty, skewed economic rationalities, or high birth rates among rural subsistence producers (see Ganzhorn et al. 2001; Hannah et al. 1998; Myers et al. 2000; Coe 1998; Smith et al. 1997). Justified citing Madagascar’s unique rates of biotic endemism, long geographic isolation from the African mainland and relatively recent
human settlement, Malagasy people who use forest resources are often represented in authoritative publications and media products in terms evoking imagery of invasive species.

Such crisis messages are disseminated in the national and international media and in published scholarship, and contribute to the cultural construction of needs and authority in the context of environmental conservation, what Igoe (2010: 3), following Debord (1983[1967], 2000[1988]), terms the “Spectacular productions of biodiversity conservation” in which:

…Conservation NGOs, as well as the foundations, government agencies and for-profit companies that support them, consistently use image and dramatic performance to conjure spaces for effective conservation interventions cum profitable investments. The former is visible because the media productions through which these performances are transmitted present a fictional universe in which many stories are possible and each feels like it fits with the others.

According to Pratt (1996: 70-76), despite variation in versions of “rurality” in relation to conservation, development, industrialization, poverty, or wilderness, for example, discourses about rurality generally “serve to enable and support the reproduction of particular uneven social relations, economic distributions, and social stratifications.” In the context of Madagascar’s national environmental discourse, essentialized “rurality” is juxtaposed with images of value to produce specific categories of needs, including the need for expert control and management of natural resources on multiple scales. This also produces what can be considered a moral hierarchy in which the interests and rights of forest-dependent Malagasy people, because of implied transgression against “greater goods,” risk becoming subordinate to the values of
mainstream conservation and national economic development. While marginalizing the interests of forest resource users, and undermining their ability to engage politically, these discourses increase social and economic power among cooperating regimes of conservation and development in processes associated with what Luke (1999:121) terms “green governmentality.”

This discourse is prevalent regarding the Mikea Forest region as well, where conservation practitioners and environmental policy documents invoke a central crisis narrative attributing environmental degradation (in this case forest loss) to an impoverished, irrational, and increasing rural human population. Since the late 1990s, discourses of rurality have justified increasingly strict environmental policies that criminalize important livelihood activities, restrict access to forest resources, and exclude locals from policy processes. But Mikea Forest environmental discourse is unique in Madagascar because of the additional legal categorization of certain people as “indigenous peoples” (Ferguson 2009). In policy documents and media productions, Mikea (or, more precisely, “true Mikea” or “the indigenous Mikea population”) are represented as a small population of primitive forest hunter-gatherers, culturally unique from other Malagasy—“in balance” with and part of the threatened natural forest environment. Although many Malagasy peoples live in, have deep cultural ties with, and directly depend on the island’s forests, Mikea are the only to be formally recognized as “indigenous peoples” as defined by Operation Directive 4.20 of the World Bank (Ferguson 2009: 17; Repoblikan’i Madagasikara et al. 2010; WWF 2003; World Bank 1991).

The philosophical underpinnings of rules like Operational Directive 4.20 and other international customary laws regarding indigenous peoples (UN General Assembly 2007) relate to cultural autonomy of historically underprivileged, mobile, or minority groups within a sovereign nation-state, either due to the idea of primordial occupation (they were there first) or
cultural uniqueness and vulnerability (they are different from everyone else at as such at risk of cultural loss) (Bowen 2000). The stated ethical intent of a rule like Operational Directive 4.20 is to ensure that particular groups of people, be they “indigenous peoples,” ethnic minorities, or other groups whose social or economic status has historically restricted their ability to assert their interests and rights to land and other productive resources, are afforded special protections to avoid increased vulnerability or relative disadvantage in the development process (World Bank 1991).

International norms for indigenous rights claim universal applicability (Bowen 2000). Yet, the concept of “indigenous peoples” is highly politicized, and is subject to local and national particularities (Pelican 2009: 53). Some grassroots social movements have seen varying degrees of success in politically engaging global media and governance bodies to lobby for “indigenous rights” to land and compensation in conservation and development contexts (Brosius 1997; Dove 2006; Holden 2007; Lucero 2006; Shah 2010; Yashar 1998), but entrenched institutional bias against ethnic minorities, mobile peoples, indigenous peoples, and autonomous subsistence producers often restricts access to legal mechanisms of seeking commensurate redress or compensation when access to land and other resources is lost or significantly altered (Agrawal and Redford 2009; Cernea and Schmidt-Soltau 2003; Colchester 2004).

As Pelican (2009) and Bowen (2000) have observed, the concept of indigeneity can be particularly problematic in Asia and Africa, where determining who qualifies as “indigenous” is highly controversial and made especially complex by historical and ongoing processes of migration, assimilation, and conquest. These processes preclude clearer-cut and more broadly acceptable (although still often controversial, and difficult to apply) distinctions between, for
example, “First Nations” or “First Peoples” and politically dominant settler societies in the Americas, Australia, and New Zealand (Bowen 2000: 13).

This chapter explores representations of indigeneity and rurality in environmental policies and resource management practices that have affected people in the Mikea Forest region since the 1990s. First, I will discuss the historical production of dominant notions of Mikea “indigeneity.” Second, I will discuss the cultural associations inherent in discourses of indigeneity and rurality, and the ways that they manifest in environmental policy and practice in the Mikea Forest Region. Third, I will present evidence for how discourses of rurality and indigeneity have influenced regional insecurities, indirectly through processes of exclusion, in three primary but related spheres: livelihoods, vulnerability to violence, and vulnerability to exploitation. In conclusion, I use Holloway’s (2005) framework for conceptualizing social transformations of power to address the question of how, like discourses of rurality, dominant discourses of indigeneity can serve to reproduce unequal social relations and further entrench institutional biases in some cultural contexts.

4.2 The cultural production of contemporary representations

4.2.1 The origin of contemporary representations: Vazimba lore, evolutionism, and the production of official history

The roots of contemporary rurality discourses lie in Pre-colonial and Colonial-era assumptions about pre-human Malagasy environments, Malthusian assumptions about resource scarcity, and assumptions about economic rationality and environmental harm of subsistence production. Contemporary beliefs about ancient origins and relict cultural status of Mikea are intimately connected to Pre-colonial processes of state making and the politics of producing official history in Madagascar, and to scientific research priorities. A complex historical process
of knowledge production has led to Mikea being seen by many as isolated primitive people, or as
the last remaining descendants of “Vazimba,” a group of legendary primordial inhabitants who
are widely believed to have lived on the island before the incursion of later proto-Malagasy
immigrants. There are many Vazimba traditions documented by Dugal (2004), Berg (1977), and
countless amateur oral historians working and living in Imerina in the Pre-colonial period. In the
course of ethnographic research and a review of scholarship dealing with Vazimba lore, Dugal
(2004) identified seven primary versions of “the Vazimba story.” These include depiction of
Vazimba as (1) an invention of Europeans, (2) dispossessed or forgotten ancestors, (3) spirits, (4)
remote others, (5) others of the central highlands, (6) communal ancestors, and (7) personal
ancestors.

One encounters several of these versions in casual conversation with Malagasy people
living in cities such as Toliara or Antananarivo, including Vazimba seen as spirits, “remote
others,” or communal ancestors. If one mentions Mikea in casual conversation, connections to
terms the “Vazimba hypothesis” of Mikea origins:

…[Mikea] are the descendants of ancient Vazimba hunter-gatherers, the original
occupants of the island before the arrival of the Proto-Malagasy from Indonesia…
a relict population of ancient hunter-gatherers, part of an unbroken hunter-
gatherer phylogeny that extends back into the past to a time when all people were
foragers (194).

In this line of reasoning, Mikea are or were among the last remaining direct descendants
of ancient Vazimba, the first settlers or occupants of Madagascar in a very literal interpretation
of some highlands oral histories. Vazimba are widely believed to have been anatomically and technologically primitive; a dwarf-like “race” of stone-age hunter-gatherers with no knowledge of fire, ceramics or metallurgy, African in origin, Bantu-speaking, who originally lived in caves of the central highlands but were outmatched by the “superior… intellect and ability” (Grandidier 1920: 209) of later proto-Malagasy immigrants of Indonesian origin. These proto-Malagasy immigrants are considered the ancestors of contemporary Merina of the central highlands region.

According to Vazimba lore, vanquished Vazimba fled from the central highlands, leaving behind only ancient tombs (identified as large stones or monoliths [Birkeli 1920: 308]), to peripheral areas of the island. Many Vazimba are said to have assimilated into Malagasy society, but those who maintained stone-age lifeways in isolated areas and did not assimilate came to be labeled “former owners of the land,” or “owners of the land who came before,” tompontany taoloha, directly descended from ancestral Vazimba.

In a fundamental sense, Vazimba lore originated simultaneously in Europe and Madagascar at a time when people all over the world were interacting through trade and transformative cultural exchange and synthesis. Fantastic travel stories of Madagascar titillated European audiences since at least the seventeenth century. Publications by the French East India Company’s appointed governor Étienne de Flacourt (1658) and others described exotic creatures, peoples, and customs. Fictional “fireside travels” (Parker Pearson 1996: 234) by popular authors like Daniel Defoe were set in Madagascar and further whetted the European imagination. Of Madagascar travelogues, the Journal of Robert Drury (1890[1729]) was particularly popular, documenting the fifteen-year-long “pleasant and surprising adventures” of an Englishman who was shipwrecked and subsequently enslaved in the southern Androy region of Madagascar.
Among Drury’s detailed descriptions was one of convalescence with a group living Western Madagascar that he called “Virzimbers,” mysterious pygmies that were physically and culturally unique from other Malagasy whom he encountered in his time on Madagascar.

Merchants, slavers, missionaries and pirates who interacted with coastal Malagasy brought home fantastic stories as well that grew in each retelling (Parker Pearson 1996). Berg (1977: 7-8) observes that, “by the end of the eighteenth century, before the arrival of Europeans in the interior, European legend proclaimed that a race of pygmies with baboon-like arms was living somewhere in primitive and mysterious isolation.” Graeber (1999: 329-330) states that, upon their arrival in the interior of the country:

…Early missionaries heard stories about dark, diminutive Vazimba spirits lurking in wild places, and concluded that they must reflect the memory of an ancient ‘aboriginal race’ … The Vazimba, then, would have to be the people already living in the highlands when [the ancestors of contemporary Merina] arrived: backward, dark-skinned savages, originally from East Africa. For English and French missionaries working in Imerina, this soon became a matter of simple common sense.

Such legends had a “momentous effect on historical thinking, for they informed the outlook of Imerina's (currently Antananarivo Province) first European observers, and through missionary schools in the nineteenth century, found their way into the center of Malagasy notions about the past” (Berg 1977: 8), including the official state histories that were produced in the service of the Merina monarchy which headed a Pre-colonial state in Madagascar. During this period, accounts of Malagasy history that were collected, edited, published, and quoted by
foreigners and educated Malagasy became a major tool of governance, justifying the existence of the state and Merina rule to Western audiences and a growing Malagasy bourgeoisie as well. The monarchy’s production of official histories (Berg [1977:1] suggests that this may have been the largest corpus of historical literature produced in any part of Africa) helped to establish the racial superiority and right to rule of Merina sovereigns as the state sought to incorporate new territories and people.

The largest and most famous compiled Malagasy history is the *Tantara ny Andriana eto Madagascar*, first published in the early 1870s by Father François Callet, a Jesuit missionary with the aspirations of an historian (Kus 1997: 201). The *Tantara* includes chronological lists of Merina kings, transcribed oral histories, and a collection of casual cultural observations. The *Tantara* also tells an origin story of the establishment of the Merina state and the subsequent end of suffering and famine through political unification in the central highlands. Although Callet’s original *Tantara* did not make overtly racialized distinctions between lines of kings and conquerors, subsequent reprints in the 1870s and 1880s show a distinctly racialized division between so-called Vazimba kings and later Merina kings. The take-away message is that the “singularity” (Kus and Raharijaona 1986: 202) of the racially superior sovereign ruling class guarantees peace, unity and wellbeing for all. Peace, unity and order are contrasted to savage and irrational “vitality” (Bloch 1985: 643-644). In later printed versions, and in citations of *Tantara*, editorial alterations to Callet’s original hand-written holograph reconcile depictions of Vazimba and conquerors with published descriptions of a black, grotesque and malevolent pre-Malagasy race and their tall, light-skinned conquerors (Sibree 1883; Berg 1977).

The *Tantara* and similar histories reflect a dominant, Eurocentric social philosophy and assumptions about human progress, including a racialized ethnic hierarchy, that have become
central to popular conceptions of early Malagasy history. They have been institutionalized in the
game, formal history curriculum of Malagasy schoolchildren for generations (Graeber 1999; Tucker
2003). According to Kelly and colleagues (1999) and Tucker (2003), with a lack of alternate
written historical sources and a paucity of archaeological evidence, the sometimes didactic,
sometimes alternately verifiable, and sometimes fictional information in formal histories is
uncritically repeated and reinvigorated subsequent generations of scholars, often without
attribution.

4.2.2 Circulating representations of Mikea in scholarship and popular culture

Like more common discourses of rurality in Madagascar, the historical development of
the Vazimba hypothesis and the imagined primitivism and antiquity of Mikea people developed
apart from the life-worlds and lived experience of people who did or do self-identify as Mikea,
as synthesis of European social theory, oral histories of the central highlands, and nineteenth-
century elite politics (Berg 1977; Tucker 2003; Graeber 1999). According to Dugal, the only
logical connection between Mikea people and Vazimba is that both are purported to be or have
been foragers (personal communication). The archaeological record contains no evidence for the
physical existence of the Vazimba of legend, nor any stone-age pre-Malagasy society, dwarf-like
or otherwise (Dugal, personal communication; Graeber 1999; Wright, personal communication
to Tucker). The persistence of the Vazimba-Mikea and Mikea-Primitive associations is in a large
part due to the priorities of researchers seeking evidence for assumptions about the settlement of
Madagascar based on evolutionist mythologies.

Mikea appear in more recent Malgachisant literature in two primary contexts, although
there is a degree of overlap. In one, Mikea are identified as one of several identity groups of the
Fihereña, and are associated with forest residence, diversified foraging subsistence, and
historical, social, and economic relationships with neighboring groups (Blanc-Palmard 2009; Decary 1969; Fagereng 1950; Fanony 1986; Marikandia 2001; Poyer and Kelly 2000; Seddon et al. 2000; Tucker 2001). In the other context, Mikea are depicted as a relict, ancestral, or primitive population of forest hunter-gatherers, frequently said to be culturally and linguistically unique from other groups in the region. Mikea are often said to live “in balance” with the natural environment of the dry Mikea Forest, reflecting what Redford and Stearman (1993: 254) describe as a “preconceived stereotype of the ‘ecologically noble savage’” (Redford 1991).

Depictions of Mikea as relict or primitive take two basic forms, both of which are heavily influenced by historical “Vazimba” associations and notions of progressive social evolution. Some authors (Birkeli 1920, 1939; Blench 2008; Blench and Dendo 2006; Faroux and Rabedimy 1985: 2 [discussion of “Les Mikea ‘traditionnels’”] Godefroit 1998: 83; Koechlin 1975; Stiles 1991, 1998) directly attribute assumed primitivism to the idea that Mikea are descendants of Vazimba. This supports the idea that the “Vazimba hypothesis” of Mikea origins (Tucker 2003: 195) has become received wisdom among many scholars, journalists (Mouyon and Francelle 1999; Rarojo 1998), and Malagasy people who live outside the Mikea Forest region.

Other authors accept the relatively recent advent of Mikea as a cultural identity, and acknowledge the historical origin of Mikea identity in refugeeism and resistance of authoritarian rule, as well as kinship with neighboring Vezo and Masikoro (discussed in-depth in Chapter 3) (Blanc-Pamard 2002: 220; Blanc-Pamard et al. 2005: 9; Eaux et Forets 2003, 2004; Faroux and Rabedimy 1985: 2 [discussion of “Les pseudo-Mikea”]; WWF 2003; Repoblikan’i Madagasikara et al. 2010). Yet these authors also describe Mikea using classic essentialisms, in terms of wildness, primitivism, or mythicism, in terms of indigeneity, or in terms of ecologically noble savagery or ecological harmony. These representations are conceptually complex because they
situate the origins of Mikea identity in the social history of the Fihereña, but deprive Mikea people of historicity or historical consciousness (Lambek 1998: 106). The implication is that people who become foragers culturally “devolve” (Lee and Hitchcock 2001: 267), and somehow step out of history and into a more “authentic” (Wilmsen 1989: 8) or basic social order that is less dynamic and more natural. The hunting and gathering mode of subsistence is presented as ahistorical, equated with isolation not only from cities, infrastructure or broader social institutions, but with “remoteness from the flow of history” itself (Wilmsen 1989: 8).

Depictions of Mikea indigeneity and primitivism are not limited to policy documents. They are described as “a primitive hunter-gatherer people” and a “little-reached tribe” on web sites of the missionary organization Ancient Path, which partially supports the Baptist mission at Anjabetrongo in the southern Mikea Forest. They are used to market CDs marketed by Malagasy pop musicians and producers of “world music” compilations, and to market expensive folk and contemporary art to tourists at establishments like La Galerie Mikea located in the national capital. They are used in mainstream conservation publications to encourage donations and support (CI/Toany 2009), in Malagasy newspaper articles (Moyoun and Francelle 1999a, 1999b; Rarojo 1998), in French travel guides, and in special public environmental events broadcast on Malagasy state television.

4.3 Representations of rurality and indigeneity in Mikea Forest governance: Building capacity for forest governance with the Strategic Framework for the Development of Indigenous Mikea Populations and the Development Plan for Indigenous Mikea Populations

In the past several years, interest in converting the Mikea Forest into a Protected Area (PA) and later a National Park (Figure 4.1) has been stimulated by national goals to increase the
amount of forested land under legal protection in Madagascar (Norris 2006), and justified citing a significant reduction in forest cover since the 1970s due to forest cutting and burning for pasturage, charcoal production, and especially for hatsaky, swidden maize production (Aubry and Ramaromisy 2003; Blanc-Pamard 2009; Du Puy and Moat 1998: 15; Durbin et al. 2006: 55; Milleville et al. 2001; Seddon et al. 2000). Regional deforestation is attributed to skewed economic rationality among rural subsistence farmers and agropastoralists, whose inefficient agricultural practices are leading to a “tragedy of the commons” scenario (Hardin 1968).

By the late 1990s, plans for a Mikea Forest Protected Area were coalescing. In 1998 the development of a Joint Commission was funded by the United Nations Development Programme (UNDP) and formed through collaboration among representatives of various national agencies, the Worldwide Fund for Nature (WWF) and Conservation International (CI), members of the Malagasy military, the gendarmerie, the courts system, and a “community” NGO called FiMaMi (Fikambanana Miaro ny Ala Mikea, or Society for the Protection of the Mikea Forest). While Madagascar National Parks (formerly l'Association Nationale pour la Gestion des Aires Protégées or ANGAP) is tasked with overseeing PA establishment and Madagascar’s PA network, FiMaMi’s responsibilities include the representation of Mikea and other local interests and the management and enforcement of environmental legislation, including a blanket ban on hatsaky maize production in the forest. Its membership comprises the elected mayors of 15 of 19 townships surrounding the Mikea Forest, and includes no self-identifying Mikea.

As PA plans evolved, the fact that both the World Bank (a partial funder of the PA) and the Malagasy government officially recognized Mikea people as indigenous contractually necessitated the creation of a Plan pour le développement des populations Mikea (PDPM, or Development Plan for Mikea Populations) to establish a framework by which Mikea peoples’
rights and “informed participation” in the development of policy would be ensured as plans to establish the Mikea Forest PA progressed (World Bank 1991). In practice, this meant that project planners would have to establish criteria for distinguishing between those who are Mikea and who are not, a difficult task considering the complexities of Malagasy systems of identity.

The PDPM (Repoblikan’i Madagasikara et al. 2010) was not produced until 2010. According to the *Cadre Stratélique Pour le Développement des Populations Autochtones Mikea* (Strategic Framework for the Development of Indigenous Mikea Populations), a document prepared by employees of the Worldwide Fund for Nature (WWF) and published jointly by World Bank and the Republic of Madagascar, the formulation of the development plan presented three primary challenges to the researchers tasked with its production (WWF 2003).

The first challenge discussed was conceptual. The term “indigenous peoples” as defined by Operational Directive 4.20 was problematic for the research team, who claimed to be confused by the task of creating a development plan for an “indigenous” group of people whilst ensuring that they could maintain cultural identity and (an assumed) primitive lifestyle (WWF 2003). The second challenge was practical. Because of a long historical memory of exploitation and violence, many Mikea are skeptical about the motives of outsiders and intentionally avoid state representatives and others who seek them out. Simply stated, the research team tasked with preparing the development plan did not actually have the opportunity to interact and discuss their tasks with a substantial number of self-identifying Mikea people. Therefore, the informed participation of Mikea people in the development of PA policies was not realized. Instead it was proposed as an ongoing process ultimately to be regulated by FiMaMi, which is considered *de jure* representative of Mikea and other resource users’ interests in matters related to conservation
and development policy and enforcement (even though no members of FiMaMi self-identify as Mikea).

The third challenge was practical as well as conceptual, and is related to the first two challenges. Operational Directive 4.20 presents five characteristics that “in varying degrees” can be used to identify indigenous peoples. These include:

(a) A close attachment to ancestral territories and to the natural resources in these areas;
(b) Self-identification and identification by others as members of a distinct cultural group;
(c) An indigenous language, often different from the national language;
(d) Presence of customary social and political institutions; and
(e) Primarily subsistence-oriented production.

People who self-identify as Mikea display the characteristics of indigeneity identified by Operational Directive 4.20 to the same degree as other subsistence producers in the region (and I would argue throughout Madagascar), regardless of identity. These shared characteristics irrefutably include a strong attachment to ancestral territory and natural resources, the presence of customary social and political institutions, and production that is primarily oriented towards subsistence.

According to discussions with MNP personnel in 2007-2009, resource use and habitation rights within PA boundaries hinge on identity, particularly whether or not one’s lifestyle and site of residence qualify as those of “true Mikea” or members of “Mikea population autochtone”
The Plan pour le développement de la population autochtone Mikea (PDPM) (Repoblikan’i Madagasikara et al. 2010: 74) identifies the indigenous Mikea population as 923 individuals living in forest “camps” of Ankililale, Antanimena, and Tanavao, located in two zones d’occupation controlées (ZOCs, or controlled occupation zones) areas in the north-central Mikea Forest, Antampimbato, in a ZOC to the south, and Bedo, located outside of the eastern boundary of the PA near the village of Vorehe. These autochthonous Mikea are said to be unique and culturally distinct from other Malagasy, maintaining unique customs and social institutions, subsisting primarily by foraging for wild foods with primitive tools, and depending on the forest for renewable resources, including medicinal plants (Repoblikan’i Madagasikara et al. 2010: 33; 82-84).

While indigenous or “true Mikea” are represented in idyllic terms as living in adaptive ecological balance as nearly exclusive foragers, other residents’ attitudes, behaviors, histories of residency are glossed by a simplified narrative of rurality and presented in stark contrast to idealized Mikea. Non-Mikea, “false Mikea,” and “migrants” are represented as encroaching on Mikea lands, negatively influencing Mikea culture and endangering “traditional” subsistence and spiritual practices by causing deforestation, introducing farming, currency, commerce, and consumer goods, and committing violent acts of theft against Mikea (WWF 2003:8). This is further elaborated in the PDPM (Repoblikan’i Madagasikara et al. 2010: 58-59, 75), which states that the primary concerns of indigenous Mikea include the protection of their unique culture, of the forest environment, and the forest’s natural resources from destructive and environmentally careless lifestyles of outsiders.

The distinctions drawn among indigenous “true Mikea,” “false Mikea,” and “immigrants” may seem like common sense to policy planners and conservation workers who are not native to
the Mikea Forest region and unfamiliar with local norms of identity and lifestyle. But local
notions of what makes one “Mikea” do not make the distinction between “true” and “false,” nor
do any people living in the region resemble the representations of primitivism that have rendered
“true Mikea” unique as indigenous primitives in popular Malagasy culture or in development
funding proposals.

Despite local norms and the fact that most people living in the region could be
categorized as indigenous under the specifications of Operational Directive 4.20, people
categorized as non-Mikea or “false Mikea” are represented pejoratively by conservation and
development professionals and in policy. While “true Mikea” are represented as living in
ecological balance as exclusive foragers, other residents’ attitudes, behaviors, histories of
residency are glossed by a simplified narrative of rurality and presented in stark contrast to
idealized Mikea. Non-Mikea and false Mikea, driven by a rationality of “predation” (Ranaivoson
2001: 50), are represented as encroaching on Mikea lands, and negatively affecting Mikea
culture by introducing currency, commerce, and consumer goods, and endangering “traditional”
subsistence and spiritual practices by causing deforestation (WWF 2003).

4.4 Rights, exclusions and insecurities

4.4.1 Rights, rules, and broad social consequences

By 2003, Mikea living in the northern and middle forest had generally stopped clearing
forest for new hatsaky or had become very good at clandestine smaller-scale maize cultivation.
In 2007 the Mikea Forest Protected Area agreement was formalized, establishing a large area of
protection with a buffer zone surrounding it. Within the PA, zones of no use (noyau dur),
controlled use (zone d’utilization controlé, or ZUC), occupation (zone d’occupation controlé, or
ZOC), and ecotourism (a dream of planners that is not yet realized other than on maps) were
created in preparation for the PA’s transition to national park status (Repoblikan'I Madagasikara 2007). On official 2009 maps of the proposed Mikea Forest National Park, the size of the park had been decreased to accommodate titanium oxide mining concessions that begin where the eastern PA buffer zone ends (FTM/Madagascar National Parks 2009).

On paper, in the northern and central forest, prescribed residence within national park boundaries is limited to two very small, resource-poor controlled occupation zones (ZOCs) where “true Mikea” or the Mikea population autochtone may live. These controlled occupation zones are located in the Namonte Basin, a lakes region in the northern forest with historical significance to Mikea origins in the 18th century, but few opportunities for foraging, especially ovy, compared to areas east and southeast of Namonte where tubers are more plentiful. In the southern forest, the only occupation zones is at the site of Antampimbato, near the Baptist mission of Anjabetrongo, also located in a resource-poor area. Within PA boundaries, acceptable “traditional” subsistence practices are limited to these controlled occupation zones and zones of use, and approved activities include “primitive gardening” near villages, foraging for wild foods and medicinal plants, and using certain types of trees to satisfy basic needs for shelter and tools. Within the controlled occupation zones, residents must at least attempt to maintain the appearance of primitive, full-time foragers who eschew commerce and markets. Although people living in villages that are designated as controlled occupation zones will be permitted to forage and harvest housing materials within specific zones of use, they will be discouraged from forest plot farming and market activity, both of which are fundamentally important aspects of Mikea livelihoods. While foraging is crucial to many Mikea livelihoods portfolios, especially in the dry season, drought years, and because of the prohibition hatsaky maize production, Mikea are
neither nomadic nor exclusive foragers. Policies based on these assumptions are likely to cause significant harm if they are systematically enforced in the future.

According to Madagascar National Parks personnel, people who are classified as non-Mikea and “false” Mikea will be gradually evicted or induced to migrate from villages and camps within the boundaries of the national park as park plans progress. Some versions of the new PA map appear to include villages and hamlets that are located within PA boundaries, while other versions do not include residential areas. On these maps that do include villages and hamlets, all villages and hamlets within the park boundaries and buffer zones have been omitted except for a very few Namonte Basin permanent Mikea villages. This, in addition to the extremely low official population estimate for Mikea (just over 900 individuals living in three forest camps) contained in the *Plan pour le développement de la population autochtone Mikea*, give the impression that this area is either sparsely populated or unpopulated (for example, see Blanc-Pamard 2009). The result is that thousands of self-identifying Mikea and others who live in this “blank space” in villages, hamlets, and seasonal camps are essentially written out of existence.

4.4.2 Domains of insecurity and vulnerability: livelihoods, violence and exploitive demands

Imposed notions of indigeneity and rurality naturalize the material poverty and marginality regularly experienced by many Mikea in the broader socio-political arena of Malagasy society, excluding and disenfranchising Mikea on the basis of falsely attributed primitivism and ideas about the adaptability of foraging. At the same time, discourses of rurality mark non-Mikea as unworthy subjects, generalized as invasive, irrational, and criminally harmful to Mikea and the Mikea Forest, justifying their exclusion from policy discussions, livelihoods and territory as well. Livelihood vulnerability (discussed in more detail in Chapter 5) and
increased risk of exposure to violence and corruption among Mikea and other residents of the region are associated directly and indirectly with the hatsaky prohibition and with representations of resource use and resource users that result in exclusion from participation in policy production processes and from important social and legal institutions.

Since the advent of the hatsaky ban, Mikea and others living in the region have also become more vulnerable to violence, especially armed banditry as people dispossessed of livelihoods have sought alternate sources of revenue, including theft. Most people affected by the new PA are aware of its existence in an abstract sense, but are frustrated by the lack of specific policy information available to villagers, the uneven enforcement of PA rules, and lack of access to legal protection against exploitation. With external forest governance and the criminalization of one of the region’s most important sources of food and income has come extortion of bribes by those claiming state authority as lehibe an’ala or forest police. Individuals and at times entire villages have been fined exorbitant amounts of cash for building houses, collecting wood, planting gardens, and planting maize in old fields. Such incidents are rarely reported; locals fear that reporting such incidents would draw more attention on the village and residents’ subsistence activities, would be met with violent or extortive retaliation, or would simply be ignored or denied. Simply paying a bribe makes the person or people demanding it go away.

4.5 Conclusions

The persistence of such notions of rurality and indigeneity is intimately related to strong, universalized associations between “race” and progress, and of hunting and gathering with primitivism and antiquity. If foraging is the primordial mode of human subsistence (Pluciennik 2004: 98), then people like Mikea who forage and live in forest environments represent a category of social and cultural organization that has somehow avoided the processes of cultural
evolution that have allowed other groups to “develop” and “progress” and therefore represent scientifically invaluable relict populations, possessing in their authenticity hidden answers to riddles of the evolution of human behavior and society (Headland and Reid 1989).

The exercise of cultural power requires hegemony or domination at the level of ideas (Gramsci 1971), which is achieved through particular techniques of governance, and holds the ultimate goal of directing or manipulating human behavior on varying socio-cultural scales (Foucault 1997; Rose et al. 2006). Escobar (1988) has highlighted the significance of power in producing representations of reality, including representations of different regions, countries, or peoples as “third world” or “developing.” Such representations help to sustain dominant modes of thinking and modes of practice, including the political rationalities and practice of mainstream conservation and development that simultaneously play roles of project, profession, industry, and moral mission on the Malagasy national political stage. These representations are broadly disseminated to global audiences in the form of fantastic natural landscapes, exotic peoples, and charismatic species under threat. This process of the cultural production of needs and authority hinges on the effective dissemination of imagery (broadly construed) that mediates relationships between “Western consumers and people and environments at locations that are distant from them,” with significant implications for human-environment relationships in the locales in which interventions are executed (Igoe 2010: 4, 12). Thus, cultural representations and material experience should not be considered in dichotomous terms, but rather as mutually constituting the production or transformation of social-environmental relationships.

In cases such as the one presented here, the representations and ideas that facilitate particular programs or projects can work to reproduce unequal social relations, amplify inequalities, and further entrench institutionalized forms of discrimination. In the case of the
Mikea Forest PA, policies are justified by representations of environmental deterioration, rurality, and indigeneity. For self-identifying Mikea, to be seen deviating from official representations of cultural authenticity constitutes criminal action (at worst) or falseness (at best). Force is embodied regionally by threat of fines, harassment, or eviction, which increase social and material insecurities.

Distinctions among “true Mikea” and “false Mikea” are not meaningful locally and are thus impossible to operationalize. In formalizing “true Mikea/false Mikea” dichotomy with a primitive and pristine foraging lifestyle as the test of cultural authenticity, PA planners excuse the omission of procedures for guaranteeing informed participation of self-identifying Mikea in the development of environmental policies relating to the legality of residence or subsistence practices within the Mikea Forest. While these practices fundamentally disenfranchise self-identifying Mikea people and other rural residents, they also use spectacular imagery to justify elite claims to manage a threatened landscape and a threatened people, satisfying international funders’ ethical concerns for the respect of indigenous human rights and contributing to the national discourse of sustainable development.
Figure 4.1 The north and central Mikea Forest region with settlements, “indigenous Mikea camps” identified in the PDPM, roads, forest, PA borders, and mining concessions. Adapted from maps by Bram Tucker and FTM/Madagascar National Parks (2009). Forest extent from 1994 Landsat images processed by James Yount.
CHAPTER 5

A space of vulnerability in ‘the long wounded year:’ Policy, nutrition, and coping capabilities

5.1 Introduction

Cultural representations and local material experience should not be considered in dichotomous terms. Rather, research on the ways that changing cultural and human-ecological dynamics influence health can provide insight into the biocultural nature of health variation (Tanner 2005:1), and can be used to identify social phenomena that are particularly salient in the production of health disparities. In the context of this project, “health” refers to the human body’s functioning, as well as to contextualized notions of health, illness and wellbeing. Health is understood as comprised of deeply socialized and historicized phenomena (Levins and Lewontin 1985; Morgan 1987; Turshen 1977, 1984), and is fundamentally dependent upon “access to and control over the basic material and non-material resources that sustain and promote life at a high level of satisfaction (Baer et al. 1986: 95).”

Adaptation is traditionally defined as changes and modifications that allow a person or group to survive in a particular environment, and has long been a central concept to anthropological understandings of human-environment interactions (Ulijaszek and Huss-Ashmore 1997; Wiley 1992: 217). A growing body of research oriented around the concept of “human adaptability” has broadened the biocultural understanding of environment to include not only ecological characteristics but also “the complex webs of social interactions which humans create and in which they are embedded” (Crooks et al 2007: 669; Leatherman et al. 1993).
Central to this expanded view of environment is that it is not only the context in which humans live and to which humans respond; environment is also that which humans perceive, experience, create and act upon. Political and economic factors influence the availability of social and material resources, unevenly distribute exposure to stressors within and across human groups, and constrain the choices that people can make in response to a broad range of social and ecological challenges (Schell 1997: 67). This produces vulnerability, defined as a group’s or individual’s cumulative exposure to contingencies and stressors, difficulty coping with them, and risk of harmful consequences within particular socio-environmental contexts (Adger 2006; Yaro 2004).

Just as different people perceive and experience conditions of vulnerability in different ways, different people have different goals, capabilities, and capacities to cope with hardships (Leatherman 2005: 53). Watts and Bohle (1993) have proposed coordinates for identifying a “space of vulnerability” formed by synergy among different forms of risk related to human environments and wellbeing: the risk of exposure to stressors, the risk of inadequate capacities to cope with stressors, and the risk of severe consequences resulting from stress, crisis, and shocks (Crooks et al. 2007; Leatherman 2005). Spaces of vulnerability are patterned by social relations on multiple scales of interaction from local to global, and as such can help biocultural researchers identify linkages between global cultural and material processes and local experiences and actions. At the same time, spaces of vulnerability are not static, but can be shifted and reconfigured as economic, social and political relations are altered (Hadley et al. 2009: 88).

When conservation and development projects involve displacement, rural subsistence producers are the most affected due to barriers to social and economic mobility, and marginal
political status in relation to their broader societies. They are often the least likely to be able to forego the immediate returns derived from land and other natural resources without increased vulnerability to negative social, economic, psychological, and biological consequences (Adger 2006; Oliver-Smith 1996; Yaro 2004). A growing body of research shows that risks related to displacement go beyond negative immediate impacts on livelihoods, and are associated with long-term consequences that may involve landlessness, joblessness, homelessness, social marginalization and political disenfranchisement, food insecurity, increased morbidity and mortality, loss of access to common property, socio-cultural disarticulation, and increased resource scarcity due to environmental degradation (Cernea 2006; Cernea and Schmidt-Soltau 2003: 12; Colchester 2004; West et al. 2006). Oliver-Smith (1996) suggests that policies that separate people from their resource base have local effects similar to those of natural disasters. Bates (2002) and Peluso (1993) contend that people displaced by conservation resemble people displaced by natural disasters in terms of socio-cultural and psychological consequences, and in material deprivation. There is continued disagreement among scholars as to whether displacement of people from geographical space and strict restrictions on resource use imposed on people living within protected areas (PAs) entail the same types of social and material risks for local people (Agrawal and Redford 2009; Cernea 2006). In order to address this gap, important questions must be asked about the experiences of people living in parks, and particularly about biocultural relationships between environmental policies and local vulnerabilities.

In this chapter I explore to what degree are people’s abilities to cope with environmental hazards are negatively influenced by conservation policies that restrict economic and subsistence activities. I operationalize people’s ability to cope with environmental hazards in terms of the
nutritional status of adults and children, and in terms of social vulnerability in domains identified by participants in focus groups and introduced in the previous chapter. Residents living in Andalambezo, Ampijilova, and Mañono are all affected to different degrees by policies related to the establishment of Parc National Mikea. Because participants living in Andalambezo, Ampijilova, and Mañono all practice diversified subsistence production, I expected that living within PA boundaries under the strongest subsistence restrictions would predict less diversified livelihoods and poorer average nutritional status among adults and children. I also expected that social vulnerability would be increased among people who are more economically and socio-politically disadvantaged in the broader context of Malagasy society.

First, I briefly describe each participating field site in terms of livelihoods and the impacts of PA policies, and present results of focus groups and analyses of dietary and nutritional data. Then I situate these results ethnographically and discuss results and conclusions. I find that in 2009, residents of the Mikea Forest region were challenged by drought, widespread socioeconomic insecurity, and restrictive environmental policy, but that Mikea forager-bricoleurs living within PA boundaries face the greatest difficulty in coping with these challenges when compared to participants living outside PA boundaries. Regionally high rates of underweight among Mikea women, and undernutrition, stunting, and wasting among Mikea children may be a recent phenomenon associated with PA policies and exacerbated by drought. Informants complain of increased incidence of armed banditry and exploitive demands for bribes by “forest police.” As discussed in Chapter 4, PA policies reflect assumptions about the ecological adaptability of foraging as a means of subsistence, and about the primitivism of people residing in park boundaries, but these assumptions do not reflect the experience of Mikea people living in relative resource poverty, nor can they account for perceived lack of access to trustworthy
security personnel and legal institutions among Mikea. When combined with the reverberating
effects of national economic crisis and severe drought, many people’s ability to cope is over-
burdened. These processes have created a “space of vulnerability” (Leatherman 2005; Watts and
Bohle 1993) formed by synergy among different forms of economic, social and political hazards.
Vulnerabilities manifest as poor nutritional status, and increased vulnerability to crime and
exploitation. Informed participation of Mikea in the production of regional environmental
policies and improved access to information and legal institutions could mitigate these harmful
consequences and improve representation of their interests.

5.2 Livelihoods, environmental policy, and national crises

As discussed in Chapters 2 and 3, people living in Andalambezo, Ampijilova, and
Mañono share a degree of common history and kinship but the locations of these villages reflect
regional variation in local ecology, lifestyle and rules related to PA establishment regarding use
of natural resources. Figure 5.1 presents a map of the Mikea Forest region that shows the
location of each site relative to boundaries of Parc National Mikea, the PA buffer zone (zone de
protection), controlled occupation zones (zones d’occupation contrôlées, or ZOCs), mining
concessions and major geographical features. Figures 5.2 through 5.4 present summaries of
livelihoods portfolios for each field site for 2009.

Andalambezo (pop. 135) is located just west of the buffer zone boundary of Parc
National Mikea. Because Andalambezo residents maintain historical memory of forest and
foraging, and combine some forest-centered livelihoods with the marine livelihoods associated
with Vezo, they are known locally as “Vezo-Mikea.” Andalambezo residents primarily rely on
markets for labor and manufactured products as well as foraged marine products, but also farm,
practice terrestrial foraging, and supplement their diets with dried beans, rice, and manioc
purchased from a local catholic mission and mobile retailers from savanna villages (Figure 5.2). Of the three participating field sites, Andalambezo is the least directly affected by PA rules because it lies outside of the boundaries of the National Park and buffer zones. Although residents frequently supplement their diets and income with foraged products from the Mikea Forest and use wood and other forest materials to construct houses and manufacture furniture, outrigger canoes, and other goods, they are not dependent on the forest in the same ways as people living in the other two field sites. Additionally, because of the presence of the Catholic mission, Andalambezo residents do not fear corruption on the part of forest authorities or those claiming to be forest authorities. Residents of Andalambezo who own cattle do fear cattle raiding, which has increased regionally since the hatsaky interdiction began in the late 1990s. In focus groups conducted in January of 2009, women in Andalambezo discussed local security provided by the presence of a catholic mission and a resident priest as deterring both corruption and armed banditry, but that cattle theft is a worry because cattle thieves, as an elder woman said, “come in the night” and move quickly.

Ampijilova (pop. 112) is located within National Park boundaries and near (but not within) a zone d’occupation controlee (ZOC). Of the three settlements included in this project, Ampijilova is the most directly affected by the PA’s limitations on resource use and especially by restrictions on hatsaky production. Residents of Ampijilova identify as Mikea foragers, but are actually creative bricoleurs, defying pristine forager stereotypes by maintaining diverse livelihoods that include extensive horticulture, market commerce, and opportunistic wage labor in addition to terrestrial foraging and freshwater fishing (Figure 5.3). At the same time, Ampijilova’s residents have in recent years drastically reduced maize production within the forest because of fear of fines and harassment by lehibe anala, or “forest police.” Mikea at
Ampijilova also feel that they have become more vulnerable to violence since the advent of the hatsaky ban, especially to armed banditry as some people (primarily young men from hard-strapped savanna villages) in the region have sought alternate sources of revenue, including theft. Banditry can be complete pillage with entire villages being robbed of all possessions including stored food, clothing, tools, livestock and domesticated fowl, and even cooking pots. Among Mikea, material goods and livestock have daily use value and most can be sold for quick cash in times of particular hardship. Since the risk of cattle theft has become especially problematic, residents of some forest villages (including Ampijilova) have abandoned or hidden cattle ownership as a means to protect themselves from the attention of criminals. For Mikea who have abandoned even very small cattle stocks, this has meant removing the most significant form of wealth storage for the sake of security.

Mañono (pop. 651) is a large village on the northern edge of the PA buffer zone, located about 15 km southeast of the city of Morombe. Because most of the residents identify as being historically Mikea and still practice some forest foraging, but also rely heavily on the agropastoral way of life associated with Masikoro cultural identity, they are referred to as “Masikoro-Mikea.” Residents of Mañono identify as agriculturalists, growing paddy rice, maize, manioc, and vegetables in irrigated fields for subsistence and sale at the permanent market in Morombe (Figure 5.4). Residents have engaged in lucrative hatsaky maize production, but are not dependent upon it for subsistence or cash flow. Residents also keep livestock, and produce charcoal as cooking fuel to sell in Morombe. Charcoal production, which is particularly important to Mañono’s economy, has been significantly impacted by PA rules. There has been significant confusion among households that dominate local charcoal production regarding
procedures for gaining legal title to productive woodlots, and significant distress caused by the
seizure of oxcart loads of charcoal by police stationed along the road to Morombe.

In 2009, as urban food insecurity skyrocketed after the inception of national political
crisis, banditry became even more of a problem, and many villages were raided not just for
material possessions, but for food in storage as well. People living in villages throughout the
region discussed the threat of violence from cattle thieves and bandits as a major source of
worry. These risks are not new, but increased incidence reflects a region-wide increase in crime
and corruption since early 2009 when, with the support of military leaders, a political opponent
forced the sitting president, Marc Ravalomanana, out of office. Popular uprisings in major
Malagasy cities targeted food warehouses, grocery stores and food distribution networks, many
of which were controlled by Ravalomanana’s company, Tiko Madagascar. This caused
immediate and widespread food insecurity in urban areas and pushed desperate urban and peri-
urban people into the countryside where many villages keep food crops in storage and cannot
defend themselves against armed banditry. As a punitive measure by the international
community, the Malagasy government also lost most of its international aid, which normally
funds a majority of rural development projects, the military, public health services, and
conservation projects. These industries quickly lost access to operating funds and employees
went unpaid. This has led a severe economic crisis and has facilitated a rise in corruption among
unpaid government employees, including some gendarmes (members of the rural police force)
and military personnel who struggle economically without pay.

5.3 Research design, sampling, and data analysis

The data presented in this chapter derive from interviews and a food insecurity and
dietary diversity questionnaire (Appendix C; n=428 for Seasons 1 and 2) (Ruel 2003), and from
standard seasonal anthropometric measurements (n=692 measures in Seasons 1 and 2) (Frisancho 1990) collected among adults and children participating in the project. Focus groups were also conducted in each field site prior to data collection in order to guide the development of a culturally salient psychosocial stress survey (discussed in more detail in Chapter 6), and some of the ideas expressed in focus groups guide the present discussion. All analyses presented here are contextualized by oral histories, daily-unstructured interviews, and ethnographic observation.

5.3.1 Sampling

Data presented in this chapter were collected over two seasons (the rainy season, January-March 2009, and the dry season, June-August 2009). The sampling plan for each field site was based on an initial census performed prior to the commencement of Season 1 data collection. According to the census, Andalambezo and Ampijilova were small enough to allow exhaustive sampling, so the research team collected data among all individuals that were willing to participate in those sites. Because of its much larger size, I chose to use judgment sampling (Bernard 2000:176-178), and limited the sample to all voluntary participants who lived in households with children. Sampling was discussed in detail in Chapter 2.

When indicated below, statistical analyses were performed on mixed longitudinal data set. Data were collected over two seasons, and results are seasonally coded. Of the 395 participating adults whose results are included in these analyses, 182 adults (resulting in 364 measures and 92.2% of total n) participated in both seasons. Two adults (0.5%) whose results are included in these analyses participated only in Season 1 data collection, and 29 adults (7.3%) whose results are included in these analyses only participated in Season 2 data collection.
5.3.2 Dietary diversity recall

To collect data on dietary diversity, a research assistant asked individual adult participants to recall whether or not they consumed foods from specific categories in the previous week. Food categories included legumes, livestock, wild game, seafood, poultry, eggs, dairy products, domestic fruit, wild fruit, and vegetables. The dietary diversity recall was one component of a larger livelihoods and food insecurity questionnaire. Responses to the ten item dietary diversity recall were coded 0 for no (the item had not been consumed in the previous week), and 1 for yes (the item had been consumed in the previous week). Each participant’s dietary diversity score was then calculated by summing the total responses, and site-wise variation was assessed for each season using the Kruskal-Wallis equality-of-populations rank test in STATA 10.

5.3.3 Anthropometric methods

Among adult participants over 20 years of age (n=395 for Seasons 1 and 2), anthropometric measurements included stature in centimeters, weight in kilograms, and waist and hip circumference, both in centimeters. For children aged 36 months through 12 years (n=297 for Seasons 1 and 2), measurements included triceps, biceps, subscapular and suprailiac skinfolds measured in millimeters with Lange calipers, stature in centimeters, mid-upper arm circumference in centimeters, and weight in kilograms. The stature of all participants aged over 36 months was measured using a portable stadiometer, and waist, hip, and upper arm circumference were measured using a flexible tape measure. Weight was measured with a Tanita solar digital scale. Nutritional status was calculated for Season 1 and Season 2 using Epi Info epidemiologic analysis software with CDC 2000 references.
Adult BMI was regressed on predictor variables (season, dummy variables representing field sites, sex, and age decade derived from rank-ordered age, separated into ten-year increments) in STATA 10 statistical data analysis software. The Kruskal-Wallis equality-of-populations rank test in STATA 10 was used to assess (1) variation in adult stature, and (2) variation in the incidence of underweight adults (BMI<18.5) by site, by sex, and by season. For children aged 36 months through twelve years, raw data were converted to height-for-age (HAZ) z-scores, weight-for-age (WAZ) z-scores, and weight-for-height (WHZ) z-scores in Epi Info with CDC 2000 references and cut-offs. HAZ, WAZ, and WHZ (n=297) were regressed against predictor variables for children (season, dummy variables representing field sites, sex, and age).

5.4 Dietary diversity and nutritional status among adults and children

5.4.1 Dietary diversity

Individual dietary diversity scores represent the number of food categories from which individual respondents recall eating in the previous week. For each field site, individual dietary diversity scores for Season 1 and Season 2 were averaged and are presented by season and site in Table 5.1. In Season 1, mean dietary diversity across the three field sites (n=202) was 3.87 (SD=1.69). In Season 1, participants living in Andalambezo (n=75) had the highest average dietary diversity with a mean of 4.44 (SD=1.83), followed by Mañono (n=94) with mean dietary diversity of 3.56 (SD=1.40) and Ampijilova (n=33) with mean dietary diversity of 3.42 (SD=1.79). In Season 2, mean dietary diversity across all the three field sites (n=226) was lower at 2.73 (SD=1.84) for the mixed sample. Mean dietary diversity was lower in Season 2 than in Season 1 in all field sites; in Season 2 Andalambezo (n=79) had a mean dietary diversity of 2.70 (SD=1.87), Ampijilova (n=36) had a mean dietary diversity of 1.86 (SD=1.51), and Mañono (n=111) had a mean dietary diversity of 3.01(SD=1.84).
According to Kruskal-Wallis equality-of-populations rank test, the mean rank for dietary diversity varied significantly among villages in both Season 1 (H=13.960(2 DF), p=0.0009) and Season 2 (H=12.627(2 DF), p=0.0018). People living in Ampijilova had the lowest mean dietary diversity scores in both seasons, and these were significantly lower than Andalambezo in Season 1 and were lower than Andalambezo and Mañono in Season 2.

5.4.2 Adult nutrition

Mean adult BMI varies by site and by season, and is presented as a combined sample (Season 1 and Season 2) in Table 5.2 and by season in Table 5.3. Results of linear regression analysis on the mixed longitudinal (two measures) data set (n=385) show that among adults, living in the forest village of Ampijilova is associated with low BMI (β= -0.79, p=0.025) and age decade (β= -0.37, p=0.001). The incidence of underweight adults (BMI<18.5) varies by site and season (Figure 5.5) and by sex (Table 5.4), but this variation was not statistically significant in the mixed longitudinal sample. According to results of Kruskal-Wallis equality-of-populations rank tests, in Season 1, sex differences in underweight adults were only significant in Ampijilova (H=9.20(1 DF), p=0.0024), where ten of eleven underweight adults were women. In Season 2, sex differences in underweight were significant in Andalambezo (H=4.919 (1 DF), p=0.0026) where fifteen of eighteen underweight adults were women, and Ampijilova (H=12.68 (1DF), p=0.004) where twelve of thirteen underweight adults were women.

According to results of the Kruskal-Wallis rank test, adult stature is not significantly different among the three field sites (H=4.58 (2 DF), p=0.795).

5.4.3 Children’s nutrition

Among children, low Height-for-Age (HAZ) z-scores indicate risk of stunting (HAZ of at least 2 SD below the median of the reference population). Low Weight-for-Age (WAZ) z-scores
indicate risk of undernutrition (more than 2 SD below the median for the reference population). Low Weight-for-Height (WHZ) z-scores indicate risk of wasting (at least 2 SD below the median of the reference population) (WHO 1995, 2009). Mean HAZ, WAZ and WHZ calculations for boys and girls are presented by site in Table 5.5. The percentages of boys and girls in each field site showing evidence of stunting, undernutrition, and wasting are presented in Table 5.6.

Results of linear regression analyses of the mixed longitudinal (two measures) data set (n=256) indicate that among children, residence in Ampijilova is associated with low HAZ ($\beta=-0.638$, $p=0.009$), low WAZ ($\beta=-1.227$, $p=0.000$), and low WHZ ($\beta=-1.0$, $p=0.000$). HAZ is also negatively associated with age ($\beta=-0.30$, $p=0.00$) and male sex ($\beta=-0.456$, $p=0.007$). Likewise, WAZ is negatively associated with age ($\beta=-0.24$, $p=0.00$) and with male sex ($\beta=-0.49$, $p=0.004$).

5.5 Discussion

The analyses above find significant differences in dietary diversity and nutritional status between Mikea living within the forest versus people living on or near the edge of the Mikea Forest PA. The highest proportion of underweight adults and lowest BMI across the mixed longitudinal sample was observed at Ampijilova, where undernutrition (BMI<18.5) is gendered (Table 5.2). At Ampijilova, nearly all women, most of whom are of reproductive age, are underweight with BMI lower than 18.5. Low HAZ, WAZ, and WHZ are associated with residence in Ampijilova, where children aged 36 months to 12 years are, compared to children living in the two other sites, disproportionately underweight or wasted (Table 5.6). Similar rates of stunting among children were observed in all three field sites, indicating that children, regardless of location or ethnic identity, have experienced episodes of malnutrition or prior health problems during their lifetimes. In Ampijilova, over two-thirds of children age 3 through
were underweight, and half showed evidence of wasting. For children, being underweight is an indication of chronic weight loss, and current risk of severe acute malnutrition (wasting) and poor growth (stunting). Wasting indicates acute malnutrition, which is a recent or current process of extreme weight loss, and is normally a consequence of starvation or severe disease (WHO 1995). Children in Ampijilova were twice as likely than children living in other villages to be underweight and three times as likely to be wasted.

The nutritional evidence is especially worrisome because of the implications of nutritional stress for childhood development and risk of morbidity and mortality later in life. These results have both immediate and long-term implications for the health and wellbeing of Mikea living within the ZOC. Dietary diversity can be used to determine the adequacy or inadequacy of nutritional intake, and tends to correlate with other measures of food security (Hoddinott and Yohannes 2002). Food insecurity is a health problem that can be an acute or chronic stressor and has “pervasive effects” on human physical and mental wellbeing (Hadley and Patil 2006: 359). Findings in industrialized and developing countries show that the negative effects of food insecurity include a variety of physical and psychological problems related to growth and development, susceptibility to infectious disease, depression, and increased general risk of mortality (Black et al. 2008; Hadley and Patil 2006, 2008; Olson 1999). Because low dietary diversity specifically indicates a likelihood of micronutrient deficiency, it has important implications for child growth, risk of chronic disease, and risk of mortality among adults (Arimond and Ruel 2004; Ruel 2003).

Women who are stunted have an increased risk of complications during pregnancy and higher risk for both maternal and child mortality at the time of delivery (Black et al. 2008: 6). Women with low BMI are at high risk of having underweight infants due to fetal growth
restriction, and women with extremely low BMI and micronutrient deficiencies may experience poor lactation (Black et al. 2008: 7). Fetal growth restriction, low birth weight, and undernutrition in early childhood can affect gene expression and alter an individual’s metabolic functioning in ways that affect both neurological development and physiological responses to the environment later in life (Barker 2006; Black 2008). These physiological changes are a major predictor of risk of cardiovascular disease and Type 2 diabetes, even when dietary intake is adequate rather than excessive (Caballero 2005; Kuzawa 2007). In addition, the negative physiological effects of early life undernutrition are not limited to one individual but have generational consequences because the metabolic environment provided by the mother (with or without nutrition restriction during gestation) influences the metabolic development of her own children during gestation (Gallou-Kabani and Junien 2006).

Variation in nutritional status is not simply an effect of geography. Average adult stature does not vary significantly among the three sites, indicating that people who are adults now may have experienced exposure to comparable levels of nutritional stress during their growth and development. This, coupled with evidence of high rates of undernutrition and wasting among children at Ampijilova, implies that people born in the past three to ten years living in Ampijilova are experiencing significantly more nutritional stress than their parents did during childhood, at least relative to other people in the region.

5.6 Conclusions: A space of vulnerability

Food insecurity and nutritional status should be understood as embodied biocultural phenomena. Variation in people’s health and adaptability in particular historical and ethnographic contexts reflects cumulative social, political and economic relations as well as biological needs and constraints that are mediated by individual and group capacities for coping.
In the case of the Mikea Forest PA, rules about residence and resource use have restricted the mobility, livelihoods diversity, and ability to store wealth for people living in forest settlements. Mobility, diversification, and the ability to store wealth (especially in cattle) have long been means of coping with hardship for Mikea. Residency rules limit habitation to ZOC areas, which are populous and resource poor relative to other parts of the forest where Mikea prefer to forage, while at the same time rules limiting livelihood activities to small ZUC areas reduce subsistence opportunities and increase competition for limited forest resources, making them more scarce. Furthermore, in implementing regional environmental policies, Madagascar National Parks has ignored the fact that thousands of people live within park boundaries regardless of the locations of particular ZOC areas.

The removal or reduction of *hatsaky* maize farming from Mikea livelihood portfolios has had broad-ranging impacts (introduced in Chapter 4). Direct impacts include the elimination for many of the largest source of cash income, and greatly reduced access the most nutritious non-foraged staple food, while the officially recommended alternative of intensive manioc production is inaccessible and entails comparatively less pay-off. Mikea living within PA boundaries have also become more vulnerable to violence since the advent of the *hatsaky* maize ban. Because risk of cattle theft has become especially problematic, residents of Ampijilova have abandoned or hidden cattle ownership as a means to protect themselves from the attention of criminals. For Mikea who have abandoned even very small cattle stocks this has meant removing the most significant form of wealth storage for the sake of immediate security, leaving them with few saleable assets in times of hardship. These factors are directly related to PA policies, and have resulted in significant health variation in the region. The confluence of these factors has created what can be understood as a “space of vulnerability” (Figure 5.6), as they have increased the risk
of exposure to stressors, eliminated many means of coping with stressors, and increased risk of severe consequences resulting from stress, crisis, and shocks among Mikea.

Restrictive PAs have been and continue to be established in ways that involve the systematic denial of residents’ human rights in ways that exacerbate existing inequities and reduce people’s ability to maintain health and social wellbeing in the face of hardship (Colchester 2004). This is true despite an upsurge in the discourse of “people-oriented conservation,” “sustainable development,” and “people in parks” throughout the 1990s and 2000s, and diversity worldwide in the way that different types of PAs are managed in respect to human activities (Miller et al. In press; Nepstad et al. 2006). Even without geographic displacement, resource poverty can push livelihoods to a breaking point, while entrenched institutional bias can restrict access to legal means of seeking redress or compensation for loss of resources, violence or exploitation (Agrawal and Redford 2009; Cernea and Schmidt-Soltau 2003; Colchester 2004).

Assumptions about Mikea lifestyle, especially those related to the ecological adaptedness of foraging and primitivism of Mikea people, guided the development of rules about residence and resource use within PA boundaries and have justified a lack of attention to the experiences of Mikea in reference to resource poverty, livelihoods diversification, and socio-political marginalization, and have actually increased regional social and economic inequalities. The effects of inequities are particularly evident in times of increased environmental and social distress such as experienced in what informants across the region called the bain-tao lava, or “the long wounded year.”

As Hadley and colleagues (2009) contend, patterns of vulnerability are not static, and spaces of vulnerability can be reconfigured as economic, social and political relations change.
PA administrators and regional governing bodies should take action to possibly mitigate harmful effects of PA policies and ensure that the livelihoods, and coping capabilities, and long-term wellbeing of Mikea living within PA boundaries are not subjected to further risk. This action could include the socially appropriate and equitable inclusion of Mikea in matters of PA governance that affect them, the establishment of formal but flexible means of sharing information between local people and organizations involved in PA governance in specific locales, and coordination among governance agencies, regional legal bodies, and rural villagers across the region to help ensure that people experiencing violence or receiving extortive demands from outsiders can seek legal recourse without risk of retaliation.
Chapter 5 Tables

Table 5.1 Mean dietary diversity for adults.

Mean dietary diversity by site and by season for adults aged over 20 years

<table>
<thead>
<tr>
<th>Field site</th>
<th>Season 1 (n=202)</th>
<th>Season 2 (n=226)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>mean</td>
</tr>
<tr>
<td>Andalambezo</td>
<td>75</td>
<td>4.44</td>
</tr>
<tr>
<td>Ampijilova</td>
<td>33</td>
<td>3.42</td>
</tr>
<tr>
<td>Mañono</td>
<td>94</td>
<td>3.56</td>
</tr>
</tbody>
</table>

Table 5.2 Mean BMI by site for adult men and women.

Mean BMI by site for adult men and women aged over 20 years, combined results for Seasons 1 and 2 (n=395)

<table>
<thead>
<tr>
<th>Field site</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean BMI</td>
<td>S. D.</td>
</tr>
<tr>
<td>Andalambezo</td>
<td>20.33</td>
<td>1.42</td>
</tr>
<tr>
<td>Ampijilova</td>
<td>19.8</td>
<td>1.19</td>
</tr>
<tr>
<td>Mañono</td>
<td>20.21</td>
<td>2.09</td>
</tr>
</tbody>
</table>
Table 5.3 Mean BMI by site and by season for adult men and women.

Mean BMI by site and by season for adult men and women aged over 20 years (n=395)

<table>
<thead>
<tr>
<th>Field site</th>
<th>Season 1</th>
<th></th>
<th></th>
<th>Season 2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>mean BMI</td>
<td>S. D.</td>
<td>n</td>
<td>mean BMI</td>
<td>S. D.</td>
</tr>
<tr>
<td>Andalamezoe</td>
<td>32</td>
<td>20.15</td>
<td>1.50</td>
<td>34</td>
<td>20.47</td>
<td>2.99</td>
</tr>
<tr>
<td>Ampijilova</td>
<td>16</td>
<td>20.13</td>
<td>1.17</td>
<td>14</td>
<td>17.62</td>
<td>2.15</td>
</tr>
<tr>
<td>Manono</td>
<td>55</td>
<td>19.7</td>
<td>2.00</td>
<td>50</td>
<td>20.70</td>
<td>3.31</td>
</tr>
</tbody>
</table>

Table 5.4 Proportion of underweight adults by sex, season, and site.

Percentage of adult men and women aged over 20 years who were underweight by site and season (n=395 total)

<table>
<thead>
<tr>
<th>Field site</th>
<th>Season 1</th>
<th></th>
<th></th>
<th>Season 2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>underweight n</td>
<td>%</td>
<td>n</td>
<td>underweight n</td>
<td>%</td>
</tr>
<tr>
<td>Andalamezoe</td>
<td>32</td>
<td>5</td>
<td>15.6%</td>
<td>34</td>
<td>9</td>
<td>26.4%</td>
</tr>
<tr>
<td>Ampijilova</td>
<td>15</td>
<td>1</td>
<td>6.6%</td>
<td>14</td>
<td>10</td>
<td>71.4%</td>
</tr>
<tr>
<td>Manono</td>
<td>55</td>
<td>14</td>
<td>25.4%</td>
<td>50</td>
<td>13</td>
<td>26.0%</td>
</tr>
</tbody>
</table>

141
Table 5.5 Mean Height-for-Weight, Weight-for-Age, and Weight-for-Height Z-scores for boys and girls aged 36 months through 12 years in 2009.

Mean HAZ, WAZ, and WHZ by site for girls and boys aged 36 months through 12 years (n=297)

<table>
<thead>
<tr>
<th>Field site</th>
<th>Boys (n=133)</th>
<th></th>
<th></th>
<th></th>
<th>Girls (n=164)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean HAZ</td>
<td>SD</td>
<td>mean WAZ</td>
<td>SD</td>
<td>mean HAZ</td>
<td>SD</td>
<td>mean WAZ</td>
<td>SD</td>
</tr>
<tr>
<td>Andalambezo</td>
<td>-1.27</td>
<td>1.18</td>
<td>-1.50</td>
<td>0.74</td>
<td>-1.04</td>
<td>1.26</td>
<td>-1.48</td>
<td>1.74</td>
</tr>
<tr>
<td>Ampijilova</td>
<td>-2.1</td>
<td>1.87</td>
<td>-3.53</td>
<td>2.20</td>
<td>-2.9</td>
<td>1.34</td>
<td>-1.58</td>
<td>1.24</td>
</tr>
<tr>
<td>Mañono</td>
<td>-1.74</td>
<td>1.42</td>
<td>-1.86</td>
<td>1.54</td>
<td>-0.88</td>
<td>1.35</td>
<td>-0.94</td>
<td>1.24</td>
</tr>
</tbody>
</table>

Table 5.6 Proportion of boys and girls showing evidence of stunting, underweight, and wasting, by site.

Percentage of girls and boys aged 36 months through 12 years who show evidence of stunting, underweight, and wasting in 2009 by site (combined Season 1 & Season 2 samples) (n=297)

<table>
<thead>
<tr>
<th>Field site</th>
<th>Boys</th>
<th></th>
<th></th>
<th></th>
<th>Girls</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>stunting (low HAZ)</td>
<td>underweight (low WAZ)</td>
<td>wasting (low WHZ)</td>
<td>n</td>
<td>stunting (low HAZ)</td>
<td>underweight (low WAZ)</td>
<td>wasting (low WHZ)</td>
</tr>
<tr>
<td>Andalambezo</td>
<td>29</td>
<td>34.5%</td>
<td>27.5%</td>
<td>17.2%</td>
<td>45</td>
<td>28.8%</td>
<td>37.8%</td>
<td>17.8%</td>
</tr>
<tr>
<td>Ampijilova</td>
<td>17</td>
<td>35.3%</td>
<td>76.4%</td>
<td>58.8%</td>
<td>27</td>
<td>25.9%</td>
<td>48.1%</td>
<td>33.3%</td>
</tr>
<tr>
<td>Mañono</td>
<td>87</td>
<td>45.9%</td>
<td>40.2%</td>
<td>20.7%</td>
<td>92</td>
<td>22.8%</td>
<td>20.6%</td>
<td>11.9%</td>
</tr>
</tbody>
</table>
Chapter 5 Figures

Figure 5.1 Map of the Mikea Forest region showing the locations of Andalambezo, Ampijilova, and Mañono relative to boundaries of Parc National Mikea, the PA buffer zone (zone de protection), controlled occupation zones (zones d'occupation controlées, or ZOCs), mining concessions and major geographical features. Adapted from maps by Bram Tucker and FTM/Madagascar National Parks (2009). Forest extent from 1994 Landsat images processed by James Yount.
Figure 5.2 Sources of subsistence and income among residents of Andalambezo in 2009, represented as percentages of the market value of total farming, foraging, manufacturing, and wage labor.
Figure 5.3  Sources of subsistence and income among residents of Ampijilova in 2009, represented as percentages of the market value of total farming, foraging, manufacturing, and wage labor.
Figure 5.4 Sources of subsistence and income among residents of Mañono in 2009, represented as percentages of the market value of total farming, foraging, manufacturing, and wage labor.
Figure 5.5 Proportion of underweight, normal weight, and overweight adults by site and season.
Figure 5.6 A “Space of Vulnerability” formed by a complex confluence of economic, environmental, and socio-political factors.
CHAPTER 6

Testing pathways of embodiment and explaining variation in perceived health and morbidity

6.1 Introduction

The establishment of protected areas for conservation must be understood within broader political contexts, as a part of larger political and economic regimes (Brockington and Holmes 2010:1). Through the late 1990s, the “scaling up” and expansion of Madagascar’s conservation efforts coincided with the neoliberal restructuring of the Malagasy state, economy, and civil society in the pursuit of national economic development (Corson 2010: 577; Sachedina 2010). Conservation and development can be understood as “cognate” strategies for national economic development despite goals that sometimes appear contradictory or result in conflicts among different communities of specialists (Brockington and Holmes 2010: 23).

Madagascar’s development efforts, at least on paper, center on what Reardon and Vosti (1997) term a “critical triangle” of sustainable development that includes economic growth, poverty alleviation, and environmental sustainability. Malagasy PAs contribute to national economic development in four primary (and many subsidiary) ways. These primary contributions include ecotourism, biodiversity research, watershed preservation, and REDD (Reduced Emissions from Deforestation and forest Degradation) (Carret and Loyer 2003; Ferguson 2009). In addition, the establishment of new PAs is justified in terms of fostering sustainable rural development by inducing extensive agriculturalists to adopt better production technology and
intensified production strategies, purportedly achieving goals of poverty reduction and improving health and general welfare through market integration and increased crop yields.

However, the win-win scenario of sustainable development predicted by development agencies and advocates of international conservation is not easily realized, in part because the establishment of PAs hinges upon the reallocation of rights, benefits, and costs among different groups of people who use or benefit from natural resources. The benefits of ecotourism, biodiversity research, watershed protection, and REDD projects are disproportionately reaped on a national and global scale (Coad et al. 2008: 23; Ghimire and Pimbert 1997: 13), and by a national minority of ecotourism operators, Malagasy researchers trained and employed by conservation agencies and research teams, households practicing intensive riziculture in irrigated highland valleys, and water consumers in cities and towns that are supplied by springs located within protected areas (Carret and Loyer 2003: 7-8).

The cost of PA management is disproportionately borne on a regional scale by administrators of Madagascar National Parks who are expected to manage PAs and pay employees with the scant revenue generated through admissions fees paid by PA visitors.

Opportunity costs are heavily paid by tens of thousands of farmers and their families who, according to Carret and Loyer (2003: 8), lose an average value of 31 US Dollars per hectare under protection per year when rights to access to natural resources (for agriculture, pasturage, and fuel) are restricted. As an illustrative example, Hockley and Razafindralambo (2006: i-iii) estimate the global value of preserving the Ranomafana-Andringitra-Pic d’Ivohibe corridor in Madagascar (comprised of Ranamofana National Park, Andrigitra National Park, and Pic d’Ivohibe Special Reserve) is near 330 million US dollars annually, but the average value for
resident families living in forest frontier villages is negative, between -196 and -2,610 US dollars per household.

According to Ghimire and Pimbert (1997: 1-2), “the prominence of the protected area system in the context of rural or agricultural development is problematic because of its specific method of restricting resource use for local populations.” In terms of rural development, the establishment of PAs, and especially restrictive reserves and national parks, closes or limits access to commons on which foraging and extensive agricultural subsistence strategies depend. Restricting access to land and other natural resources increases resource scarcity among extensive subsistence producers (Sims 2009). Rural development policies seek to induce these rural producers to make a choice between (1) migration to urban or peri-urban areas or (2) adoption of new production technologies and intensive, market-oriented agricultural production strategies (Zeller et al. 2000:10). These policies are supported by the assumption that technical change increases crop yields (thereby increasing income among producers and laborers), lowers food prices for net food buyers, and reduces the amount of land needed for cultivation (Minten and Barrett 2007: 9).

In order for such transitions to benefit people who lose access to common lands, producers must have increased access to equitable financial institutions and credit markets, markets for seed, agricultural inputs, and agricultural outputs, reliable water sources for irrigation, and access to public services, including transportation, education, health services, and agricultural extensions (Dear and McCool 2010: 106-107; Zeller et al. 2000: 10). In the Mikea Forest region, institutional capacity building for rural development efforts has primarily focused on more densely populated areas to the east and southeast of the Mikea Forest, where transitions to intensive cotton, manioc, maize, rice, pulses, and sustainable biofuel and charcoal production
are supported by a number of national and international NGOs. Even so, throughout Madagascar, the accessibility of such infrastructure and social institutions has decreased significantly since the mid-1990s (Zeller 2000: 12), while the amount of land under protection has significantly increased.

In much of the Mikea Forest region, even the most basic infrastructure and support services are inaccessible to residents who are nonetheless compelled to comply with resource use policies or risk fines and the seizure of produced goods. In such situations, the effects of increasing resource scarcity can have ripple-like effects throughout impacted regions as rapidly changing human-environment interactions and changing markets for goods and labor influence demographic shifts and impact people’s ability to cope with novel environmental and social challenges. PAs are not just sites of biodiversity established to meet conservation goals, but are also sites of social interaction and social reproduction that can fundamentally restructure how people understand, use, and interact with social and biophysical surroundings (West and Brockington 2006: 609).

Even though the establishment of PAs for conservation and development is inextricable from broader political-economic processes, their precise effects on livelihoods and welfare, what are widely referred to as “social impacts” (West and Brockington 2006; West et al. 2006), tend to be extremely localized. Globally, there is immense variability in the documented positive and negative impacts of protected areas on the livelihoods and welfare of populations that live in and near them. Based on a synthesis of a number of case studies documenting social impacts of conservation-related displacement, Cernea (2000: 3662) and Cernea and Schmidt-Soltau (2003: 9-11), identify a number of “impoverishment risks” (Cernea and Schmidt-Soltau 2003: 11) associated with these processes that include landlessness, joblessness, homelessness,
marginalization, short- and long-term food insecurity, increased morbidity and mortality, loss of access to common property and social disarticulation. An additional impoverishment risk in terms of human population and general environmental health is associated with increasing resource depletion due to pressure from new permanent settlements surrounding PAs (Cerneanu and Schmidt-Soltau 2003: 19). From the perspective of rights reallocation, Mascia and Claus (2009: 20) expand this list to include disruptions and alterations to local modes of governance, economic wellbeing, health (including food insecurity, general health, nutritional status, psychological wellbeing, and health services access), educational opportunities, the availability of social resources and social support, and culture (cultural spaces and sense of place, knowledge, norms and values). Even though these effects are highly variable and localized (and even variable on a “local” scale [Cerneanu and Schmidt-Soltau 2003: 9]), a key issue for researchers remains understanding variation in effects within and between resident and neighboring communities.

In the previous chapter, I operationalized people’s ability to cope with environmental hazards, including PA policies, in terms of food insecurity and nutritional status, and asked to what degree people’s ability to cope with environmental hazards is negatively influenced by conservation policies that restrict economic and subsistence activities. In this chapter, I continue to addresses questions about the relationships of social change related to environmental policies and production of vulnerabilities among Mikea by testing four hypotheses related to the social production of health. Specifically, I test whether three related socio-cultural routes that can be understood as pathways of embodiment and have been identified by social epidemiologists, and whether participation in markets, identified by biocultural anthropologists as significant to
variation in health, are associated with variation in perceived health and perceived morbidity among adults living in Andalambezo, Ampijilova, and Mañono.

The related routes or pathways identified by social epidemiologists as salient to the production of health include a *social structural route* related to socioeconomic status (SES), an individual’s position in an ordinal social hierarchy based on measures related to wealth and social mobility; a *psychosocial route* related to individual experience of stress that results from exposure to a stressor, cognitive assessment of a stressor, and capacities to cope; and a *social-protective route* related to social support and perceived or actual social network resources. Social change related to environmental management and rural development policies include a range of social, material and symbolic effects on people’s lives and surroundings (West et al. 2006: 252), including those related to social structure (impacts on governance, hierarchies, and socio-economic stratification), exposure to psychosocial stressors (impacts on resource scarcity, food insecurity, and conflict resolution), and the availability of social support (affecting social disarticulation, and changing norms of social behavior, trust and reciprocity) (Cernea 2000; Cernea and Schmidt-Soltau 2003; Mascia and Claus 2009). As such, impoverishment risks and social effects of PAs are closely linked to social, psychological, and environmental processes that create the pathways of embodiment identified by social epidemiologists.

In recent years, anthropologists studying local experiences of social change in different national contexts have asked intriguing questions about relationships between social change, especially integration into markets for goods and labor, and human health and wellbeing. Despite a growing body of research, few general conclusions can be drawn regarding local relationships between market participation and variation in human health. According to Godoy and colleagues (2005c: 7), when people increase market participation or become more dependent on markets,
health may be observed to improve or worsen (Godoy et al. 2005c: 7). Changing patterns of market access and dependency are related to broader social processes, and are associated with people’s patterns of labor and consumption, with changing cultural norms, and expectations for health and affluence. Because of this, market participation can be conceived of in similar terms to SES, psychosocial stress and social support—as a potential social route by which variation in human health may be understood.

In this chapter, I seek to understand the relative importance of socio-economic status, social support, exposure to psychosocial stressors, and participation in markets to the production of health among residents of Andalambezo, Ampijilova and Mañono. Even though participants living in all three villages share history and identity and live in a relatively small part of the Mikea Forest region, there is a good deal of variation in the ways that people are experiencing social changes influenced by conservation policies and by guiding assumptions about rural development that I outlined above. This variation in the experience of social change is related to people’s geographic location, primary livelihoods, and accessible resource base (proximity to markets, quality of land, legal rights to resources), but also to relative statuses (economic, gendered, and age-based, for example), household characteristics, and a number of other factors that work to foster opportunities or furnish constraints that can influence people’s ability to cope with change.

First, I present and briefly introduce approaches used by social epidemiologists and biocultural anthropologists studying variation in human health and wellbeing in relation to processes of social and economic change. Second, I present methods of data collection and describe variables used in subsequent analyses. Third, I present two regression models that test the effects of variables related to locally salient measures of socio-economic status (SES),
psychosocial stress, social support, and participation in markets on subjective health outcomes. The first model predicts *perceived health*, which was measured by self-reported health (SRH) rankings among adults. The second model predicts *perceived morbidity*, assessed as recalled frequency and severity of experienced illnesses and somatic symptoms. I use the results of these models to test the following four hypotheses regarding relationships of perceived health and morbidity to variables related to proposed pathways of embodiment and market participation:

(H1) Perceived health is associated with high SES, high levels of social support, and a high degree of market participation.

(H2) Perceived health is negatively associated with exposure to psychosocial stressors.

(H3) Perceived morbidity associated with low SES, low levels of social support, and low levels of market participation.

(H4) Perceived morbidity is associated with high levels of exposure to psychosocial stressors.

Finally I discuss results in relation to theory, and then offer conclusions that relate to health, wellbeing, and ongoing processes of social change in the Mikea Forest region.

6.2 “Pathways of embodiment:” Bridging biocultural anthropology and social epidemiology

6.2.1 Anthropology, social change, and health

There is a great deal of variation in the health risks faced by people within any social group (Gakidou et al. 2000), and social scientists and epidemiologists have long investigated variation in health risk within and between human groups. One particular area of interest for anthropologists relates to exploring health transitions in the face of increasing integration of autarkic peoples into dominant national societies and regional or global markets (Byron 2003;
Researchers have focused on the ways that increasing integration into markets influences changes in and among socio-cultural systems, including traditional status hierarchies, family and household structures, intra-household resource allocation, social support, traditional ecological knowledge, and pluralistic healing systems (Janes 1999; Nguyen and Peschard 2003; Nyamongo 2002; Quinlan and Quinlan 2007; Reyes-García et al. 2008; Vandebroek et al. 2004). Researchers investigating market transitions have also examined changes in socio-environmental relations, including changing population density and resource competition, changing risk of exposure to pathogens and pollutants such as pesticides, and changing dietary, subsistence, and labor environments (Byron 2003; Janes and Chuluundorj 2004; Tanner 2005). Others have explored variation in nutritional status and food security, self-reported health, rates of illness, stress, mental health and emotional wellbeing (Blackwell et al. 2009; Byron 2003; Godoy and Cárdenas 2000; Godoy et al. 2005; Godoy et al. 2010; Hadley et al. 2009; Kunlein et al. 2004; Lourenço et al. 2008; Nyberg 2009; Reyes-García et al. 2005; Undurraga et al. 2010; Welch et al. 2009).

Like research on local social effects of protected areas, research on market transitions and health supports few generalizations about local relationships between social change and health. This is because a great many processes crosscut both, historical circumstances vary significantly among research sites, and because of methodological inconsistency and resultant statistical incomparability among studies (Byron 2003; Lu 2007). When autarkic peoples increase participation in markets or become more dependent on markets, health may be observed to improve or worsen (Godoy et al. 2005c: 7). Market participation can improve access to health-sustaining resources, present new opportunities for earning income, improve access to nutritious
food, provide access to education, medical care, and pharmaceuticals. However, shifting population density and developing a sedentary lifestyle can increase pathogen exposure, and contribute to increasing incidence of nutritional disease (Armelagos 1990; Byron 2003).

When environmental or rural development policies seek to induce agricultural specialization and intensification, people whose subsistence behavior is the object of these policies often face drastic changes in terms of human-environment interactions and in terms of relationships with markets and broader national society (Schroeder 1999; Lansing 1991). Intensification and specialization mean that the diversity of cultivated foods is significantly reduced, making people more vulnerable to drought, pests and food insecurity, and may increase exposure to environmental pollutants like pesticides (Calwell 1992: 54). People participating in markets acquire new language skills, attitudes and values through concurrent acculturation (Godoy et al. 2005c). As a result, health expectations, standards of hygiene, body image, and therapeutic practices may undergo profound changes with positive or negative impacts on individuals’ health (Janes 1999; Nyamongo 2002). Growing inequalities within countries and communities is associated with increased social conflict, negative affect, and stress behaviors, and has also been associated with increasing inequalities (gendered, age-related) within households in terms of allocation of emotional support and health-sustaining resources (Caldwell 1992: 56; Godoy et al. 2006; Sauerborn et al. 1996).

6.2.2 Embodiment and variation in patterns of health

One way that researchers have sought to overcome problems related to comparability and methodological inconsistency of the types described by Byron (2003) and Lu (2007) in investigating relationships between social change and health relates to identifying potential pathways of embodiment. This term refers to routes by which aspects of social existence are
related to variation in human perception and human biology (Krieger 1997, 2001). Embodiment, used by Krieger (1994) as a bridging concept to invoke the interplay of social life and the human body in social epidemiology, refers to “the impact of ongoing bio-contextual dynamics on physical form, functions, and capacities” (Worthman and Costello 2009). As a linking concept, embodiment can contribute to understanding the scaled and complex relationships among forms of social change, demographic and epidemiological patterns, and variation in the experiences, health and wellbeing of individuals in different contexts. Worthman and Costello (2009: 3) note that, “embodiment results from systematic obligate interactions of cultural and physical ecology with physiology across the life course” and is influenced by synergy among psychological, biophysical, and socio-cultural factors (Krause and Liang 1993). Patterns of variation in health both within and among different groups of people should therefore be identified not simply in relation to pathologies and individualized risk factors, but also in relation to socio-cultural pathways (involving interplay among cultural and physical ecology, human biology, the human body, and notions of health and healing) related to deeply socialized and historicized processes (Csordas 1990; Levins and Lewontin 1985; Morgan 1987; Turshen 1977, 1984).

6.2.3 Experience-contingent pathways of embodiment: Socioeconomic status, psychosocial stressors, and social support

Social hierarchy and socioeconomic status (SES)

Social epidemiologists have identified three broad but related routes by which social relationships may effect variation in human health. The first route is a social-structural route related to variation in individual health behaviors, the distribution of material resources, and access to public services across social strata. Epidemiologists have long observed considerable variation in health within societies according to socio-economic position, a person’s relative
“location” in an ordinal social hierarchy based on variables related to socio-economic status (such as income, wealth, educational attainment, status and occupation) (Williams and Collins 1995; Trostle and Summerfield 1996; Kelly et al. 1997; Deaton 2003; Nguyen and Peschard 2003; Charlton and White 1995). Higher socioeconomic position is generally associated with longer life, lower mortality rates, and better self-reported health (SRH). A health gradient tends to apply across all economic strata from lowest to highest (Charlton and White 1995; Kawachi et al. 1997). The most famous demonstrations of the health gradient come from results of the Whitehall Studies of British civil servants (Hemingway et al. 1997; Marmot and Smith 1997; Marmot and Wilkinson 2001) and the “Black Report” (DHSS 1980; Hunt et al. 1985; Smith et al. 1990) in the UK, and the Alameda County Studies in the US (Frank et al. 2003; Haan et al. 1987; Kaplan and Camacho 1983). It is true that in industrialized contexts, people with higher socio-economic status (SES) tend to be healthier, have access to more or better health services, and engage in fewer harmful health behaviors such as smoking or excessive alcohol consumption. But explanations for better health that rely on improved physical environment and individual risk factors associated with SES are incomplete explanations, as they only statistically explain about 30 percent of class-wise variation in health (Borg and Kristensen 2000:1020; Flinn and England 1997:33; Marmot et al. 1987; Nguyen and Peschard 2003: 449).

**Psychosocial stressors, cognitive mediation, and coping**

The second route by which social relationships influence variation in health is a psychosocial route related to exposure to stressors, cognitive responses to or assessment of stressors, and the ability of individuals to cope with exposure to stressors (Aneshensel 1992; Williams and Collins 1995; Gallo and Matthews 2003; Nguyen and Peschard 2003). Stressors
are external circumstances that challenge or obstruct an individual’s intended actions, behaviors, or coping abilities, while stress is internal arousal that emanates from discrepancies between what Aneshensel (1992: 16) terms “externalities” (encountered or experienced stressors), and individual characteristics including cognitive assessment of the stressor and coping capabilities. Social hierarchies create hazards in the form of chronic and acute stressors, focus risk of exposure to socio-environmental stressors, and exacerbate the effects of psychosocial stress (Aneshensel 1992; McEwen 1998; McEwen 2003: 5-6; Nguyen and Peschard 2003; Schell 1997). Psychosocial stress is fundamentally about the costs of living in a society, and for some members of society (those who are socially marginalized, experience chronic financial strain, food insecurity, unsatisfactory employment, race or class bias, or violence, for example) the costs may be particularly high (Pike and Williams 2006: 730).

A psychosocial framework directs attention to endogamous biological responses to human interactions, and understanding psychosocial processes can illuminate links between human bodies, cognitive processes, and the sociocultural milieu (Hruschka et al. 2006: 9; Krieger 2001: 669). Psychosocial stress appears to be a common trigger by which social structure exerts deleterious effects on the health of populations and individuals (Nguyen and Peschard 2003: 451) because the experience of stress directly impacts the function of immune, nervous, and endocrine systems. Psychosocial stress is strongly associated with physiological phenomena including immunosuppression and overactive inflammatory response (Flinn and England 1997: 34; McDade 2005: 509-510).
Social support and the quality of social resources

Other characteristics of a person’s social environment can be beneficial to coping with physical and psychosocial stressors, and can work to counter psychosocial processes that can negatively affect pathogenic and psychological outcomes (Cohen and Hoberman 1983; Coyne and Downey 1991; Stewart and Brown 1998: 1608). The third route by which social relationships can influence health is a potentially protective psychosocial-structural route related to characteristics of social networks, social cohesion, and the quality of social relationships, and the ways that these social characteristics influence a person’s access to material and non-material resources, and/or a person’s cognitive appraisal of a stressor to which they are exposed.

Cohen and Wills (1985) review two models proposed to explain a documented positive statistical association between health and social support. These include a “Main-Effect model” and a “Social Buffering model.” The difference between these two models is in the type of statistical effect that is observed. Evidence for the Main-Effect model comes from the demonstration of a statistical main effect of social support on health with no interaction variable (STRESS X SUPPORT) (Cohen and Wills 1985: 310). Support for the Social Buffering model is derived from the demonstration of a statistical interaction effect on health.

According to the Main-Effect model, social resources (understood to be synonymous with social support) promote health, and are beneficial to an individual regardless of the individual’s level of exposure to stressors or challenges (Cohen and Wills 1985; Fried and Tiegs 1993; Hennessey at al. 2009). An individual’s high level of perceived social support is associated with perceived stability and predictability of their environment, positive affect, and a high sense of self-worth and self-efficacy (Cohen and Wills 1985: 310). According to Taylor and Brown (1988), high “background” levels of perceived social support serve beneficial cognitive,
affective, and social functions by encouraging positive perceptions or even “illusions,” including perceptions of control, mastery and optimism.

The model of Social Buffering specifically relates perceived or observed social support, cognitive appraisal of a particular stressor, and coping ability (Cohen and Wills 1985). Cognitive appraisal is the perception of balance between the demands of a stressor and an individual’s coping resources. Cognitive appraisal determines which (and to what extent) potential stressors result in emotional, behavioral, and physiological responses, and appraisal of a stressor is conditioned by individual mediating characteristics and by cultural and biological context (Ice and James 2007: 16-17). Cumulative or chronic exposure to stressors can overwhelm a person’s problem-solving capacity, leading to a break-down of coping ability and ultimately resulting in feelings of helplessness, negative affect, and increased risk of poor health (Cohen and Wills 1985: 312). According to the buffering model, a person with knowledge or perception of social support are likely to appraise a particular stressor as less threatening and more controllable than a person without social support (Kikusui et al. 2006). Social support can guard against overloading an individual’s capacity to cope, intervening in the stress process by providing social problem-solving resources.

Both the Main-effect model and the Social buffering model are supported by evidence (Berkman 1984; Berkman et al. 2000; Coyne and Downey 1991; Crnic et al. 1983; Dressler 1985, 2001; Fried and Tiegs 1993; Hadley et al. 2007). But there have been important differences in how social support is conceptualized and measured in different studies (Berkman et al. 2000). According to Fried and Tiegs (1993), studies supporting the buffering model have most often measured qualitative aspects of social support in terms of an individual’s perceived availability of support resources or functions, while research supporting the main-effect model
has most often measured social support with multi-item structural support indices measuring relative degrees of social integration. The former conception of social support as access to material and non-material resources through social relationships resembles Bourdieu’s (1986: 248) notion of social capital as “the aggregate of actual or potential resources linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition,” and Lin’s (1999: 486) definition of social resources as “resources derived through one’s direct and indirect ties.” The latter conception of social support takes a more Durkheimian (1897) approach, conceiving of social support in terms of the relative integration of an individual into society. This is reflected in Coleman’s (1988, 1990) identification of social capital as a characteristic of membership in and sharing the norms of a “community” (broadly conceived), and Putnam’s (2000) identification of social capital as a beneficial characteristic arising from participation in voluntary and civic organizations.

6.3 Methods of data collection, key variables, and data analysis

As stated in the introduction to this chapter, I am interested in understanding relationships among social factors and variation in perceived health and perceived morbidity among Mikea participants. I test four primary hypotheses regarding associations between explanatory variables identified by social epidemiologists and biocultural anthropologists as salient to the production of health, and the predictor variables representing perceived health and perceived morbidity:

(H1) Perceived health is associated with high SES, high levels of social support, and a high degree of market participation.

(H2) Perceived health is negatively associated with exposure to psychosocial stressors.

(H3) Perceived morbidity associated with low SES, low levels of social support, and low levels of market participation.
(H4) Perceived morbidity is associated with high levels of exposure to psychosocial stressors.

Analyses presented in this chapter consider data collected among adult men and women living in Andalambezo, Ampijilova, and Mañono in 2009 using three primary research instruments. A seasonal livelihoods questionnaire (Appendix C) collected data on individual and household characteristics, material assets, income, livelihoods, social support, food insecurity, and participation in social events/cultural institutions. A seasonal health survey (Appendix E) collected individual self-report health rankings, as well as illness and symptom recalls and information about health-seeking behaviors. Using results from focus groups (Appendix B), a seasonal psychosocial stress survey (Appendix D) was developed specifically for this project to collect data on individual experiences of stressful events and worries related to subsistence and livelihoods, domestic interactions, violence, sorcery, exploitation in commerce, and corruption.

6.3.1 Health outcome variables: Perceived health and perceived morbidity

I measured individuals’ perceived health using seasonal self-reported health (SRH) ratings and measured individuals’ perceived morbidity using seasonal illness recalls. SRH ratings and illness recalls are two different measures that are frequently used in subjective health assessments. Perceived health and perceived morbidity are outcome variables used in the regression analyses that I present below.

An individual’s SRH ratings can capture the multidimensionality of health as a state experienced by an individual at particular points in time, as well as a process by which health is produced (Benyamini et al. 1999). Individual ratings are influenced by a person’s concrete experience of somatic symptoms, causal explanations related to explanatory cultural models, affective experiences and distress, and by a lifetime of observations of others and themselves.
Furthermore, SRH ratings are a good predictor of an individual’s health outcomes, often correlating highly with other subjective and non-subjective measures of morbidity and mortality (Benjamins et al. 2004; Benyamini et al. 1999: 477; Hunt et al. 1985; Kaplan and Camacho 1983; Miilunpalo et al. 1997; McGee et al. 1999). Variation in self-reported health has been associated with income, health behaviors (diet, smoking, alcohol consumption, physical activity, use of health services), psychosocial characteristics (positive and negative affect, stress and distress, perceived control), individual and neighborhood (group) socio-economic status (a function of occupation, education and income), social networks and social support (Bobak et al. 1998; Brief et al. 1993; Hunt et al. 1985; Litwin 2006; Malmström et al. 1999; Wang 2005: 155).

Illness and symptom recalls simply measure an individual’s perceived morbidity within a particular time frame. Biocultural anthropologists studying different dimensions of human health often use health recalls as a subjective measure of morbidity (Byron 2003; Tanner 2005). Because of relative ease of data collection, recalls are popular among researchers carrying out participatory rural appraisals for development projects and the evaluation of public health interventions. Recalls have been used in wealthy and relatively poorer regions to study changing health patterns in populations, gendered differences in health, and to study healthcare decision-making and other factors that influence the use of health services (Feikin 2010; Ferraro and Farmer 1999; Kroeger 1983; Ross and Vaughan 1986).

*Measuring perceived health: self-reported health (SRH) rankings*

Self-reported health rankings (two seasonal measures; n=295 total) were elicited with a single question: “How would you evaluate your health at this moment (*manaob akory ny fahasalamao henanizao*)?” Participants were asked to rank their health categorically as one of
three scaled responses: (1) as salama (healthy), (2) as mararyrary or salamalama (expressions meaning poor health), or (3) as tsy salama (unhealthy; no health) or marary (hurting; sick). Because I was interested in predicting health rather than predicting degrees of poor health, I transformed the three-category ranking into a dichotomous variable (health=1) that was used as the outcome variable in the logistic regression model that I present below. This was the first question asked in order to avoid bias due to the participant’s reflection on recalled illnesses or household health.

Measuring illness/symptom recall

Adult participants (two seasonal measures; n=289 total) were asked to list and describe the severity all of the health problems that they experienced since the beginning of the season, and then for each problem listed, the participant was asked if the condition had been resolved, if the condition had changed in some way but had not been resolved, or if the condition had continued unchanged and had not resolved. Scores for the variable HEALTH RECALL were calculated as follows: for each participant, the variable was weighted one point for each health problem listed, one point for each health problem that had continued unresolved, and one point if least one of the health problems that they listed was debilitating (resulting in significant behavioral change, or loss of work, or convalescence).

6.3.2 Explanatory variables

Individual and household variables

Individual and household variables were collected as a sub-section of the seasonal livelihoods questionnaire. Individual and household variables used in this analysis include sex, age, years of schooling, the number of people living in the household, total income, and village
of residence. I also included food insecurity in initial analyses because of potentially significant relationships of food insecurity to both health and stress.

*Socioeconomic status (SES)*

Socioeconomic status (SES) refers to an individual’s rank in an ordinal social hierarchy based on income, educational attainment, and occupation (Williams and Collins 1995; Trostle and Summerfield 1996; Kelly et al. 1997; Deaton 2003; Nguyen and Peschard 2003; Charlton and White 1995). In industrialized societies, these factors are closely associated with attained wealth, ascribed social status, and social mobility. Among Mikea, these factors are of less significance to wealth and social mobility because subsistence production is dominant, formal education is inaccessible for many, and “occupation” is incredibly diversified. For this analysis, I use the results of an inventory of material assets and livestock (from the seasonal livelihoods questionnaire, weighted for individual ownership) as a proxy estimation of SES for a few important reasons. First of all, earned cash income is valued locally but is highly variable as people participate unevenly and opportunistically in markets for goods and labor. Second, material assets, including houses, radios, cooking pots, oxcarts, spades, canoes and furniture have three-fold significance: they have daily functional value, they serve as a public signal of wealth status, and they can be sold or traded for necessities in times of hardship. Similarly livestock, and especially cattle, signal wealth status and clan membership, are necessary for bridewealth and for sacrifice in social ceremonies, and can be sold of traded in times of hardship.
Psychosocial stressors

For this project, I developed a seasonal psychosocial stress survey based on results of sex-segregated focus groups conducted in each field site prior to the commencement of season one data collection. Focus groups are described in Chapter 2 and Appendix B and sought to identify salient “idioms of distress” (Pike and Williams 2006; Nichter 1981). The eleven-item survey, based on criteria outlined by Pike and Williams (2006), asked participants to recall how frequently they encounter stressors related to domestic relationships, banditry and violence, social expectations and respect for one’s family, sorcery or “people with bad ideas,” corruption, and exploitive relations. For each particular question, participants were asked to give a ranked response to indicate how often they encountered the particular situation or scenario. Responses were weighted zero (0) points for “never” (tsy misy or tsy manao), one (1) point for “very rarely” or “only one time” (raiky, or raiky avao), two (2) points for “infrequently” or “sometimes” (kindraikindrai) and three (3) points for “often” or “very often” (maro). The psychosocial stress variable is the sum of each participant’s ranked responses.

Social support

Social support was assessed as a component of the seasonal livelihood questionnaire. In this analysis, the social support variable is a combination of two measures. The first represents the perceived availability of resources and functions that can be derived from a participant’s social network. Each participant was asked “How easy would it be for you to obtain the following favors from someone outside your household (Tsy mampaïino anao va ñy mampanao raha olol hafa (tsy an-trañonao ato) amin’ny raha mañaraky retoa)?” followed by a list of fourteen (14) favors (listed in section IV of Appendix C). Responses to each of the fourteen
items were scored as follows: zero (0) points for “impossible (tsy mety),” one (1) point for “difficult (sarotse),” two (2) points for “not difficult (tsy sarotse),” and three (3) points for “easy (tsimañahe or mora).” This measure captures the dimensions of social capital emphasized by both Bourdieu (1986) and Lin (1999), and is measured in terms of individuals’ perceived availability of social support, material support, or support functions within their social network.

The second measure was a six-item instrument that assessed the frequency of participation in or hosting of particular social ceremonies, including healing festivals (bilo), circumcisions (savatse), invocations of ancestors (soro) and rites of filiation (soron’anake). This measure reflects dimensions of social capital and social integration emphasized by sociologists (Durkheim 1897; Coleman 1988, 1990; Putnam 2000) including relative integration into society, shared norms and participation in social institutions.

Market participation and livelihood diversity

Both market participation and livelihood diversity variables were calculated from data collected on individual income and production. Market participation represents the percentage (0-100) of total production income derived from the sale or trade of produced goods, livestock, or wage labor. Livelihood diversity represents a sum of the categories of subsistence and income-producing activities (agricultural, terrestrial or marine foraging, market commerce, wage labor, etc.) in which a person participated in the previous season.

6.3.2 Statistical analysis

I constructed two regression models to test the four hypotheses, and results are presented below. In order to test whether or not perceived health (H1) is positively associated with SES, perceived levels of social support, and market participation, and (H2) is negatively associated
with exposure to psychosocial stressors, I constructed a logistic regression model. In this model, I used the dichotomous predictor variable of perceived health (0=not healthy, 1=healthy), and the explanatory variables of socioeconomic status, psychosocial stressors, social support, market participation, and livelihood diversity. I controlled for individual and household variables including sex, age, years of schooling, the number of people living in the household, total income, and village of residence, as well as food insecurity and nutritional status. I also tested for interactions between explanatory variables (SOCIAL SUPPORT X PSYCHOSOCIAL STRESSORS). I then refined the model guided by the results of the Akaike Information Criterion (AIC) and the link test, goodness of fit postestimation tests in STATA 10. Because sex was strongly associated with perceived health (see model below), I repeated this analyses separately for men and women.

In order to test whether or not perceived morbidity (H3) is negatively associated with SES, social support, and market participation, and (H4) positively associated with exposure to psychosocial stressors, I constructed a second regression model using ordinary least squares (OLS) multiple regression in STATA. As with the logistic model described above, I regressed explanatory variables of socioeconomic status, psychosocial stressors, social support, market participation, and livelihood diversity, and controlled for individual and household variables including sex, age, years of schooling, the number of people living in the household, total income, and village of residence, as well as food insecurity and nutritional status. I again tested for interactions between explanatory variables. I then refined the model guided by the results of the Akaike Information Criterion (AIC) and likelihood-ratio postestimation testing in STATA.
6.4 Results

Predicting perceived health: model selection

Table 6.1 presents a logistic regression model for perceived health. Initially, variables for age, sex, years of schooling, village of residence, household size, total income, food insecurity, nutritional status, SES, market participation, and livelihood diversity were regressed against the outcome variable, perceived health. Variables were then eliminated sequentially based on the minimum Akaike Information Criterion (AIC) (Akaike 1972, 1981) until the most parsimonious, or “best” model (Gagne and Dayton 2002) was identified (Sarton-Miller et al. 2003: 559).

According to AIC and the link test, controlling for age, years of schooling, household size, total income and food insecurity decreased the model’s goodness of fit, as did separate variables for social support and psychosocial stressors. Including variables of sex, village of residence, SES, market participation, and livelihood diversity all increased the model’s goodness of fit according to AIC and link test. An interaction variable that combined social support and psychosocial stressors (SOCIAL SUPPORT X PSYCHOSOCIAL STRESSORS) also improved the model goodness of fit, and was included. Good health is positively associated (p < 0.05) with male sex (β=0.860; p=0.001), residence in Mañoño (β=0.795; p=0.006), market participation (β=0.009; p=0.025), and livelihood diversity (β=0.176; p=0.024). SES and the interaction variable of PSYCHOSOCIAL STRESSORS X SOCIAL SUPPORT improved the explanatory power of the model and were positively associated with health, but these associations are not statistically significant.

This regression model demonstrates mixed support for H1: Perceived health is positively associated with SES, but this association is not statistically significant. Perceived health is also positively associated with the interaction variable PSYCHOSOCIAL STRESSORS X SOCIAL
SUPPORT, but this association is not statistically significant. This may indicate weak, but not statistically significant, support for the Social buffering model (Cohen and Wills 1985). Market participation is positively significantly associated with perceived health. This regression model is ambiguous in relation to H2.

Because male sex strongly predicted good health in this model ($\beta=0.860; p=0.001$), I repeated the logistic regression analysis separately for men and women. I found that when the sample is limited to female participants, only high livelihood diversity is significantly associated with good health ($\beta=0.341; p=0.004$). When the sample is limited to men, only residence in Manono is significantly associated with good health ($\beta=1.059; p=0.010$).

Predicting perceived morbidity

Table 6.2 presents a multiple regression model for perceived morbidity. Initially, variables for sex, age, years of schooling, village of residence, household size, total income, food insecurity, nutritional status, social support, psychosocial stressors, market participation, and livelihood diversity were regressed against the outcome variable, perceived morbidity. As with the logistic regression model predicting perceived health that I described above, variables were then eliminated sequentially based on the AIC until the most parsimonious model was identified. According to results of the AIC, controlling for age, years of schooling, total income, food insecurity, and nutritional status decreased the model’s goodness of fit, as did the inclusion of variables for SES and interaction variables. Variables for village of residence, household size, social support, psychosocial stressors, market participation, and livelihood diversity improved the model goodness of fit and so were included in the model. Higher perceived morbidity is significantly associated with village of residence (Andalambezo [$\beta=0.759; p=0.000$] and
Ampijilova [β=0.589; p=0.012]) and is negatively associated with social support (β=-0.022; p=0.004). Household size, market participation, livelihood diversity, and psychosocial stressors all contributed to the model’s explanatory power. Larger household size is associated with higher perceived morbidity, while market participation, livelihood diversity, and psychosocial stressors are negatively associated with morbidity, but none of these associations were statistically significant.

This regression model demonstrates partial support for H3: While it is ambiguous in relation to SES, perceived morbidity is significantly negatively associated with social support and market participation. This regression model does not support H4: Perceived morbidity is negatively associated with exposure to psychosocial stressors, but this association is not statistically significant.

6.5 Discussion

On this scale of analysis, I did not find support that any of the proposed pathways of embodiment are significantly associated with perceived health. Individuals’ socioeconomic status (assessed using an index of material assets and livestock), and the interaction variable of PSYCHOSOCIAL STRESSORS X SOCIAL SUPPORT were only weakly associated with perceived health, even though both of these variables did contribute to the explanatory power of the regression model that I presented. The model predicting perceived morbidity did reveal a significant main-effect of social support in protecting against perceived morbidity.

*Perceived health, sex, residence, markets, and livelihood diversification*

Health ratings are influenced by a person’s experience of symptoms, causal explanations related to explanatory cultural models, affective experiences and distress, and by a lifetime of observations of others and themselves (Benyamini et al. 1999). I predicted that better individual
health ratings would be positively associated with SES, perceived levels of social support, and market participation, and that they would be negatively associated with exposure to psychosocial stressors. Contrary to these predictions, I found that male sex, village of residence, market participation and livelihood diversification were significantly associated with perceived health.

Women may be more likely than men to perceive their health as “poor” or “sick” for a number of reasons. First of all, women experience health problems that men do not. Women frequently discussed ongoing health concerns related to childbearing, nursing, menstruation, candidiasis, and prophylactic pharmaceuticals (especially contraceptive injections), all health concerns that men do not share. Women also discussed anxiety and depression as health concerns, while men did not. Second, men’s and women’s daily lives and labor burdens are very different and may contribute to different somatic experiences and diverging perceptions of poor health or sickness. Third, women are more likely to care for another member of the household or family when they are ill, and due to increased cumulative experience observing and caring for people with illnesses, may be more sensitive to interpreting their own symptoms and affect as cause for concern. Fourth, gendered social and economic inequalities may account for some of the divergence between men’s and women’s perceived health. As an illustration of one type of gendered inequality in the research area, Figure 6.1 demonstrates income inequality between male and female participants based on data collected on individual income and subsistence production collected seasonally in 2009. Gendered social and economic inequalities are often the most pronounced inequalities on a local scale and are related to gendered social expectations, relative mobility, standards of wages, and responsibilities of child rearing.

Participants living in Mañono are significantly more likely to report good health than people living in Andalambezo or Ampijilova. This could be an effect of greater access to health
resources relative to people living in the other two villages. Men and women living in Andalambezo both complained of frequent illness attributed to low-quality water and eating undesirable foods, and discussed distance as a significant limiting factor in accessing clinics, hospitals and dispensaries; the Catholic mission at Andalambezo does not offer health care services and the nearest public hospital takes two days to reach on foot. Young nursing mothers living in Ampijilova complained of constant fatigue due to food scarcity and low dietary diversity. Mañono has a local family planning-oriented health center that is periodically staffed by a trained medical provider, and over fifteen semi-professional traditional healers in residence (compared to two at Andalambezo where traditional medicine is allegedly discouraged by mission staff and one at Ampijilova). Access to health-promoting resources is also facilitated by Mañono’s proximity to the city of Morombe which hosts public and private clinics, hospitals, dispensaries and a dentist, and purchased pharmaceuticals are readily available there as well.

Both market participation and livelihood diversity are positively associated with health. This may be (1) because healthy people are more capable of managing the responsibilities of diverse livelihood portfolios and are better able to maintain trade relationships over time, or (2) because increased income and marketing activities increase access to new technologies, knowledge, health care, and foods, all resources that can sustain health (Godoy et al. 2005) and livelihoods diversity buffers environmental and social risk (Little et al. 2001). In some contexts, market integration and sedentization can reduce livelihood diversification by inducing specialization for market niches (Ndema et al. 2001; Vadez et al. 2004) and can harm health by, for example, increasing exposure to pathogens and environmental pollutants associated with increasing population density and contemporary and prehistoric processes of urbanization.

While most participants in this study engage in and gain significant benefits from market activities, participants vary in the degree to which remain independent of markets. Based on data collected on individual income and subsistence production collected seasonally in 2009, Andalambezo is the most market dependent of all participating field sites, with 79% of total production oriented toward markets and 21% oriented towards subsistence. Because of a lack of high quality agricultural land, opportunities for market-oriented marine foraging, and a high reliance on labor and manufacturing, residents of Andalambezo are also the most dependent on purchased food, most of which is bought at the local mission or from mobile retailers from savanna villages. Of the three field sites, residents of Ampijilova participate in markets the least, with 34% of total production oriented towards markets and 66% oriented towards subsistence. The prohibition of *hatsaky* maize production has particularly affected the ability of people at Ampijilova to lucratively engage with markets and has increased local vulnerability to the harmful nutritional effects of food insecurity (discussed in Chapter 5). In contrast, 54% of production at Mañono is oriented towards markets and 46% towards subsistence, and residents of Mañono are not dependent on markets for food. The average annual diversity of livelihood portfolios at Mañono (4.0 productive activities per person) was much higher than Andalambezo (2.48 activities) or Ampijilova (1.75 activities) in 2009. Residents of Mañono are not market dependent, but rather lucratively and opportunistically engage with markets while at the same time maintaining self-sufficiency in terms of subsistence. This pattern may explain why residents of Mañono are more likely to perceive that they are in better health than residents of other field sites. Opportunistic market engagement, as a component of a diverse livelihood portfolio and a
means of risk buffering and accessing a higher amount of health-promoting resources including medical care, may contribute to self-perceptions of good health (Godoy et al. 2005; Little et al. 2001; Tschirley and Weber 1994; Vadez et al. 2004).

Perceived morbidity, residence, and social support

I predicted that perceived morbidity would be negatively associated with SES and perceived levels of social support, and positively associated with exposure to psychosocial stressors. I observed that people living in Andalambezo and Ampijilova perceive greater morbidity than people living in Mañono. This result is commensurate with the finding that people living in Mañono are more likely to feel that their health is good compared to people living in the two other sites, and indicates (although this point may seem intuitive) that lower frequency of illness/somatic symptoms may be a contributing factor to self-perceptions of good health. I also observed that perceived morbidity has a significant negative association with social support, lending partial support to H3. No other associations in the model presented in table 7.2 were significant.

The significant negative association of social support with perceived morbidity is theoretically interesting. First of all, this effect was not observed in the model explaining perceived health, demonstrating the importance of the cognitive aspects of perceived general health. Second, this result is a main effect (rather than the effect of an interaction variable) of social support in protecting against perceived morbidity. Interestingly, most studies that have supported a Main-Effect model as explaining the protective effects of social support have used variables based on multi-item structural support indices measuring relative degrees of social integration (Fried and Tiegs 1993) rather than one measuring perceived availability of social network resources and support functions (which is generally associated with a Buffering or
interaction effect). In the model that I constructed, the included variable for social support reflected two theoretically distinct conceptions of social capital that appear in social science literature on social support: one based on the concept of social network resources, and one based on social integration. This implies multidimensionality in the types of socially derived resources that promote health, as well as a potential pathway by which individual perceptions related to one’s social relationships and intersubjective aspects of culture that facilitate social integration function dynamically to protect individual wellbeing.

6.6 Conclusions

These results highlight the importance of considering local ecologies of health that emerge within broader political-economic contexts, and the potential difficulties in developing salient means of measuring what are actually very complex phenomena. Gendered and village-wise disparities in self-reported health and village-wise disparities in perceived morbidity beg important questions regarding patterns of access to health-promoting resources within families and throughout the region.

We see that participation in markets is positively associated with perceived health, but as one part of a diversified livelihood strategy rather than an alternative to diversification. I observe a significant main effect of social support on perceived morbidity, but only when social support reflects two different aspects of social life—the perceived availability of resources and functions obtained through social relationships as well as social integration reflected in participation in important pro-social group activities.

In examining localized patterns of perceived health and perceived morbidity among the three field sites, we see three linked site-based scenarios with implications for conservation and rural development in the region. In Andalambezo, residents are highly involved in markets and
are at the same time unable to maintain subsistence autonomy or a diverse livelihood portfolio. In Ampijilova, residents’ market opportunities, ability to maintain sufficient subsistence, and livelihood diversity are significantly restricted by PA policies. In both Andalambezo and Ampijilova, these patterns are associated with relatively poor perceived health and relatively high perceived morbidity. In contrast, residents of Mañono perceive that their health is relatively good and recall fewer health problems and somatic symptoms. They maintain a high degree of involvement in markets, self-sufficiency of subsistence, and maintain very diverse livelihoods portfolios despite some livelihood restrictions related to PA establishment.

Conservation and rural development policies that induce common property resource scarcity and/or promote the radical reconfiguration of production and market strategies (such as the encouragement of intensive manioc production near the Mikea Forest PA) as a means of adapting to this resource scarcity and achieving development run the risk of increasing vulnerability in the region. These processes reduce people’s opportunities to respond to social and ecological challenges, thereby reducing people’s ability to adapt creatively to changing circumstances. This is especially true in regions with extreme social and economic inequalities, with sizable disparities in access to infrastructure and institutional support services that may ease transitions for spatially displaced or newly resource-poor people, and where intensive, market-oriented agricultural production presents substantial agronomic and legal challenges.

These policies also have implications in regards to the availability of social support, which I have demonstrated as having a statistically significant protective effect on perceived morbidity. Social disarticulation is a documented social consequence of PA establishment that is linked to landlessness, political marginalization, and increased morbidity (Cernea 2000, 2003, 2006; Cernea and Schmidt-Soltau 2003; Coad et al. 2008; Schmidt-Soltau 2003, 2005). It occurs
when restriction of resource access induces displacement or causes extreme disruption of livelihoods (Cernea 2006). In processes of social disarticulation, communities are dispersed, patterns of social organization are dismantled, and kin groups and reciprocal social networks are scattered. As social resources become scarce, their protective effect against morbidity should diminish or disappear.

The establishment of Parc National Mikea and associated ideas about rural development may contribute to Madagascar’s national discourse of sustainable economic development and to satisfying former president Marc Ravalomanana’s “Durban Vision” to convert 10 percent of Madagascar’s surface area to formal protection. However, there are significant local consequences to the reallocation of rights, benefits and costs associated with PA establishment. In the Mikea Forest region, conservation and rural development policies may be associated with poor health and increased morbidity in the future.
**Chapter 6 Tables**

Table 6.1 Logistic regression model predicting perceived health.

<table>
<thead>
<tr>
<th>variable name</th>
<th>β</th>
<th>Standard error</th>
<th>z</th>
<th>p</th>
<th>95% conf. interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>male *</td>
<td>0.860</td>
<td>0.257</td>
<td>3.34</td>
<td>0.001</td>
<td>0.355 - 1.36</td>
</tr>
<tr>
<td>Andalalmezo reference category</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ampijilova</td>
<td>-0.279</td>
<td>0.409</td>
<td>-0.68</td>
<td>0.497</td>
<td>-1.082 - 0.525</td>
</tr>
<tr>
<td>Mañone*</td>
<td>0.795</td>
<td>0.289</td>
<td>2.75</td>
<td>0.006</td>
<td>0.229 - 1.361</td>
</tr>
<tr>
<td>SES</td>
<td>-0.020</td>
<td>0.014</td>
<td>-1.48</td>
<td>0.138</td>
<td>-0.047 - 0.006</td>
</tr>
<tr>
<td>Market participation*</td>
<td>0.009</td>
<td>0.004</td>
<td>2.25</td>
<td>0.025</td>
<td>0.001 - 0.018</td>
</tr>
<tr>
<td>Livelihood diversity*</td>
<td>0.176</td>
<td>0.078</td>
<td>2.25</td>
<td>0.024</td>
<td>0.023 - 0.329</td>
</tr>
<tr>
<td>Psych. stressors X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social support</td>
<td>0.004</td>
<td>0.005</td>
<td>0.84</td>
<td>0.404</td>
<td>-0.005 - 0.864</td>
</tr>
</tbody>
</table>

*a* The most parsimonious model excluded variables for age, years of schooling, household size, total income, food insecurity, nutritional status, social support and psychosocial stressors based on results of the AIC.

Log likelihood: -182.341 ; AIC: 380.91

Table 6.2 Multiple regression model predicting perceived morbidity.

<table>
<thead>
<tr>
<th>variable name</th>
<th>β</th>
<th>Standard error</th>
<th>t</th>
<th>p</th>
<th>95% conf. interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andalalmezo*</td>
<td>0.759</td>
<td>0.185</td>
<td>4.10</td>
<td>0.000</td>
<td>0.395 - 1.122</td>
</tr>
<tr>
<td>Ampijilova*</td>
<td>0.589</td>
<td>0.234</td>
<td>2.52</td>
<td>0.012</td>
<td>0.128 - 1.049</td>
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<tr>
<td>Mañone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household size</td>
<td>0.056</td>
<td>0.029</td>
<td>1.92</td>
<td>0.056</td>
<td>-0.001 - 0.113</td>
</tr>
<tr>
<td>Social support*</td>
<td>-0.022</td>
<td>0.008</td>
<td>-2.89</td>
<td>0.004</td>
<td>-0.037 - 0.007</td>
</tr>
<tr>
<td>Market participation</td>
<td>-0.004</td>
<td>0.002</td>
<td>-1.74</td>
<td>0.083</td>
<td>-0.008 - 0.000</td>
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<tr>
<td>Livelihood diversity</td>
<td>-0.068</td>
<td>0.043</td>
<td>-1.57</td>
<td>0.117</td>
<td>-0.154 - 0.017</td>
</tr>
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<td>Psych. stressors</td>
<td>-0.021</td>
<td>0.022</td>
<td>-0.94</td>
<td>0.348</td>
<td>-0.065 - 0.023</td>
</tr>
</tbody>
</table>

*a* The most parsimonious model excluded variables for age, years of schooling, total income, food insecurity, nutritional status, SES, and interaction variables based on results of the AIC. AIC: 380.91

R-squared = 0.1009

Adjusted R-squared = 0.0786
Chapter 6 Figures

Gendered inequality in income (the market value of produced goods and labor) by sex (n=299)

Income: market value of goods and labor produced by an individual

Figure 6.1 Gendered income inequality between male and female participants in 2009.
CHAPTER 7
Pluralistic healing practice, health seeking, and disparities in access to healthcare resources

7.1 Introduction

Advocates of international conservation argue that environmental regulations, including the establishment of PAs, are essential to ensuring the sustainability of the Earth’s biological systems, and necessary to ensure human health and welfare (Wilkie et al. 2006:247). Djoghlaf (2008: 1) discusses PAs as “life’s buffer” against large-scale environmental challenges including climate change and biodiversity loss. However, health benefits purportedly associated with PA establishment are often discussed in a diffuse manner, making claims about such benefits difficult to verify. On a global scale, PAs are discussed in association with positive upstream benefits of “environmental services” (produced by natural capital that is preserved in particular localities) to planet-wide human health (Boumans et al. 2002; Costanza et al. 1987: 8; Daly et al. 1997; De Groot et al. 2002; Foley et al. 2005; Giannecchini 1993). Global-scale health benefits are also presented in reference to the practice of biodiversity prospecting (or bioprospecting) for unique genetic and biochemical resources that can be used to derive new products, especially therapeutic technologies, from natural sources that are assumed to be more concentrated in biodiversity-rich areas (Alves and Rosa 2007: 4; Fabricant and Farnsworth 2001; Simpson 1999). Caan (2005) associates international environmental management and PAs with human psychological wellbeing through “ecotherapy,” therapeutic contact with wild species and natural spaces. Other authors associate PAs with the satisfaction of human psychological and psycho-aesthetic needs related to “biophilia,” a love of living things or living systems (Giannecchini
On a local scale, advocates of formal protection argue that health benefits are associated with providing ecosystem services to communities living near PAs (Butler and Olouch-Kasura 2006; Daily et al. 1997). Others cite general poverty alleviation through rural development (discussed in Chapter 6), and with the provision of healthcare services and sanitary infrastructure by governments or by conservation and development groups (CI 2011; Wilkie et al. 2006). In terms of ecosystem services, however, such statements neglect to acknowledge that people who are dependent on natural resources for foraging or extensive agriculture directly benefit from the biophysical environment without political intervention. Furthermore, when spaces that encompass what Daily (1997) and de Groot and colleagues (2002: 393) term “natural ecosystems” are transformed into PAs, environmental benefits to local foragers and agriculturalists may actually be reduced. As discussed in Chapter 6, the provision of public health resources cannot be taken for granted; if health services and sanitary infrastructure are not effective due to lack of funding or personnel, or are not accessible to those whom they are intended to serve, they cannot be assumed to improve people’s health.

Generalized statements regarding positive benefits to human health and welfare mask significant social and economic inequalities that exist across scales, within regions, and even within particular localities affected by the establishment of PAs (Kremen 2005; McCauley 2006: 27). These inequalities are related to and exacerbated by processes of social change that are characteristic of rural development, particularly in terms of changing organization of labor and changing ways in which environmental resources are governed (Leacock 1982). These inequalities can be assessed in terms of differences in the accessibility of material and social
resources (including healthcare resources), in terms of relative political power, rights, and legal protection, and in terms of disparities in health and health-seeking behavior. PAs are most often established in the most geographically remote regions within countries, and people living in such areas are likely to be asset-poor and politically marginalized relative to their national societies. These are also areas where resources may be less abundant or less productive, where households rarely have access to markets and are the last to be provided with social services (Wilkie et al. 2006: 427).

In reviews of research on “impoverishment risks” (Cernea and Schmidt-Soltau 2003: 11) and the social impacts of protected areas, health (including morbidity, mortality, and nutritional status) and health care (access to public services) appear as points in long lists of potential risks facing affected communities (Mascia and Claus 2009; West and Brockington 2006; West et al. 2006). However, noting social impacts says little about the social processes that contribute to changing patterns of health in conservation contexts. In addition to intimate associations with livelihoods and subsistence, changing patterns of health are also linked to the accessibility of traditional and biomedical healthcare resources and to relationships between local systems of health and healing, individuals’ health-seeking behavior, and broader patterns of socio-cultural transformation (Wilkie et al. 2006: 247).

“Traditional medicine” refers to professional (but non-biomedical) healing systems that have been incorporated into broader national medical systems (examples include Chinese medicine, Indian ayurvedic medicine, Arabic unani medicine), as well as other “non-conventional” medical systems that are neither incorporated into nor endorsed by mainstream medical practice (Alves and Rosa 2007:1). Even though biomedicine is culturally dominant on a global scale, most people practice medical pluralism, a situation in which multiple therapeutic
systems, including biomedicine, household healing, various forms of traditional healing, and a diversity of health behavior patterns co-exist (Minocha 1980:217; Nichter 1980: 225; Pescosolido 1992: 189). Over 80% of people living in developing countries depend to some degree on traditional modes of healing (Anyiam 1995: 325; Berman 1996: 3; Tabuti et al. 2003: 119). This is due to the fact that developing countries are more likely to have dysfunctional or inaccessible public health systems, and due as well to the fact that traditional modes of healing are often more affordable than biomedical care and may be better equipped to provide care that is personally-oriented and is effective in treating common and culturally-specific health problems (Betti 2004; Tabuti et al. 2003: 119).

Like health, healing is contingent on health ecologies, which are constituted by local socio-environmental dynamics and normative health-related behaviors, as well as by phenomena that cross social scales and influence the quality of lived social and physical environments, the availability of a diverse array of material and non-material resources, and people’s capabilities in terms of knowledge and resource access (Honari 1999: 21). Like other cultural systems, traditional healing systems are not static; they undergo transition along with changing human-environment interactions involving changing patterns of labor and resource use and changing socio-economic arrangements (Anyiam 1987: 801). As the “environmental health nexus” (Harper 2002: 27) shifts, traditional healing systems adapt to the emergence of new health problems and the changing accessibility of technology and other health-sustaining resources. Traditional healing systems are one domain in which practitioners and laypeople alike adapt to broader socio-cultural change, reinventing practice as a means of adapting to new constraints and opportunities (Anyiam 1987: 802; Harper 2002: 27).
Like people in much of the world (Janes 1999; Nyamongo 2002), Mikea and other southwestern Malagasy maintain a pluralistic system of healing to manage an array of health problems. That is, they take advantage of diverse resources, including household knowledge, formal or professional traditional modes of diagnosis and healing, and biomedical technology and expertise in order to satisfy their healthcare and health maintenance needs. Traditional medical practice ("Gasy medicine," called *aoly gasy*, or *fanafody gasy*) is not endorsed or practiced by biomedical caregivers working in the Mikea Forest region. Rather, traditional Malagasy healing is practiced by members of a household and by local healers. It is sometimes preferable and often the most accessible option to address health problems. Different modes of observational, divination-based, and spiritual diagnosis, plus medicines made from foraged plants and trees, and sympathetic or symbolic magic are all important to traditional medical practice and are contingent on an expert knowledge base and access to forest resources. But new forms of environmental governance are altering access to these health resources in the Mikea Forest region while access to biomedicine, potable water sources, and other public health resources is not increasing.

In Chapters 5 and 6, I examined variation in nutritional status, perceived health, and perceived morbidity relative to environmental factors and people’s adaptability in the face of social changes associated with the establishment of *Parc National Mikea*. These social changes include changing patterns of market access, restricted livelihoods due to induced land scarcity and prohibition of particular subsistence activities, and increased banditry and exploitation. In this chapter, I explore how Mikea living in Andalambezo, Ampijilova and Mañono conceptualize and manage health, and examine patterns of variation in reported health-seeking behaviors among people living in the three sites. I first provide background information on local healthcare
resources available to residents of Andalambezo, Ampijilova and Mañono. Then, I describe
research methods and present results of analyses in reference to the four research questions:

(1) How do participants living in Andalambezo, Ampijilova, and Mañono conceive of
health and healing?

(2) What is the relative significance of traditional modes of healing versus biomedicine
within the pluralistic medical system?

(3) How do people decide among different therapeutic options?

(4) Is health-seeking behavior significantly gendered among participants?

Next, I discuss results and answer the four research questions outlined above. In conclusion, I
discuss implications for participants’ maintenance of pluralistic healthcare strategies, in relation
to increasing inequalities, and in relation to Mikea Forest environmental governance.

7.2 Local healthcare resources

Health promoting resources include local social and environmental characteristics that
promote good health, relate to exposure to pathogens and non-pathogenic health hazards, as well
as health-related knowledge and resources directly related to healthcare. Residents of
Andalambezo, Ampijilova, and Mañono, like people throughout rural Madagascar, maintain
pluralistic healing practices that include self-diagnosis and self-medication with traditional oral
or topical medicines or purchased pharmaceuticals, consultation and medicines obtained from an
array of local traditional healers, and consultation and medication obtained from nurse
practitioners and doctors working in public and private clinics. Ingredients from plants and trees
that are used to make traditional medications are usually gathered in forests and anthropogenic
areas (fallow fields, roadsides, etc.), and are rarely grown in household gardens. Other ingredients used to make traditional medicines (tobacco, oil, vinegar, kerosene, alcohol, salts) are purchased from vendors in markets or shops. People living in Andalambezo may purchase antibiotics and paracetamol from a mission shop, and people in Mañono may purchase pharmaceuticals and condoms from two small shops. Other pharmaceuticals must be purchased in other towns with stocked shops, large stores, or dispensaries, or at weekly markets held in larger villages.

Mañono is the only village of the three with a local health center, a Centre de santé de base I (CSB I) that focuses on family planning and is visited quarterly by a nurse practitioner who administers prophylactic injections to women. None of the field sites has local access to general health centers, CSB II, but all have resident traditional healers. Tromba are spirit mediums that are often called upon to diagnose illnesses and recommend courses of therapy through spirit possession and spiritual consultation. Ambiasa are diviner-healers and astrologists. Ambiasa diagnose health problems based on a patient’s description of symptoms as well as through various forms of divination that vary based on the particular training that the ambiasa received as an apprentice. While ambiasa are primarily male and tromba majority female, matron are always female. Any particular healer may occupy more than one professional title. For example, ambiasa are frequently also tromba. Likewise, a matron may be an ambiasa or a tromba or both. Andalambezo has a resident tromba medium and a matron midwife who is also an ambiasa diviner-healer, both of whom make health consultations. Ampijilova has one resident ambiasa (but residents can visit other Namonte Basin villages to consult with other traditional healers), and Mañono has over 15 traditional healers in residence.
People living in larger villages and towns near Route National 9 have access to a larger array of public, private, formal and informal options for meeting health care needs, including public health centers offering free consultations and low-cost general care, family planning, and treatment for tuberculosis and leprosy, at-cost public dispensaries for prescription medications, private medical clinics offering fee-based general care, private for-profit dispensaries, and practitioners of traditional Malagasy healing. People who live in villages at great distance from larger towns utilize health care available at public health centers or private clinics rarely in comparison. Rather, they most frequently rely on local resources, including plant-based medicines, household diagnostic and curative knowledge and local semi-professional healers.

7.3 Methods of data collection, key variables, and data analysis

In order to determine how participants conceive of health and healing (Q1), and to determine the relative significance of traditional modes of diagnosis and healing versus biomedicine (Q2), I used data collected in four gender-segregated focus groups conducted in 2007 in the Masikoro village of Andranodehoke and the Mikea village of Ankililale, in semi-structured interviews with traditional healers (n=6) in 2007 and 2009, and with Mikea and Masikoro villagers in 2007 (n=7), and in semi-structured and unstructured interviews conducted with participants living in Andalambezo, Ampijilova, and Mañono in Season 1 of 2009 (n=20). These focus groups and interviews were conducted in Malagasy with the assistance of a Malagasy research assistant who was also fluent in French. I used qualitative content analysis (Hsieh and Shannon, 2005) to identify shared conceptions or definitions of health and ill health, to understand pluralistic healing strategies in this context, and to construct an ethnographic model of illness causation, or etiological model, that I present and explain in the results section below.
In order to determine *how participants decide among different therapeutic options* (Q3), I first used data collected in interviews with district public health program administrators, other public health professionals, physicians, and nurses (n=8) in 2007 to identify biomedical professionals’ explanations of traditional modes of healing and health-seeking behavior\(^5\). I then treat this explanation as a hypothesis, which I test using regression analysis. Specifically, I test administrators’ and clinicians’ explanation (discussed below) that formal education is associated with increased utilization of public health resources and other forms of biomedical care. In this analysis, I explore associations among a dichotomous predictor variable BIOMED_CONSULT (the variable was coded 1 if an individual had consulted a biomedical health care provider [doctor, nurse, nurse practitioner] to treat a health problem experienced in the previous season and coded 0 if they had not), and individual and household variables including sex, village of residence, years of formal education, social support, income quartiles, and market participation collected in seasonal questionnaires in 2009, and perceived health and perceived morbidity (discussed in detail in Chapter 6) collected with seasonal health surveys in 2009 (n=300).

Because I was curious about health seeking behavior related to the use of traditional as well as biomedical practitioners, I performed a second logistic regression analysis in STATA 10 with a dichotomous predictor variable ANY_CONSULT (the variable was coded 1 if an individual had sought any type of expert consultation [traditional or biomedical] to treat a health problem experienced in the previous season and 0 if they had not), and the same set of independent variables used in the previous analysis (individual and household variables

\(^5\) This sample does not include all of the medical professionals working in the vicinity of the north and central Mikea Forest region, but it does include a great many who work in rural settings, small towns and larger towns that participants in this research project would access.
including sex, village of residence, years of formal education, social support, income quartiles, market participation, perceived health, and perceived morbidity).

I wanted to understand more about the individual healthcare decision-making process, i.e. how people decide to take health-seeking action. So in order to further address Q3, I used a grounded ethnographic approach to develop a preliminary healthcare decision model (Beck 2005; Garro 1998; Gladwin 1989; Gladwin et al. 2002; Ryan 1998; Young 1981). Ethnographic modeling of health care related decision-making is based on two primary assumptions. First, a researcher must assume that individuals are purposive actors, in this case seeking wellbeing through healthcare. Second, following Garro (1998: 319), that “in recurring decision situations where alternate courses of possible action exist, members of a group come to have shared understandings, a common set of standards concerning how such choices are made.” Third, that by asking what people do, and considering what people say about why they do what they do, one may identify ways in which both endogenous factors (shared experiences, culture) and exogenous factors (socio-economic factors, social structural, or opportunity-related factors) influence decisions about health-seeking behavior (Young 1981). To develop a decision model, “decision criteria” are identified from an initial sample of interviews. Decision criteria can be thought of as hypotheses that are based on participants’ verbal reports, and concern conditions under which a person selects a particular decision option (Beck 2005: 243; Gladwin et al. 2002: 527). Based on subsequent interviews with members of a group, a researcher can refine the model to determine how and why individuals make particular choices in relation to particular decision criteria. The decision model is tested and refined by comparing participant choices to the decision “rules” (Beck 2005).
The model that I present here was based initially on interviews with people living in the villages of Andranodehoke and Ankililale in 2007, and was refined in 2009 based on results of unstructured interviews conducted concurrently with the collection of health survey data among women living in Andalambezo, Ampijilova and Mañono (n=20). A female research assistant fluent in Malagasy and French collected health survey data and assisted these interviews, which involved asking why particular actions were chosen in regards to particular health problems.

The sample on which the model is based is limited to women and is relatively small for two reasons. First, it includes only women because (due to local gender norms) women felt more comfortable discussing healthcare decision making in my presence than men did. I had intended to expand the sample and include men over the course of Season 2 data collection, but was compelled to return to the US due to events outside of my control. In the course of future research I hope to expand the sample and include men, eventually developing a more sophisticated “ethnographic decision tree model” (Gladwin 1989) that can be used to predict healthcare decisions in a variety of contexts with a high degree of reliability. Because the sample considered is relatively small and included only women, it cannot at this time be generalized across the region. However, the preliminary model that I present is useful in understanding the relative influence of different factors on women’s healthcare decisions in Andalambezo, Ampijilova and Mañono.

Because I previously observed significant gendered disparities in adult nutritional status (Chapter 5), income, and in perceived health status (Chapter 6), I also wanted to determine if patterns of health seeking behavior might be similarly gendered. In order determine whether or not health-seeking behavior is significantly gendered among Mikea participants (Q4), I used
data collected in seasonal health surveys (n=300) to compare frequencies of men’s and women’s health-seeking behaviors using the chi-squared test in STATA.

7.4 Results

7.4.1 Q1: How do Mikea participants conceive of health?

Mikea participants have a great many terms to describe states of health (salama) and poor health (tsy salama). For example, if someone describes their health status as mañelo, they are saying that they do not feel well but that the problem, such as a headache or a mild fever, is not severe. Marary, which also means hurt or pain in relation to an injury, describes a state of illness or injury that causes significant discomfort and a disruption of one’s normal activities, generally for a prolonged period. While someone may be healthy and mañelo, if someone is marary, they are unwell. Miopake is a third term sometimes used to describe a state of unhealthiness. In the case of miopake a person is often so ill or wasted from illness that that they cannot do anything at all. Mikea participants identify their own and others’ health problems relative to feeling good or healthy, and by their impact on physical and psychological functioning in terms of an individual’s ability to carry out their daily responsibilities.

When I asked participants, “How do you know if someone is sick (Olo manao akory ñy atao hoe marary)?” I received many answers. While some people followed by listing somatic symptoms such as high fever or prolonged periods of diarrhea, most began with details regarding the consequences of those symptoms relative to normal daily functioning and responsibilities. These responses included statements such as these from Masikoro-Mikea women in Mañono in February of 2009 and Masikoro women living in Andranodehoke in July of 2007: “I know that I am sick if I cannot eat,” “I am sick if I cannot eat the food that others eat, but only vary sosoa (watery, soft rice porridge),” “Once I was sick with fany (pronounced dizziness or vertigo) and I
could not walk properly so I could not leave my bed to do anything.” “I know that I am sick if others must do my work for me,” “I am sick if I cannot work,” “I am sick if I crave broth and chicken that someone else must cook for me,” and “I am sick if I cannot leave my bed because I am weak.” When asked how one would identify that another person in the town or household was sick, the father of a large family in Andalambezo told me “When children are sick, they do not behave like other children. They don’t play, but just lie still.” Many people told me that one might identify a sick person because they cannot behave in a normal fashion; a sick person may stay in bed, may be unable to work, cannot cook, may become crazed (adala), irrational, depressed or antisocial, or may flee from their home into the forest. There seems to be a clear conceptual line between the presence of physical symptoms (cough, headache, back pain) and the state of being sick (marary) or having poor health (tsy salama).

7.4.2 Q2: What is the relative significance of traditional healing versus biomedical healthcare?

Pluralistic healing practice

Throughout the Mikea Forest region, including among residents of villages that are in relatively close proximity to biomedical services, the most commonly used healthcare is found in the home, among family members, where ecological and health-related knowledge is shared, initial diagnoses of health problems occur, and decisions about further care seeking are made. For relatively minor or common health problems that are not severe enough to impact daily functioning, diagnosis and treatment may take place completely within the household, and may be administered by oneself or a family member. Although there is widespread agreement that elder members of a household, especially women, usually have more knowledge of diagnosis and healing than other household members due to life experience, even young children of eight
or nine years can identify and discuss preparation of plant-based medicine and the use of some purchased pharmaceuticals to treat toothache, skin irritations, various stomach problems and fever, and can identify medicinal plants and trees in the forest or fallow fields. Biomedical knowledge and technology are important elements in Malagasy pluralistic health care strategies. Adults frequently discuss self-medication with pharmaceuticals that are available for purchase at weekly markets in larger towns, including vitamin supplements for children, paracetamol (acetaminophen), nivaquine (chloroquin), and various antibiotics (most frequently tetracycline, amoxicillin, and ampicillin). Table 7.1 demonstrates Malagasy medical pluralism in practice, presenting information from seasonal health surveys on health-seeking behaviors (household, traditional, biomedical, and combinatory) among men and women living in Andalambezo, Ampijilova and Mañono who recalled experiencing health problems in 2009 (n=295). Table 7.2 presents this same information, but as percentages.

For health problems that cause significant inconvenience, persist, or challenge the knowledge and experience of the household, semi-professional traditional Malagasy practitioners (ambiasa, tromba, matron) frequently carry out diagnosis and etiological determination. Aside from household healing, these healers are one of the most important health care resources for people living in very rural or geographically isolated areas who may be particularly cash poor and lack easy access to biomedicine and markets. Ambiasa, tromba and matron may diagnose and offer treatments for some of the same ailments as physicians and nurses working in public or private clinics, but are distinguished locally from physicians and other biomedical caregivers by the type of knowledge they are said to possess—experiential and experimental knowledge as opposed to scientific knowledge of physicians, according to one elder ambiasa living in Vorehe in 2007. Traditional Malagasy healers can be further distinguished from most biomedical...
caregivers in the region in that they tend to be culturally, linguistically and socially integrated into the communities they serve while biomedical practitioners tend to remain in an outsider’s role; physicians and nurse practitioners have been educated in cosmopolitan centers, express bourgeois class consciousness, frequently speak French and the official dialect of Malagasy may come from other parts of Madagascar, and often lack social ties of shared kinship, history and identity in the communities in which they practice.

*Shared etiological models*

According to southwestern Malagasy healers interviewed in 2007 and 2009, an ill person should visit a healer to determine the cause and severity of a health problem before undertaking any specific type health-seeking action. While the adamancy of healers on this point may serve to maintain their flow of healers’ income from consultation fees (in the form of cash, goods, food, or livestock), ideas about illness causation and treatment are associated with Malagasy cosmology, religion, ecological knowledge, experiences with missions and physicians, and conventions regarding the relative efficacy of biomedical and traditional healthcare for treating health problems of different etiologies.

During seasonal recall of symptoms and illnesses in 2009, residents of Andalambezo, Ampijilova and Mañono listed a wide variety of health problems (Table 7.3). Health problems can fall into one of two general etiological categories: “sickness caused by god” (*Voan’dzânahare*, or “Fruit of god”) and “sickness caused by people” (called *voan’olo, voan’olo raty*, and *voan’olo raty hevitse* meaning respectively “Fruit of people,” “Fruit of bad people” or “Fruit of people with bad ideas”) (Figure 7.1). After consultation with a patient, an *ambiasa* or
tromba is expected to assign causation to the patient’s health problem and recommend a course of action for the patient.

“Sickness caused by god” may be considered “natural” or may be attributed to the will of ancestors. Natural maladies are those that are experienced as an aspect of fate, or part of normal human experience. These health problems are seen to be best treated by bed rest, nourishment, traditional medicines, self-prescribed pharmaceuticals, or, if symptoms persist or increase in severity, by a biomedical practitioner and prescribed medications. Colds, malaria, measles, muscle aches, arthritis, sexually transmitted infections, leprosy and tuberculosis are all examples of sicknesses considered to be natural health problems and are treated as such in the course of healthcare decision-making. For a health problem considered to be natural such as tuberculosis, for example, which is considered a serious and contagious but curable threat to health and livelihood, ambiasa and tromba frequently recommend rest, abstention from work, nourishment, and biomedical treatment. However, complex economic and social factors often prevent people from choosing to consult a doctor or nurse practitioner even when a traditional healer recommends it.

Shameful or disrespectful behavior toward one’s kin, of failing to honor lineage rules such as place or food taboos (faly), or of failing to appropriately atone for socially inappropriate behavior can also result in sickness. Symptoms of such sickness may include visions or vivid dreams, strange public behavior or may resemble symptoms of natural sicknesses (headache and fatigue, for example, are common). Curing the sickness may require a livestock sacrifice in the context of a public social healing ceremony (soro or bilo) in which the community participates to heal the suffering person or persons.
“Sickness caused by people” is specifically caused by “people with bad ideas” or *olo raty hevitse*. As with Evans-Pritchard’s (1937) classic study among Azande of Sudan, bad ideas are ideas that cause harm to others because they are antisocial or motivate antisocial behaviors. These sicknesses come about most frequently as the result of jealousy, inequity or perceived unfairness, malice, unresolved conflict, or through generally harboring socially inappropriate desires including greed or covetous sexual desires. These sicknesses can be caused without conscious intent; a person with bad ideas can in some rare cases cause illness and death to others by harboring antisocial thoughts and unintentionally influencing spirits to do bad deeds to others. A person with bad ideas can also initiate them through the use of cursing spells or sorcery, *aoly vorike*, obtained from a practitioner of black magic called a *mpamorke*. Curses may influence a person’s behavior or mental state directly, or may cause a deceased person’s spirit to perform some sort of action against a cursed individual, frequently through spirit possession but also through a process similar to puppetry, where the victim is conscious that their actions are being controlled by an unseen force but can do nothing to overcome the manipulations. Many people protect against different types of *vorike* with charms that are prepared by *ambiasa* for fees.

When someone uses *aoly vorike* against another, the person who initiates the curse is not only considered to be causing harm through the suffering that the illness causes, but is causing harm by intervening in *vinta*, a concept akin to both fate and destiny, and by taking away the victim’s will and ability to control their own actions. *Aoly fitia*, or love magic, is a type of curse that causes a victim to fall in love or become sexually infatuated with the person who initiates the curse. *Ambalavelo*⁶ is considered one of the most dangerous categories of *vorike* because it

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⁶ The term *ambalavelo* combines the prefix *am* with the words *vala*, meaning “pen” or “enclosure” such as those built to keep livestock, and *velo* which means “life.” *Ambalavelo* can thus be translated as “life in a pen” or “penned life” and can be understood as something like a
frequently causes the death of the cursed person. Particular symptoms of different *ambalavelo* curses vary. For example, *gazy* is a type of *ambalavelo* that causes a cursed person to display great strength and a desire to run away from a village and live in the forest like an animal, eating inappropriate food and be exposed to wild animals and the elements. *Valavokombo* is a curse that causes a victim to lose motor control and the ability to eat and drink, causing death from thirst and starvation. The symptoms of *ritrehaky* resemble jaundice caused by malaria, but the sufferer will have no malarial fever and their condition will not respond to natural medications (traditional or pharmaceutical). *Kidamahia* is a variety of *ambalavelo* that causes slow wasting of the body. *Jabeli’añala* is a curse that causes a woman to die shortly after giving birth while leaving the newborn unaffected physically but orphaned. Many sicknesses caused by people can manifest the same or similar symptoms to natural sicknesses, but methods of treating natural sicknesses are considered inappropriate for treating sickness caused by people and will thus be ineffective.

An *ambiasa* may divine the true cause of such a sickness and recommend action based on expert training, which generally includes a years-long apprenticeship under the guidance of an established elder *ambiasa*. A *tromba* may also hold a spirit possession ceremony and ask his or her spirit companion to reveal the cause of a sickness and direct the sufferer to the proper course of action. Symptoms of such sicknesses may also result from the sufferer’s belief that curses are at play, even when there has been no actual curse initiated. Symptoms may be physical—we unexplained wounds, rashes, sensory loss, or pain, or may include violent or bizarre behavior, curse that imprisons or pens a life. While there are exceptions, the names of particular curses do not make literal sense in that they do not usually describe or reflect symptomology. For example, *kidamahia* is literally translated as “skinny banana,” *valavakombo* means literally “crippled rat,” and *jabeli’añala* means something like “in the forest post-partum.”
prolonged depression, disturbing dreams, sensory hallucinations (such as the feeling that one’s skin is crawling with or being repeatedly stung or bitten by insects, or that one’s stomach, throat, or rectum is filled with crawling or biting insects), hearing disembodied voices or seeing visions. Common treatments include protective charms, traditional sympathetic or non-sympathetic medicines, prescribed herbal baths, special healing ceremonies, or exorcisms.

7.4.3 Q3: How do participants decide among different therapeutic options?

Administrators’ and clinicians’ explanations of local healthcare decision-making

District public health program administrators, other public health professionals, physicians, and nurses (n=8) working in the district health center in Morombe and public and private clinics in towns near Route National 9 and along the coastal highway west of the Mikea Forest were interviewed in 2007 to identify biomedical professionals’ explanations of traditional modes of healing and health-seeking behavior. All administrators and caregivers that I interviewed indicated that traditional Malagasy medicine is not efficacious in diagnosing or treating health problems. When I asked why, all indicated that traditional Malagasy healing is not efficacious because it is non-scientific, based on magical ideas and beliefs about spirits rather than on scientific knowledge.

I then asked whether or not the clinics served patients who lived far from health centers and clinics. All clinicians working in public clinics (n=5) responded “yes” and explained that, while most of their patients live in close proximity to the health center (usually less than five kilometers), people who are ill and able to travel will sometimes travel up to twelve or fifteen kilometers for no-cost consultation and low-cost therapies. Clinicians working in private clinics (n=2) said that patients prefer public health services because they have lower fees, but when a private clinic is the only medical option in an area some people will choose it.
When I asked administrators and clinicians to list the biggest obstacles facing healthcare delivery in the region, all eight responded that cultural factors, including “croyances paysannes” (peasant religion) (n=1), lacking sensibilisation (awareness or education), ignorance of the value of scientific knowledge (n=3), widespread belief in supernatural causation and a lack of formal education (n=8), lead most people suffering from diseases not to seek biomedical care. In general, most people suffering from infectious diseases never report to a health center for treatment. Three clinicians and one public health administrator, all of whom are involved with free public treatment programs for tuberculosis and leprosy, said that the majority of people who do report to a health center for treatment do not complete therapy or act to reduce contagion, and that that patients who do comply with an initial course of therapy do not report back to health centers if symptoms return. One doctor working in a private clinic in Vorehe (a relatively remote but large town, home to a weekly market and a Lutheran Church and dispensary) added that mobile medical personnel could help people in more remote areas, especially mothers with newborn infants, but that there are no public or private resources available to fund mobile healthcare. Two public health physicians added that they are compelled to use inferior equipment or go without necessary medical supplies and medicines, and that this prevents them from providing the best healthcare to their patients. To illustrate this point a primary care physician working in Morombe reached into a desk drawer and then handed me an obviously broken stethoscope. He said, “My materials are left over from colonialism! How can I use this? It is what we have, and it is all this way.” A nurse practitioner working in coastal Tsiandamba discussed difficulty in treating people for malaria and diarrheal disease (a result of dirty water) because she had no regular access to clean syringes, medications, or sterile bags and bottles for the delivery of intravenous fluids.
Medical professionals’ explanations of healthcare choice among southwestern Malagasy all mentioned formal education as a primary factor in the use of public and private biomedical health services. However, in 2007 and 2009, Mikea and Masikoro participants discussed the importance of biomedical care and desire for increased access to biomedical services as part of general healthcare strategies. Because of this apparent contradiction, I was interested in statistically testing public health employees’ explanations of Malagasy health seeking behavior.

*Is formal education significantly associated with the use of biomedical health care services?*

I used a two-sample t-test (n=299) and logistic regression analysis (n=296) to test the hypothesis that formal education is associated with increased utilization of public health resources and other forms of biomedical care, and to identify variables that are associated with the use of different types of healthcare. In order to identify the most parsimonious regression model, variables were eliminated sequentially based on the minimum Akaike Information Criterion (AIC) (Akaike 1972, 1981; Gagne and Dayton 2002; Sarton-Miller et al. 2003). The most parsimonious model (Table 7.4) excluded variables for sex, age, years of schooling, market participation, village of residence and perceived health, none of which were significantly associated with biomedical consultation.

Adult participants in this project completed an average of 2.32 years of formal education (SD=2.81, n=300), but this also varies by village. For example, adults living in Andalambezo completed an average of 2.78 years of formal schooling (SD=2.35, n=110), and adults in Mañono completed an average of 2.57 years of schooling (SD=2.99, n=145), while adults in Ampijilova only completed an average of 0.39 years of formal schooling (SD=0.88, n=45). According to results of a two-sample t-test in STATA (n=299), contrary to administrators’ and
clinicians’ beliefs, formal education (assessed in years of schooling completed) is not significantly associated with the use of biomedical services among participants. According to results of logistic regression analysis, across the sample the use of biomedical services to treat health problems was only significantly associated with medium-high ($\beta=2.099$, $p=0.001$) and high ($\beta=2.593$, $p=0.000$) income (based on quartiles) and with perceived morbidity ($\beta=0.581$, $p=0.000$) measured in illness recalls. Similarly, in a separate logistic regression (Table 7.5) analysis ($n=296$), consultation with any type of professional healer (biomedical and traditional) is significantly associated with medium-high ($\beta=1.579$, $p=0.001$) and high ($\beta=2.024$, $p=0.000$) income and with perceived morbidity ($\beta=0.581$, $p=0.000$). Consulting any medical professional is negatively associated with schooling although the association is not significant. Among participants, there is no significant correlation between income and education measured in years of formal education completed (Pearson’s $r=0.01$, $n=299$, $p=0.84$).

*What are salient factors to individual processes of healthcare decision-making?*

Figure 7.2 presents a preliminary ethnographic decision-model developed over the course of research based on focus group results and conversations with women about decisions related to health care and health maintenance. The first level of assessment involves an individual’s self-evaluation of symptoms, and primary decision criteria relate to somatic experience and the individual’s ability to carry out normal daily functions. Symptoms are generally treated in the home with on-hand pharmaceuticals, common plant-based remedies, or by adjusting the diet. If symptoms are noticeable by others or challenge an individual’s knowledge, the second level of assessment involves members of one’s household or friends, who may recommend different courses of home-based action or professional consultation. After self- and household-level
evaluation of a health problem, cost is a primary consideration or decision criterion in decisions about health care, influencing decisions about whether or not to take action and what sorts of action to take, including inaction. Ultimately, if the anticipated costs (relative to an individual’s ability to meet costs) of any particular type of healthcare to treat a natural sickness are greater than the individual’s anticipated benefits from treatment, the individual is not likely to pursue care and will most likely continue to treat symptoms in the home with common plant-derived medicines and purchased pharmaceuticals.

Are patterns of health seeking behavior significantly gendered? Patterned by site?

Results of chi-squared tests (n=296) indicate that among Mikea participants, men are significantly more likely than women to consult a biomedical professional at a health center for a particular health problem (Pearson $X^2[1]=8.1233$, $p=0.004$). In fact, men were significantly more likely than women to consult any type of healthcare professional about a health problem (Pearson $X^2[1]=6.883$, $p=0.009$).

Women were significantly more likely than men to report taking no action to treat a health problem (Pearson $X^2[1]=5.9088$, $p=0.015$), to self-diagnose and self-prescribe traditional medicines and purchased pharmaceuticals without consulting a biomedical provider or a traditional healer (Pearson $X^2[1]=4.7528$, $p=0.029$).

Women were more likely than men to exclusively use traditional medicines prepared and administered in the home, but this association was not statistically significant (Pearson $X^2[1]=3.658$, $p=0.056$). There was also no significant difference between men and women who exclusively consulted a traditional healer (Pearson $X^2[1]=3.658$, $p=0.056$), although exclusive consultation with a traditional healer was reported much more infrequently (22 respondents) than consultation with a biomedical provider (62 respondents). Finally, there was no significant
difference between men’s and women’s use of self-prescribed purchased pharmaceuticals (Pearson $X^2[1]=1.269$, $p=0.260$).

There are few significant patterns of healthcare behavior by village. Exceptions include the observation that residents of Andalambezo are more likely than residents of other villages to consult a traditional healer to treat a health problem (Pearson $X^2[1]=4.17$, $p=0.04$), and people living in Mañono are more likely than residents of other villages to visit a biomedical professional (Pearson $X^2[1]=8.03$, $p=0.005$) or to use both traditional medicines and purchased pharmaceuticals to treat a health problem (Pearson $X^2[1]=5.1920$, $p=0.023$).

7.5 Discussion

Mikea participants evaluate states of good or poor health relative to feeling physically and psychologically good, and relative to symptoms’ impact on the ability to carry out daily tasks, uphold responsibilities, and participate in social life. A person may experience particular sets of symptoms associated with a known illness, but individuals and others who interact with them regularly gauge severity in terms of the behavioral consequences of an illness. A person’s significant deviation from behavioral norms indicates an ideal course of action on the part of an individual or members of her household.

The most common health-seeking actions include home-based diagnosis, medication, and behavioral and dietary adjustments. Most of the world’s health care is performed within the household by laypeople (non-professionals without specialized training) living in pluralistic medical settings. In such settings, people choose what to do about health problems from a variety of options and formulate a variety of treatment strategies, including home-based diagnosis and treatment and the use of traditional healers as a “conduit” to evaluate and access other options outside the home (Ryan 1998).
Among Mikea participants, if home-based healthcare strategies are ineffective, a sick person may consult with people outside of the household or may choose to consult a traditional diagnostician and healer. While traditional medical practice is widely considered the only appropriate way to treat health problems of social origin, i.e. “Sickness caused by people,” natural illnesses that challenge local knowledge and expertise are most effectively treated by consultation with a doctor or nurse working in a health center, making biomedical expertise and technology, as part of a pluralistic medical system, a very important healthcare resource to Mikea participants. Participants in Andalambezo, Ampijilova and Mañono discussed the importance of individual and household knowledge, the efficacy of plant-based traditional medicines and biomedical care for treating natural health problems, and expressed a desire to have greater access to public health centers. While some health problems can be treated effectively with common plant-based remedies and purchased pharmaceuticals in the home, many cannot.

Based on results of logistic regression analyses presented above, we can conclude that, contrary to public health administrators’ and clinicians’ explanations, among Mikea participants relatively high income and high perceived morbidity may be more important to decisions to seeking a consultation with biomedical providers (or traditional healers) than years of formal education. Results of Chi-squared analyses demonstrate that patterns of health-seeking behavior are significantly gendered; while men are more likely than women to visit a clinic or consult any type of professional healer, women are more likely to take no action to address health problems, or to exclusively self-medicate with a combination of traditional plant-based medicines and purchased pharmaceuticals.

Observed gendered disparities in health-seeking behavior (Figure 7.3) are consistent with evidence of gendered disparities in perceived health and gendered income inequalities that were
presented in Chapter 6, and are supported by the preliminary ethnographic model of health-seeking decision-making that I presented above. Among women, the severity of a health problem and cost (broadly construed) are important criteria on which health-seeking decisions hinge. In this context, cost must be considered in a broad sense and not just in terms of the price of diagnostic consultations with traditional healers or medical professionals and prescription drugs. Consulting traditional healers can be costly depending on the healer’s level of expertise, and, depending on determined etiology of the health problem, a traditional healer may recommend biomedical consultation or a costly social healing ceremony. Individuals seeking care at clinics and hospitals far from their homes are likely to accrue significant monetary and social debts, and may put livelihoods and their family’s welfare at risk.

In some situations, access to liquid assets and the availability of social support make such treatment seeking possible. However, for most rural subsistence producers, the decision to relocate even temporarily for health care alone is too costly to pursue. Examinations are technically free of charge at public health centers, but a patient who lives far from a public health center must relocate for a variable amount of time. This is especially true of treatment for tuberculosis and leprosy; in order for treatment to be most effective relocation must be for the complete duration of an initial eight to twelve-week course of therapy. Relocation means that an individual must make arrangements for ensuring the welfare of dependant household members, and must ensure that property such as houses, animals and fields be cared for in his or her absence. Relocation also means that one seeking care must have access to lodging near the clinic or dispensary and be able to carry or purchase enough food for the duration of treatment. If an unexpected crisis (such as an incident of banditry or cattle theft) occurs in the home village, a patient undergoing therapy may be called home to help manage the effects. Others undergoing
therapy may simply decide that they cannot afford lost labor, income and food security and so return home before completing prescribed therapy. Women wishing to relocate for treatment face particular difficulties because they must make arrangements not only for themselves, but also for any young children. When cost is a significant constraint to accessing healthcare, women are significantly more likely than men to go without care or exclusively self-treat.

Men do not use health services more often than women because they have stronger faith in its efficacy than women do, nor because they are less healthy than women. Women do not often chose to exclusively self-medicate because it is preferable to biomedical care. Aside from perceived morbidity, use of biomedical services is most strongly associated with an individual’s income, specifically whether their income falls into middle-high or high income quartiles. Across the sample, men disproportionately occupy middle-high and high income quartiles. Other factors relating to cost that figure in to gendered patterns of health seeking behavior include gendered patterns of labor and mobility. Women’s responsibilities to household maintenance, food provisioning and preparation, daily commerce, and childcare present significant challenges to seeking healthcare away from home, and these are challenges that men do not fully share.

7.6 Conclusions

Education is a conventional public health strategy (Daar et al. 2002) and in studies of national demographic statistics, increasing education is associated with decreasing mortality rates (Anand and Ravallion 1993; Baker et al. 1997; Rosenstock 1966). This does not however seem to be because formal education increases people’s belief in the scientific efficacy of biomedicine, but because formal education is strongly associated with socioeconomic status (along with income and occupation), the quality of social and physical environments, and increased national investments in public health that improve opportunities for people to use
health services (Caldwell 1986: 172). In some settings, particular education campaigns have helped, for example, reduce transmission of HIV by promoting condom use, have helped reduce water contamination by improving knowledge about disease transmission and sanitary practices, and have helped mothers improve their children’s nutrition by promoting healthy breastfeeding and supplemental infant feeding practices, but education alone has not been shown to increase people’s use of general health services. According to Nutbeam (2000: 260), it has become clear to public health researchers that health campaigns focusing solely on education (the transmission of information), and neglecting consideration of individuals’ social and economic circumstances do not achieve anticipated results. This is in part because information campaigns do not actually make health services more accessible by reducing costs, distances, and other barriers to accessing care.

Men and women living in Andalambezo, Ampijilova, and Mañono act to pursue wellbeing, a state of meaningful functioning and feeling well, as part of daily practice. An important part of wellbeing is the ability to act in order to maintain one’s health and to seek treatment for health problems that arise. Southwestern Malagasy maintain a pluralistic health system that meaningfully integrates traditional ecological knowledge, social practice, and biomedical expertise and technology. Traditional medicine and traditional modes of diagnosis are crucial to treating particular categories of illness, and for some Mikea they are the only available healthcare option. Malagasy healing relies on access to forest-based and other natural resources, as well as specialized knowledge about these spaces, to address health problems of varying etiology. The use of biomedical resources is sometimes a more desirable option to effectively treat natural sicknesses, but depends on the accessibility of public health resources. Disparities in the accessibility of biomedical healthcare resources are revealed in patterns of
health seeking behavior. Among residents living in Andalambezo, Ampijilova and Mañono, women are less likely to have access to biomedical resources than men and are more likely to self-diagnose and self-treat health problems with both purchased pharmaceuticals and traditional medicines prepared from foraged plants and woods.

But access to natural resources that sustain traditional medical practice is changing in the region while the accessibility of the public health infrastructure is not. Economic development is associated with increased levels of economic inequality, and increasing inequalities (gendered, age-related) within households as well, particularly in terms of allocation of emotional support and health-sustaining resources (Caldwell 1992: 56; Godoy et al. 2006; Sauerborn et al. 1996). Among Mikea, access to health-sustaining forest resources is likely to decrease as access to protected forestland is restricted to all but a few. Because of gendered disparities in access to biomedical care and gendered patterns of health seeking behavior, this may disproportionately affect women’s ability to treat health problems in the future. Public health in Madagascar is chronically underfunded and has never been able to effectively serve the country’s non-urban population. Because of continuing national political and economic troubles, the services that are available to people with access to basic health centers have been further reduced.
Table 7.1 Health-seeking action taken by participants in 2009, presented by field site and by sex.

Health-seeking action by village and sex (n=295)

<table>
<thead>
<tr>
<th>actions taken</th>
<th>Andalambezo women</th>
<th>Andalambezo men</th>
<th>Ampijilova women</th>
<th>Ampijilova men</th>
<th>Mañono women</th>
<th>Mañono men</th>
<th>totals / sex women</th>
<th>totals / sex men</th>
<th>n</th>
</tr>
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<tr>
<td>Reported no health problems</td>
<td>7</td>
<td>7</td>
<td>4</td>
<td>4</td>
<td>15</td>
<td>18</td>
<td>26</td>
<td>29</td>
<td>55</td>
</tr>
<tr>
<td>Took no action</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>13</td>
<td>1</td>
<td>21</td>
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<td>1</td>
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<td>0</td>
</tr>
<tr>
<td>Used traditional medicine only</td>
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<td>6</td>
<td>8</td>
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<td>10</td>
<td>9</td>
<td>31</td>
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<td>4</td>
<td>5</td>
<td>13</td>
<td>13</td>
<td>27</td>
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<td>58</td>
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<td>Used traditional medicine and ...</td>
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<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>8</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Consulted doctor/nurse only</td>
<td>7</td>
<td>9</td>
<td>0</td>
<td>6</td>
<td>16</td>
<td>24</td>
<td>23</td>
<td>39</td>
<td>62</td>
</tr>
<tr>
<td>Consulted traditional healer only</td>
<td>7</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>11</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>Consulted traditional healer and ...</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>9</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>totals</td>
<td>60</td>
<td>46</td>
<td>25</td>
<td>20</td>
<td>72</td>
<td>72</td>
<td>157</td>
<td>138</td>
<td>295</td>
</tr>
</tbody>
</table>
Table 7.2 Health-seeking action taken by participants in 2009, presented in percentages by field site and by sex.

Health-seeking action (percentages by sex and village) (n=295)

<table>
<thead>
<tr>
<th>actions taken</th>
<th>Andalambezo</th>
<th></th>
<th>Ampijilova</th>
<th></th>
<th>Mañono</th>
<th></th>
<th>Totals</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>women</td>
<td>men</td>
<td>women</td>
<td>men</td>
<td>women</td>
<td>men</td>
<td>women</td>
<td>men</td>
</tr>
<tr>
<td>Reported no health probems</td>
<td>11.6%</td>
<td>15.2%</td>
<td>16.0%</td>
<td>20.0%</td>
<td>20.8%</td>
<td>25.0%</td>
<td>16.5%</td>
<td>21.0%</td>
</tr>
<tr>
<td>Took no action</td>
<td>1%</td>
<td>8.6%</td>
<td>8.0%</td>
<td>10.0%</td>
<td>18.1%</td>
<td>1.3%</td>
<td>13.4%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Rested only</td>
<td>1.6%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0.6%</td>
<td>0%</td>
</tr>
<tr>
<td>Used traditional medicine only</td>
<td>21.6%</td>
<td>13.0%</td>
<td>32.0%</td>
<td>5.0%</td>
<td>13.8%</td>
<td>12.5%</td>
<td>19.7%</td>
<td>11.6%</td>
</tr>
<tr>
<td>Used purchased pharmaceuticals only</td>
<td>16.6%</td>
<td>28.3%</td>
<td>16.0%</td>
<td>25.0%</td>
<td>18.1%</td>
<td>18.1%</td>
<td>17.2%</td>
<td>22.5%</td>
</tr>
<tr>
<td>Used traditional medicine and pharmaceuticals</td>
<td>8.3%</td>
<td>0%</td>
<td>12.0%</td>
<td>0%</td>
<td>0%</td>
<td>1.3%</td>
<td>5.0%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Consulted doctor/nurse only</td>
<td>11.6%</td>
<td>19.6%</td>
<td>0%</td>
<td>30.0%</td>
<td>22.2%</td>
<td>33.3%</td>
<td>14.6%</td>
<td>28.3%</td>
</tr>
<tr>
<td>Consulted traditional healer only</td>
<td>11.6%</td>
<td>10.8%</td>
<td>8.0%</td>
<td>5.0%</td>
<td>2.7%</td>
<td>6.9%</td>
<td>7.0%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Consulted traditional healer and doctor/nurse at health center</td>
<td>6.6%</td>
<td>4.3%</td>
<td>8.0%</td>
<td>5.0%</td>
<td>4.1%</td>
<td>1.3%</td>
<td>5.7%</td>
<td>2.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>totals n</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60</td>
<td>46</td>
<td>25</td>
<td>20</td>
<td>72</td>
<td>72</td>
<td>157</td>
<td>138</td>
</tr>
</tbody>
</table>

|              | 100%         | 100%         | 100%         | 100%         | 100%         | 100%         | 100%   | 100%         | 100%     |
Table 7.3 Health problems and etiological categorization recalled by participants.

Health problems recalled and etiological categorization, 2009

<table>
<thead>
<tr>
<th>Health problem (Malagasy name)</th>
<th>Description of symptoms</th>
<th>General causation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marary loha</td>
<td>Headache</td>
<td>God</td>
</tr>
<tr>
<td>Beka</td>
<td>Active tuberculosis</td>
<td>People</td>
</tr>
<tr>
<td>Marary lambosy</td>
<td>Back pain</td>
<td>X</td>
</tr>
<tr>
<td>Tratra, tsapelapela</td>
<td>Chest pain, difficulty breathing</td>
<td>X</td>
</tr>
<tr>
<td>Mivala, mizoloke, fizoloha, fivalagna</td>
<td>Diarrhea</td>
<td>X</td>
</tr>
<tr>
<td>Mandoa</td>
<td>Vomiting</td>
<td>X</td>
</tr>
<tr>
<td>Arety vania</td>
<td>Lower back pain, generally caused by sexually transmitted infection (STI) or urinary tract infection (UTI)</td>
<td>X</td>
</tr>
<tr>
<td>Tazo, palu</td>
<td>Fever/ malaria</td>
<td>X</td>
</tr>
<tr>
<td>Arety maso</td>
<td>Eye problems</td>
<td>X</td>
</tr>
<tr>
<td>Kialo, soridala</td>
<td>Sores on thighs and buttocks</td>
<td>X</td>
</tr>
<tr>
<td>Sarotsos, marary kibo</td>
<td>Stomach problems, often pain with diarrhea</td>
<td>X</td>
</tr>
<tr>
<td>Fany</td>
<td>Dizziness; vertigo</td>
<td>X</td>
</tr>
<tr>
<td>Tombotroke</td>
<td>Debilitating foot pain</td>
<td>X</td>
</tr>
<tr>
<td>Kohake</td>
<td>Prolonged cough</td>
<td>X</td>
</tr>
<tr>
<td>Farasisa, baibay, kola</td>
<td>Syphilis</td>
<td>X</td>
</tr>
<tr>
<td>Grippe</td>
<td>Severe cold or influenza</td>
<td>X</td>
</tr>
<tr>
<td>Arety nify; arety hy</td>
<td>Tooth problems</td>
<td>X</td>
</tr>
<tr>
<td>Mokitse maré</td>
<td>Fatigue or exhaustion</td>
<td>X</td>
</tr>
<tr>
<td>Mivala lio</td>
<td>Bloody diarrhea</td>
<td>X</td>
</tr>
<tr>
<td>Bay</td>
<td>Wounds</td>
<td>X</td>
</tr>
<tr>
<td>Marary sofy</td>
<td>Ear pain</td>
<td>X</td>
</tr>
<tr>
<td>Marary, magnerike, ozatsy</td>
<td>General poor health, often muscle problems</td>
<td>X</td>
</tr>
<tr>
<td>Sempotse</td>
<td>Trouble breathing regularly</td>
<td>X</td>
</tr>
<tr>
<td>Mangily holitse</td>
<td>Itching or burning skin, attributed to leprosy</td>
<td>X</td>
</tr>
<tr>
<td>Tension</td>
<td>High blood pressure</td>
<td>X</td>
</tr>
<tr>
<td>Tsy mamany</td>
<td>Unable to urinate</td>
<td>X</td>
</tr>
<tr>
<td>Rombake, sombake</td>
<td>Seizures</td>
<td>X</td>
</tr>
<tr>
<td>Mafana holitse</td>
<td>&quot;Hot skin&quot;, high temperature, fever</td>
<td>X</td>
</tr>
<tr>
<td>Mamany lio</td>
<td>Blood in urine</td>
<td>X</td>
</tr>
<tr>
<td>Tamborikiki</td>
<td>Seizure disorder</td>
<td>X</td>
</tr>
<tr>
<td>Koko</td>
<td>Seizures and soft palate deformity</td>
<td>X</td>
</tr>
<tr>
<td>Hehitsay, hehitr'ay</td>
<td>Unknown</td>
<td>X</td>
</tr>
<tr>
<td>Nà oro</td>
<td>Bloody nose</td>
<td>X</td>
</tr>
<tr>
<td>Mitoretotoreo</td>
<td>Unknown</td>
<td>X</td>
</tr>
<tr>
<td>Vavafo</td>
<td>Loss of voice, or loss of control of speech</td>
<td>X</td>
</tr>
<tr>
<td>Angamay</td>
<td>Unknown</td>
<td>X</td>
</tr>
<tr>
<td>Condition</td>
<td>Description</td>
<td>X</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---</td>
</tr>
<tr>
<td>Ambalapengitse, mikoraikeraike</td>
<td>Causes uncontrollable screaming and crying</td>
<td>X</td>
</tr>
<tr>
<td>Marary say</td>
<td>Unknown</td>
<td>X</td>
</tr>
<tr>
<td>Hasola</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td>Famine</td>
<td>Absolute lack of food or &quot;digestible&quot; food, leading to chronic fatigue and poor health</td>
<td>X</td>
</tr>
<tr>
<td>Marary hatoke, fatike</td>
<td>Infected foot, caused by stepping on a thorn.</td>
<td>X</td>
</tr>
<tr>
<td>Teriteke</td>
<td>Rib pain</td>
<td>X</td>
</tr>
<tr>
<td>Arety manintsy</td>
<td>Chills</td>
<td>X</td>
</tr>
<tr>
<td>Ambalavelo</td>
<td>Various; Great strength and a desire to run away into the forest</td>
<td>X</td>
</tr>
<tr>
<td>Adala moron'andro</td>
<td>Unknown</td>
<td>X</td>
</tr>
<tr>
<td>Vorike, kombo</td>
<td>General poor health due to curse</td>
<td>X</td>
</tr>
<tr>
<td>Fangeboa</td>
<td>Fatigue or exhaustion, with an inability to work</td>
<td>X</td>
</tr>
<tr>
<td>Ongotse</td>
<td>Genital pain</td>
<td>X</td>
</tr>
<tr>
<td>Valavokimbo</td>
<td>Feet don't work properly, &quot;malemy&quot; or &quot;floppy&quot; feet</td>
<td>X</td>
</tr>
<tr>
<td>Fò</td>
<td>Heart pain, broken heart</td>
<td>X</td>
</tr>
<tr>
<td>La clé an'ldoha</td>
<td>Head swells continuously and does not stop swelling</td>
<td>X</td>
</tr>
<tr>
<td>Tombotsoke</td>
<td>Belly swells continuously and does not stop swelling</td>
<td>X</td>
</tr>
<tr>
<td>Féo</td>
<td>Neck pain</td>
<td>X</td>
</tr>
<tr>
<td>(Broken bones)</td>
<td>Injury</td>
<td></td>
</tr>
<tr>
<td>Kilalaky</td>
<td>Uncontrollable urge to dance kilalaky</td>
<td>X</td>
</tr>
<tr>
<td>Jabeli' añala</td>
<td>After childbirth, urge to run away into the forest</td>
<td>X</td>
</tr>
<tr>
<td>Tsy omby hazo</td>
<td>Body swells until victim dies. After death, the body continues to swell.</td>
<td>X</td>
</tr>
</tbody>
</table>
Table 7.4 Logistic regression model predicting biomedical consultation.

<table>
<thead>
<tr>
<th>variable name</th>
<th>β</th>
<th>Standard error</th>
<th>z</th>
<th>p</th>
<th>95% conf. interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>social support</td>
<td>0.026</td>
<td>0.018</td>
<td>1.64</td>
<td>0.102</td>
<td>-0.005 - 0.065</td>
</tr>
<tr>
<td>Income q1 (Low)</td>
<td></td>
<td>reference category</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income q2 (Low-med)</td>
<td>-0.147</td>
<td>0.743</td>
<td>-0.20</td>
<td>0.843</td>
<td>-1.600 - 1.310</td>
</tr>
<tr>
<td>Income q3 (med-high)*</td>
<td>2.099</td>
<td>0.606</td>
<td>3.47</td>
<td>0.001</td>
<td>0.912 - 3.286</td>
</tr>
<tr>
<td>Income q4 (high)*</td>
<td>2.593</td>
<td>0.609</td>
<td>4.26</td>
<td>0.000</td>
<td>1.399 - 3.787</td>
</tr>
<tr>
<td>Perceived morbidity*</td>
<td>0.581</td>
<td>0.144</td>
<td>4.05</td>
<td>0.000</td>
<td>0.299 - 0.862</td>
</tr>
</tbody>
</table>

a The most parsimonious model excluded variables for sex, age, years of schooling, market participation, village of residence, and perceived health based on results of the AIC.

Log likelihood: -119.085 ; AIC: 251.33

Table 7.5 Logistic regression model predicting consultation with any type of professional healer.

<table>
<thead>
<tr>
<th>variable name</th>
<th>β</th>
<th>Standard error</th>
<th>z</th>
<th>p</th>
<th>95% conf. interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>social support</td>
<td>0.024</td>
<td>0.016</td>
<td>1.51</td>
<td>0.123</td>
<td>-0.193 - 0.023</td>
</tr>
<tr>
<td>Income q1 (Low)</td>
<td></td>
<td>reference category</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income q2 (Low-med)</td>
<td>0.348</td>
<td>0.505</td>
<td>0.69</td>
<td>0.490</td>
<td>-0.642 - 1.339</td>
</tr>
<tr>
<td>Income q3 (med-high)*</td>
<td>1.579</td>
<td>0.475</td>
<td>3.32</td>
<td>0.001</td>
<td>0.647 - 2.511</td>
</tr>
<tr>
<td>Income q4 (high)*</td>
<td>2.024</td>
<td>0.481</td>
<td>4.21</td>
<td>0.000</td>
<td>1.081 - 2.966</td>
</tr>
<tr>
<td>Years of schooling</td>
<td>-0.085</td>
<td>0.055</td>
<td>-1.54</td>
<td>0.123</td>
<td>-0.193 - 0.023</td>
</tr>
<tr>
<td>Perceived morbidity*</td>
<td>0.581</td>
<td>0.144</td>
<td>4.05</td>
<td>0.000</td>
<td>0.299 - 0.862</td>
</tr>
</tbody>
</table>

a The most parsimonious model excluded variables for sex, age, market participation, village of residence, and perceived health based on results of the AIC.

Log likelihood: -149.98 ; AIC: 314.768
Figure 7.1 Ethnographic model of illness causation developed in 2007 among Masikoro and Mikea, and in 2009 among Mikea living in Andalambezo, Ampijilova, and Mañono.
Figure 7.2 Preliminary ethnographic model of healthcare decision-making developed in 2007 and 2009.
Health-seeking action by sex (n=295)*

*55 individuals (26 women and 29 men) reported no health problems.

Figure 7.3 Frequencies of different health-seeking actions reported in 2009, presented by sex.
CHAPTER 8

Conclusions

8.1 Introduction

Wellbeing can be assessed in terms of both subjective and objective dimensions, measured at the level of individuals or society and relates to opportunities and life satisfaction that cannot be defined, attributed or primarily influenced by standard metrics of economic development (McAllister 2005:2; Camfield et al. 2009: 6). Human wellbeing is grounded in and mediated by social, cultural and political structures and processes, and as such is produced by having resources, capabilities, and opportunities which may exist on a local scale, but are often organized or distributed by social forces that extend far beyond local spaces (Camfield et al. 2009).

In this dissertation, I adopted a critical definition of health as “access to and control over the basic material and non-material resources that sustain and promote life at a high level of satisfaction” (Baer et al. 1986: 95), and a theoretical position that variation in human biology and contextualized notions of health, illness and wellbeing are fundamentally social and historical phenomena (Levins and Lewontin 1985; Morgan 1987; Turshen 1977, 1984). Political-economic analyses of variation in health and access to the resources and institutions that sustain life and are conducive to wellbeing cannot neglect human-environment relationships, cultural struggles related to environmental and social resources, and issues of scale (Leatherman 2005; Mayer 1996; Nguyen and Peschard 2003; Panelli and Tipa 2007; Richmond et al. 2005). From this perspective, political-economic analyses of health are in a fundamental way commensurate with
political-ecological analyses. Biocultural anthropologists and medical geographers working within a political ecology framework have in recent years begun to generate a body of empirical research that illuminates pathways by which culture, human environments, and human health are mutually influenced (Collins 2001; Crooks 1998; Finnis 2006, 2007, 2008; Grineski 2006; Hanchette 2008; Harper 2002, 2004; Kalipeni and Oppong 1998; Leatherman 1996; Oppong and Harold 2009; Renfrew 2007; Schell 1997).

The general purpose of this dissertation was to examine relationships among forms of social change, especially new forms of environmental governance, and human health and wellbeing, among Mikea. I have been particularly interested in contextualized and subjective experiences associated with social change. This dissertation used analyses of data collected in 2007 through 2009 in order to address questions about how historical and contemporary socio-cultural processes shape relations among people, the state and broader national society, and the social-environmental nexus, and how these changing relations are associated with variation in both objective and subjective aspects of health.

My research questions crossed three primary domains: (1) the production of regionally specific environmental discourses and environmental policies, (2) the production of social and economic vulnerabilities, and (3) the production of human health and wellbeing. To conclude this dissertation, I will first summarize the general findings in relation to broad research objectives identified in Chapter 1. Second, I will discuss the broader theoretical significance of this research, and policy implications of my findings. Finally, I will identify limitations of this research.
8.2 General findings of the dissertation

8.2.1 Discourses of people and environment, policy, and the production of inequity

I asked how the production of knowledge, including authoritative discourses regarding Mikea people and the Mikea Forest environment, is associated with changing social and environmental relationships in the Mikea Forest Region. I found that official truths that guide Mikea Forest environmental policy reflect hegemonic ideas about mediation of and adaptation to global environmental problems, ideas about sustainability, national economic development and their relationship to environmental management (Adams and Hulme 2001; Reardon and Vosti 1997; Roe 1995; Roe 2008: 492), regional patterns of forest loss and extensive agricultural production (Blanc-Pamard et al. 2005; Méral et al. 2006; Seddon et al. 2000), economic rationalities of peasants (Bernal 1994), the primitivism of people who forage for subsistence (Headland and Reid 1989; Pluciennik 2004), and the adaptability of foraging as a means of subsistence (Sahlins 1968).

Broader-scale discourses related to global environmental problems and sustainable national development influence international funding priorities and national priorities for policy action. Regional-scale discourses regarding forest loss establish scientific justification for PA establishment, and help policy planners identify spaces that can be targeted for critical interventions. Discourses relating to particular localities identify causes of environmental degradation from which policy solutions are inferred. Mikea Forest environmental discourse juxtaposes the “two distinct deforestation discourses” identified by Adger and colleagues (2001: 687). The first, which I term a “discourse of rurality,” attributes increasing deforestation to inefficient slash-and-burn maize production by a rural population of subsistence-level extensive agriculturalists who are driven to destroy the dry Mikea Forest by poverty and resource scarcity.
The second, a “discourse of indigeneity,” identifies a compelling victim of forest degradation, in this case the “true Mikea” or Mikea population autochtone, who are described in policy documents, scholarship, and media productions as a small, culturally distinct population of primitive forest foragers and have been recognized as an indigenous population under Operational Directive 4.20 of the World Bank and by the Malagasy Government (Repblikan’i Madagasikara et al. 2010).

Historical processes of knowledge production associated with establishing legitimacy of the Pre-colonial Merina state, and with scholarly preoccupation with Malagasy settlement chronology have contributed to Mikea being seen by many as isolated primitive people. But these ideas developed apart from the life worlds and lived experience of people who did or do self-identify as Mikea. As a result, there are significant incongruities between official representations of identity and lifestyle on one hand and local history, cultural norms, and social-environmental realities on the other.

In the context of conservation and development planning, international norms for indigenous rights are meant to mitigate risk of harm and improve democratic participation among historically underrepresented peoples. As plans to establish a Mikea Forest PA progressed, World Bank funding hinged on the production of a Plan pour le developpement des populations Mikea (PDPM, or Development Plan for Mikea Populations) to establish a framework by which Mikea peoples’ rights and “informed participation” in the development of policy would be ensured as plans to establish the Mikea Forest PA progressed (Repblikan’i Madagasikara et al. 2010; World Bank 1991). However, particular conceptual and logistic challenges were cited as preventing planners from including Mikea in the policy production process (WWF 2003). Official population estimates for Mikea are low by thousands.
Furthermore, because of received wisdom about Mikea primitivism and adaptability, planners have failed to consider that, like others living in the region, Mikea might desire increased access to social institutions and economic opportunities beyond foraging.

Residence within park boundaries is limited to three very small, resource-poor occupation zones where “true Mikea” or the Mikea population autochtone may live. People living within PA boundaries may practice “traditional” subsistence practices are limited to these controlled occupation areas and limited zones of use. Hatsaky, swidden maize production, has been prohibited under the threat of fines and arrest since the late 1990s, and people living within the PA are to be discouraged from market activities. In short, residents must at least attempt to maintain the appearance of primitive, full-time foragers in order to remain in their homes. Non-Mikea and Mikea who do not resemble official representations of Mikea primitivism will be evicted or induced to migrate from villages and camps within the boundaries of the national park.

Mikea and others living within the region have experienced a series of increased vulnerabilities associated directly with the gradual establishment of Parc National Mikea. The hatsaky maize prohibition and later “enclosure” of the Mikea Forest eliminated an important source of cash and food and made resources such as agricultural land and fuel increasingly scarce across the Mikea Forest region. As subsistence-sustaining resources have become increasingly scarce, banditry and cattle theft have become a threat to people living on the coast, in the forest, and on the savanna. The threat of extortion of fines and seizure of produce by outsiders claiming to be “forest police” has increased as well. Most people who have been directly affected by the new PA are aware of its existence, but do not have access to specific policy information and feel that PA rules are enforced arbitrarily or in a consistently exploitive manner.
8.2.2 Environmental governance and local vulnerabilities

This project investigated whether new forms of regional environmental governance are associated with increased insecurities in terms of livelihoods, food insecurity, and nutritional status. I found that Mikea living within PA boundaries at Ampijilova have experienced the greatest pressure in terms of livelihoods, and the most threats in terms of security as they are among the least likely regionally to have access to trustworthy security personnel, and experience frequent discrimination in commerce and exploitation by people claiming authority to police resources within park boundaries.

Of the three participating field sites, Andalambezo is the least directly affected by PA rules because it lies outside of the boundaries of the National Park and buffer zones. Although residents frequently supplement their diets and income with foraged products from the Mikea Forest and use wood and other forest materials to construct houses and manufacture furniture, outrigger canoes, and other goods, they are not dependent on the forest in the same ways as people living in either Andalambezo or Mañono.

Residents of Mañono have in the past engaged in lucrative hatsaky maize production, but are not dependent upon it for subsistence or cash flow. Residents also keep livestock, and produce charcoal as cooking fuel to sell in the nearby coastal city of Morombe. Charcoal production is particularly important to Mañono’s economy, and has been significantly affected by PA rules. One result of this has been confusion among households that dominate local charcoal production regarding proper procedures for gaining legal title to productive woodlots, and significant distress caused by the seizure of oxcart loads of charcoal by police stationed along the road to Morombe. Despite this, residents maintain an agricultural subsistence and are able to gain significant income from the sale of produce, growing paddy rice, maize, manioc, and
vegetables in irrigated fields that surround the village. Residents worry about banditry, but also feel more secure than they would without resident security personnel.

Ampijilova is the most directly affected by the PA’s restrictions on resource use and especially by restrictions on hatsaky production. Residents of Ampijilova defy pristine forager stereotypes by maintaining diverse livelihoods that include extensive horticulture, market commerce, and opportunistic wage labor in addition to terrestrial foraging and freshwater fishing. But maintaining sufficient livelihoods has become increasingly difficult. In recent years, Ampijilova’s residents have significantly reduced maize production within the forest because of fear of fines and harassment by “forest police.” They feel that they have become more open to violence since the advent of the hatsaky ban, especially to armed banditry as some people (primarily young men from hard-strapped savanna villages) in the region have sought alternate sources of revenue, including theft of cattle and pillage of villages. To avoid attracting unwanted attention of cattle thieves, residents of some forest villages, including Ampijilova, have abandoned ownership, removing the most significant form of wealth storage for the sake of security. Of the three focal field sites, people living in Ampijilova are most likely to experience reduced livelihood opportunities associated with PA policies, have the least diverse livelihood portfolios and the fewest opportunities for market participation, experience the most food insecurity and poorest nutritional consequences. This is especially true among women and children at Ampijilova. Nearly all adult women are underweight with BMI below 18.5, over two-thirds of children age 3 through 12 were underweight, which is evidence that they are at risk of severe malnutrition, and half showed evidence of wasting, which is evidence of severe acute malnutrition.
8.2.3 Variation in perceived health and perceived morbidity, pluralistic healing systems, and resource access

Third, I ask how both endogenous and exogenous socio-cultural factors are associated with variation in health, and how Mikea conceptualize and manage health and wellbeing amidst ongoing processes of social and environmental change associated with the new Parc National Mikea.

I asked whether individual and household characteristics and variables related to market participation and experience-contingent pathways of embodiment are statistically associated with perceived health and perceived morbidity among Mikea living in Andalamebezo, Ampijilova, and Mañono. I found that among Mikea participants, market participation, livelihoods diversity, and male sex are significantly positively associated with perceived health. In other words, men, people who participate in markets, and people with relatively diverse livelihoods portfolios were more likely to report feeling good or healthy that others. I also found that higher perceived morbidity is significantly associated with residence in Andalamebezo and Ampijilova, and that perceived morbidity is significantly negatively associated with social support. In other words, people living in Andalamebezo and Ampijilova report significantly more health problems than people living in Mañono, while low social support is associated with more reported health problems.

Next, I asked how Mikea participants conceptualize and manage health and wellbeing amidst ongoing processes of social and environmental change. I found that Mikea identify their own and others’ health problems relative to feeling good or healthy, and by their impact on physical and psychological functioning in terms of an individual’s ability to carry out their daily
responsibilities. There is a conceptual distinction between the presence of physical or psychological symptoms and the state of being sick or having poor health. I also found that both biomedical technology and expertise, household-based, and traditional modes of diagnosis and healing are inextricable to pluralistic health care strategies. Doctors, nurses, individuals, family members, and different types of traditional healers are all considered effective at treating a variety of health problems, with the difference being severity and persistence of symptoms, and the assigned cause of symptoms.

An individual will usually self-diagnose and treat common or minor health problems within the household. Common household treatments include rest, nourishment, food prohibitions, purchased pharmaceuticals, and common plant-based medicines. Ideally, if home-based healthcare strategies are ineffective, a sick person may consult with people outside of the household or may choose to consult a traditional diagnostician and healer. In this stage of health seeking, a healer will make a diagnosis, assign etiology to the illness, and recommend a course of action based on that etiology. For “natural” illness, a healer will often recommend rest, ample nourishment, and consultation with a doctor or nurse. Mikea consider biomedical care the best means of treating natural health problems that challenge the expertise of the patient or the household. Natural illnesses include diseases such as accidental injuries, tuberculosis, syphilis, leprosy, colds, malaria, and many others that are experienced as part of normal human existence. Conversely, traditional Malagasy healers best treat illnesses of social origin, those that are “caused by people with bad ideas.” These sicknesses can be caused without conscious intent, or a “person with bad ideas” can initiate them through the use of cursing spells or sorcery, aoly vorike, obtained from a practitioner of black magic.
However, Mikea participants are not always able to follow an ideal course of action that includes an ordered process of self-evaluation and home treatment, professional diagnosis by traditional healer, and pursuit of therapies appropriate to the cause of the illness. Medical professionals’ explanations of healthcare choice among southwestern Malagasy all mentioned formal education as a primary factor in the use of public and private biomedical health services. However, I found that, among Mikea participants, formal education is not associated with the choice to seek biomedical care, nor to seek any type of professional health consultation. The only factors that are significantly associated with consultation with professional healers (biomedical and traditional) are medium-high and high income, and perceived morbidity.

Self- and household-level evaluation and treatment are inexpensive and often at least somewhat effective ways of managing health care, especially for problems that are common or are not severe, or for managing symptoms of more severe health problems. After self- and household-level evaluation of a health problem, cost is a primary criterion in decisions about health care, influencing decisions about whether or not to take action and what sorts of action to take, including the choice to take no action. If the anticipated costs relative to resources are greater than an individual’s anticipated benefits from treatment, the individual is not likely to pursue expert consultation or care and will most likely continue to treat symptoms in the home with common plant-derived medicines and purchased pharmaceuticals.

I found that health-seeking action, like income, perceived health, and nutritional status, is highly gendered. Women are more likely to fall into low and low-medium income quartiles, while men are disproportionately likely to fall into medium-high and high income quartiles. Women are more likely to report poor health than men, and are more likely to be underweight. Women are more likely than men to take no action to cure a health problem and to exclusively
self-diagnose and self-medicate in the home with a mixture of plant-based medicines and purchased pharmaceuticals. Men are significantly more likely than women to consult a biomedical professional to treat a natural illness. Men do not use biomedical care more often than women because they have stronger faith in its efficacy, nor because they are less healthy than women. Women’s responsibilities to household maintenance, food provisioning and preparation, commerce, and childcare present significant challenges to seeking healthcare away from home, and these are challenges that men do not fully share. While I am not denying that women can wield power and influence, these results do reflect gendered dimensions of marginalization among Mikea. Profound gendered inequalities result from local politics, in which women are often unrepresented or underrepresented, formal and informal social institutions and modes of property governance that privilege men, especially elder men, and the fact that new patterns of resource access often disproportionately negatively impact women’s autonomy and economic opportunities (Brockington 2001; Bandiaky 2008; Nyamu 2000; West et al. 2006).

8.3 Significance of the research findings

8.3.1 Significance to theory

A theme throughout this dissertation has been vulnerability, the production of which results from a process related to a group’s or individual’s cumulative exposure to contingencies and stress, difficulty coping with them, and risk of harmful consequences (Adger 2006; Yaro 2004). Among participants in this research project, security, satisfactory subsistence, cash income, and individual and group identity are contingent on access to natural resources. Mikea participants’ ability to actively and sufficiently cope with drastic social and environmental change depends on flexible access to those resources and opportunities to use them strategically.
In the past decade changing markets, increased population and competition for resources due to migration, prolonged drought, rising prices for purchased goods, and the gradual deployment of new policies aimed at conserving and regulating the use of natural resources in the region have influenced the development of a number of “productive bricolage” (Batterbury 2001: 483) livelihood strategies that combine agricultural, non-agricultural, subsistence and market-oriented activities. Despite these creative strategies, relatively asset-poor Mikea are among the least likely regionally to be able to forego the immediate returns and long-term benefits derived from natural resources without negative social, economic, psychological, and biological implications for wellbeing (Oliver-Smith 1996; UNDP 2006; Marcus and Kull 1999).

**Representation and the production of vulnerabilities**

The exercise cultural power aims to direct or manipulate, through ideological mechanisms and through force, human and behavior on varying socio-cultural scales (Foucault 1982, 1997; Gramsci 1971; Holloway 2005; Rose et al. 2006). Escobar (1988) has highlighted the significance of power in producing representations of reality, including representations of different regions, countries, or peoples as “third world” or “developing.” Mikea Forest environmental discourse focuses on deforestation, which has been a key global environmental issue since the 1980s and is bound to other issues of global concern including biodiversity loss, climate change, and desertification (Adger et al. 2001). Spectacular vistas, rare species, and exotic faces from developing nations are powerful images that become conceptually linked to crises of global magnitude, implying both a contributing cause of and possible means to mediate the coming global catastrophe. Such representations help to sustain dominant modes of thinking and modes of practice, including the political rationalities and practices of mainstream conservation and development that simultaneously play roles of project, profession, industry, and
moral mission on the Malagasy national political stage. This process culturally produces needs and managerial authority. It is contingent on the effective marketing of visual, verbal, and textual imagery that creates relationships between global consumers and environmental objects that exist in distant locales. This process has significant implications for human-environment relationships in the locales in which interventions are executed (Igoe 2010: 4, 12).

Thus, cultural representations and material experience should not be considered in dichotomous terms, but rather as mutually constituting the production or transformation of social and social-environmental relationships. In the Mikea Forest Region, the representations and ideas that facilitate PA establishment reproduce and reinvent unequal social relations across scales, further entrenching institutionalized forms of discrimination, amplifying local social and economic inequalities, and affecting “myriad marginalizations and inequalities enforced on smaller and smaller scales” (Brockington 2003: 29). Policies are justified by representations of environmental deterioration, rurality, and indigeneity. For self-identifying Mikea, to be seen deviating from official representations of cultural authenticity constitutes criminal action (at worst) or falseness (at best). Force is embodied regionally by threat of fines, harassment, or eviction, which increase insecurities and fracture the social flow of doing. In the process, one group’s power, or capacity to do, is transformed into its converse through the threat of force (Holloway 2005: 22-39).

As this social transformation takes place, the social environment and social-environment relations, including subjective freedoms and the capabilities, are fundamentally altered. Among Mikea participants, living within PA boundaries under the strongest subsistence restrictions predicted less diversified livelihoods, higher food insecurity, and poorer average nutritional status among adults and children when compared to people living outside of PA boundaries. In
addition, social vulnerability was increased among people who are more economically and socio-politically disadvantaged in the broader context of Malagasy society. If the received wisdoms that justified formal recognition of the indigeneity of so-called “true Mikea” and guided the development of rules about residence and resource use within PA boundaries were accurate, we would not expect such poor outcomes among those who are, according to representatives of Madagascar National Parks, being protected from harm. Rather, these beliefs have justified a lack of attention to the experiences of Mikea in reference to resource poverty, livelihoods diversification, and socio-political marginalization, have increased existing regional social and economic inequalities, and have created new ones.

*The social production of health*

Ecosocial theory, elaborated by Nancy Krieger (1994, 2001) seeks to understand the ways that people biologically incorporate the material and social world in which they live through pathways formed by social processes and biological possibilities and constraints (Krieger 2001; 2005). Like political-economic and political-ecological approaches to health, ecosocial theory centers on the idea that both health sciences and human health are fundamentally social and historical. I asked whether variables associated with proposed pathways of embodiment predict perceived health and perceived morbidity among Mikea participants. The regression model predicting perceived health did not support the hypotheses that proposed experience-contingent pathways of embodiment are significantly associated with perceived health, even though inclusion of socio-economic status and an interaction variable of PSYCHOSOCIAL STRESSORS X SOCIAL SUPPORT did contribute to the parsimony of the model. The regression model predicting perceived morbidity supported the hypothesis that social support protects against morbidity, but only when social support is assessed multidimensionally.
This supports the idea that social support may be beneficial to individuals’ abilities to cope with physical and psychosocial stressors, and can work to counter psychosocial processes that can negatively affect pathogenic and psychological outcomes. In the model that I presented, the variable for social support that contributed the most explanatory power to the statistical model was one that included measures reflecting two theoretically distinct conceptions of social capital that appear in the literature on social support: one based on the concept of social network resources (Bourdieu 1986; Lin 1999), and one based on social integration (Durkheim 1897; Coleman 1988, 1990; Putnam 2000). This implies multidimensionality in the types of socially derived resources that promote health, as well as a potential pathway by which individual perceptions related to one’s social relationships and intersubjective aspects of culture that facilitate social integration function dynamically to protect individual wellbeing.

Biocultural research has demonstrated that increasing integration into markets may have positive, negative, or ambiguous effects on the health of people experiencing rapid socio-economic transitions (Byron 2003; Godoy et al. 2005; Godoy et al. 2005b; Hunt 1989; Leatherman 1994, 2005; Wirsing 1985). I found that market participation and livelihoods diversity are both positively and significantly associated with perceived health. I also found social support to be protective against perceived morbidity. I conclude that people who are able to maintain a high degree of involvement in markets, self-sufficiency of subsistence, and very diverse livelihoods portfolios may be better able to cope with environmental and social challenges, and as a result may feel better, report being healthier, and report fewer health problems than others who experience more constraints.

Although public health administrators and clinicians claim that people living in the most rural areas of the region choose not to use biomedical services because they lack education, my
research shows that costs, perceived morbidity, and accessibility are key factors in deciding whether or not to seek biomedical consultation among Mikea. Education is a conventional and sometimes highly successful public health strategy (Anand and Ravallion 1993; Baker et al. 1997; Daar et al. 2002; Rosenstock 1966). However, this is not because formal education increases people’s belief in the scientific efficacy of biomedicine. It is because formal education is associated with socioeconomic status, the quality of social and physical environments, and increased national investments in public health that improve accessibility of health services (Caldwell 1986: 172). An important part of wellbeing is the ability to act in order to maintain one’s health and to seek treatment for health problems that arise. Southwestern Malagasy maintain a pluralistic health system that meaningfully integrates traditional ecological knowledge, social practice, and biomedical expertise and technology. The use of biomedical resources is sometimes a more desirable option to effectively treat natural sicknesses, but is largely inaccessible to women, those with the most health problems, and to those with the least financial resources.

These results support the idea that where people’s options are increasingly limited, vulnerability is increased. They also support claims of the livelihoods approach, which emphasizes the significance of opportunities in the production of wellbeing and recognizes that poverty and wellbeing are complex states comprised of elements that cross multiple domains of human life. These elements include a number of substantive capabilities, including the ability to maintain security, the ability to maintain one’s health, access to education and cultural institutions, access to social network resources and social support, and the ability to provision one’s family in culturally appropriate ways, as well as the ability to access markets and earn income (Becker 1993[1964]; Bourdieu 1986; Chambers 1995; Cleaver 2005; Ellis 1998, 2000;

8.3.2 Significance to policy

Despite a proliferation in the discourses of “people-oriented conservation,” “sustainable development,” and “people in parks” throughout the 1990s and 2000s, and diversity worldwide in the way that different types of PAs are managed in respect to human activities, restrictive PAs have been and continue to be established in ways that involve the systematic denial of residents’ human rights in ways that exacerbate existing inequities and reduce people’s ability to maintain health and social wellbeing in the face of hardship (Colchester 2004; Miller et al. 2011; Nepstad et al. 2006). Even without geographic displacement, resource poverty pushes people’s abilities to cope with challenges to a breaking point, while institutional bias restricts access to legal means of seeking redress or compensation for loss of resources, violence or exploitation (Agrawal and Redford 2009; Cernea and Schmidt-Soltau 2003; Colchester 2004). The costs of PA establishment are not only borne primarily on a local scale, but the distribution of costs within villages and households can result in profound inequity (Brockington 2003; Carret and Loyer 2003; Coad et al. 2008).

Advocates of formal environmental protection argue that PA establishment is associated with benefits of living near PAs due to the provision of ecosystem services, poverty alleviation and increased food security through rural development projects, and with the provision of healthcare services and sanitary infrastructure by governments or by conservation and development groups (Butler and Olouch-Kasura 2006; CI 2011; Daily et al. 1997; Wilkie et al. 2006). However, such generalized assertions regarding positive benefits to human health and welfare mask significant social and economic inequalities that exist across scales, within regions,
and even within particular localities that are affected by the establishment of PAs (Kremen 2005; McCauley 2006: 27). This is especially true in countries like Madagascar that seek to expand PA networks to foster national economic development, but lack the institutional capacity to ensure that loss of resource access does not cause harm to mostly rural, subsistence dependent population. In order even begin to compensate for lost access to territory and health sustaining resources, people experiencing such transitions must have increased access to equitable financial institutions and credit markets, markets for seed, agricultural inputs, and agricultural outputs, reliable water sources for irrigation, and access to transportation, education, health services, and agricultural extensions (Dear and McCool 2010: 106-107; Zeller et al. 2000: 10). This is especially true when PAs are established in very geographically remote regions where resources may be less abundant or less productive, where households rarely have access to markets, and people who are nonetheless expected to comply with new rules governing resource access are often the last to be provided with social services (Wilkie et al. 2006: 427). In the Mikea Forest region, access to natural resources that sustain livelihoods, health, and traditional medical practice is changing while the accessibility of social services and national infrastructure is actually decreasing.

Observed variation in nutritional status among Mikea participants is not simply an effect of geography. Average adult stature does not vary significantly among the three sites, indicating that people who are adults now may have experienced exposure to comparable levels of nutritional stress during their growth and development. This, coupled with evidence of high rates of undernutrition and wasting among children at Ampijilova, implies that people born in the past three to ten years living in Ampijilova are experiencing significantly more nutritional stress than their parents did during childhood, at least relative to other people in the region. Gendered
disparities in income, nutrition, perceived health, and access to healthcare are associated with
gendered patterns of labor, mobility, and child rearing, but are exacerbated by environmental
policies and a lack of access to infrastructure.

In the Mikea Forest Region, there are significant gaps among prescribed policy, realized
legislation and protocols, and micro-regional conservation and development practice. Rather than
empowering people to “negotiate on equal terms with project proponents” (Goodland 2004) as is
the intent of international norms for recognizing the rights of socially and politically
marginalized peoples, the discourse of Mikea indigeneity mystifies Mikea identity, and
naturalizes material poorness and social marginalization that many Mikea experience in the
broader social context. This has excused a lack of attention to the needs of Mikea people in the
context of rapidly changing social and environmental relationships, with a major result being
extreme disparities in the abilities of people to cope with change in terms of livelihoods and food
insecurity, nutritional status, health and the ability to seek healthcare.

When local experience runs counter to generalized conceptions of social life and human-
environment interactions, questioning dominant discourses and adjusting policy and practice
accordingly can enhance knowledge about particular phenomena and local processes, and lead to
improved practice and outcomes. Practitioners developing and administering environmental
protection policies in the Mikea Forest region can achieve more just and democratic policies, and
can work to mitigate the unintended negative consequences of policies that are already in place.
But better practice cannot be based on received wisdoms about cultural difference or indigenous
environmentalism. Rather than basing policies on cultural distinctions that do not reflect local
history or norms of identity and lifestyle, PA policies and normative practice should be amended
to substantively foster respect for residents’ dignity and human rights, including consideration of
a broad range of people, Mikea as well as non-Mikea, who are socially and economically vulnerable because of restricted capacity to assert their interests in a democratic manner.
REFERENCES


Gezon, L. 1997. Institutional structure and the effectiveness of integrated conservation and

—. 2000. The changing face of NGOs: structure and communitas in Malagasy conservation and
development. *Urban Anthropology and Studies of Cultural Systems and World Economic

—. 2002. Marriage, kin, and compensation: a socio-political ecology of gender in Ankarana,

*Political Ecology Across Spaces, Scales, and Social Groups*. Edited by S. Paulson and L.
Gezon. New Jersey: Rutgers University Press.

and concepts," in *Social Change and Conservation. Environmental Politics and Impacts

Glick, P., and F. Roubaud. 2006. Export processing zone expansion in Madagascar: what are the


Godoy, R., M. Gurven, E. Byron, V. Reyes-Garcia, J. Keough, V. Vadez, D. Wilkie, W.

economies on the well-being of indigenous peoples and on their use of renewable

capital, wealth and nutrition in the Bolivian Amazon. *Economics and Human Biology*
3:139-162.

Godoy, R., E. Zeinalova, V. Reyes-Garcia, T. Huanca, H. Kosiewicz, W. Leonard, S. Tanner,
and TAPSBoivianStudyTeam. 2010. Does civilization cause discontent among
indigenous Amazonians? Test of empirical data from the 'Tsimane' of Bolivia. *Journal of
Economic Psychology* 31:587-598.


Humbert, H. 1927. La destruction d'une flore insulaire par le feu principaux aspects de la végétation à Madagascar. Mémoires de l'Académie Malgache 5:1-78.


Popkin, B. M. 2002. Part II. What is unique about the experience in lower- and middle-income less-industrialised countries compared with the very-high-income industrialised countries? The shift in stages of the nutrition transition in the developing world differs from past experiences! *Public Health Nutrition* 5:205-214.


Renfrew, D. 2007. "We are all contaminated." Lead Poisoning and Urban Environmental Politics in Uruguay, State University of New York.


Statacorp. 2007. Stata Statistical Software: Release 10. College Station, TX: StataCorp LP.


Tiwari, M. 2009. Poverty and wellbeing at the 'grassroots'--how much is visible to researchers? Social Indices Research 90:127-140.


APPENDIX A

METHODS OF DATA COLLECTION

This table summarizes formal methods of major data collection and sample sizes, Seasons 1 and 2.

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Description</th>
<th>Season 1 (January 1-March 1, 2009)</th>
<th>Season 2 (June 10-August 12, 2009)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus groups (Appendix B)</td>
<td>Questions were pre-formulated in order to gain information related to the stressful or distressing events and situations that people in each site frequently experience.</td>
<td>Conducted in each field site during Season 1 only. Used to guide development of Psychosocial stress survey. Focus groups were segregated by sex, and facilitated by a sex-matched research assistant. Focus groups ranged in size from 10 to 20 attendees.</td>
<td>NA</td>
</tr>
<tr>
<td>Questionnaire (Appendix C)</td>
<td>Individual and household characteristics; material and social capital; livelihoods and income (farming, foraging, herding and commerce); food insecurity, dietary diversity and hunger.</td>
<td>Sample size: n=212 total adults (Andalambezo: n=75 adults; Ampijilova: n=34 adults; Mañono: n=103 adults)</td>
<td>Sample size: n=215 adults (Andalambezo: n=74 adults; Ampijilova: n=33 adults; Mañono: n=108 adults)</td>
</tr>
<tr>
<td>Anthropometry</td>
<td>Measurements: for infants (birth to 36 months): length (cm) and weight (kg); for children and adolescents (36 months to 20 years): skinfolds (triceps, biceps, subscapular and suprailiac; mm), stature (cm), mid-upper arm, waist and hip circumference (cm), and weight (kg). Adults (over 20 years): stature (cm), weight (kg), and waist and hip circumference (cm).</td>
<td>Sample size: n=557 total adults (Andalambezo: n=60 adults, n=95 sub-adults; Ampijilova: n=29 adults, n=52 sub-adults Mañono: n=105 adults, n=216 sub-adults)</td>
<td>Sample size: n=487 total adults (Andalambezo: n=53 adults, n=78 sub-adults; Ampijilova: m=22 adults, n=43 sub-adults; Mañono: n=95 adults, n=196 sub-adults)</td>
</tr>
</tbody>
</table>
ENGLISH LANGUAGE VERSION

1. If someone is experiencing a difficult situation with people in their household, what might they do? Ex: Talk to someone, change behavior, etc.

2. If someone feels that they are being cheated or that they are in an unjust situation, what might they do?

3. What causes a person to have bad ideas? What are the consequences for the community? If someone in the community is behaving badly toward others, how do people in the community respond?

4. Why do bad things happen to good people?

5. What types of things might cause someone to be possessed by spirits?

6. What are the causes and consequences of a life with many difficulties?

7. Which is more important—rules of the ancestors, rules of the people, or rules of the Malagasy government? What is the difference? Why?

FRENCH LANGUAGE VERSION

1. Si quelqu’un dans le village expérience un situation très difficile avec des gens dans leur ménage ou dans leur communauté, qu’est on peut faire ? Ex : Parle avec les amis, ou avec quelqu’un dans la famille ? Change leurs comportements ?

2. Si quelqu’un se sentir floué où a des expériences qui ne sont pas juste, qu’est on peut faire ?
3. Qu’est ce que la cause de olo raty hevitse ? La solution ? Qu’est ce que le réponse de la communauté ? Quelles sont les conséquences pur la communauté ?

4. Pourquoi est ce que les gens qui sont bien expérience des choses mauvais dans la vie ? Où est le contrôle ?

5. Si on est dévoré par des esprits, qu’est que c’est la cause ?

6. Quelles sont les causes de une vie avec beaucoup des problems ? Quelles sont les conséquences ?


MALAGASY LANGUAGE VERSION

1. Laha misy olo mandalo fotoan-sarotse na problème amin’ny fianany a olo miharo trano aminy na miharo tanà aminy—Ino ŋy raha mba ataony:
   -Miresaky amin’ny namany?
   -Miresaky amin’ny fianakaviany?
   -Sa nanova fihetsika?

2. Laha misy olo hararastin’ny olo na ataon’olo ino ñ’atany?

3. Ino no mahatonga n’olo raike ho raty hevitse?
   Ino ŋy mba hevitrin’ny mpiara-monina aminy?
   Ino koa ŋy mba fiatraikan’izany (oloraty) amin’ny mpiara-monina?

4. Nanino ŋy olo manao raha soa no matetiky ayon-draha raty?

5. Laha misy do raiky azom-panahy raty (tromba, doany…), ino ny nahatonga agy?

6. Ino iaby ŋy antony mahatonga gny fiainan’olo ho maro problèmes?
Manao akory ŋy fiaatraikan’zay anin’ny fiainany?

7. Aminaereo, ino no tena hajà na my ambony:

- ņy fombon’olo?

- ņy fombam’jaza?

- ņy lalanam-panjakana?
APPENDIX C

QUESTIONNAIRE

Individual and household characteristics; material and social capital; livelihoods and income (farming, foraging, herding and commerce); food insecurity, dietary diversity and hunger

I. INDIVIDUAL CHARACTERISTICS

1. Name (individual identifier)

2. Sex (F=0; M=1)

3. Age (exact or based on rank-order)

4. Clan

5. Mother’s clan

6. Father’s clan

7. Identity group

8. Spouse’s name (cross-identifier)

9. Religion (0=none; 1=Catholic; 2=Lutheran/Protestant)

10. Years of schooling

11. Primary livelihood (velomanpò)
II. HOUSEHOLD CHARACTERISTICS

1a. How many children do you have?
   b. Males?
   c. Females?

2a. How many live in your household?
   b. Males?
   c. Females?

3. Do you think you will have any more children (yes or no)?

4a. How many of your children are students in this village?
   b. Males?
   c. Females?

5a. How many of your children are students in another rural village?
   b. Males?
   c. Females?

6a. How many of your children are students in Morombe or Toliara?
   b. Males?
   c. Females?
7. Years of schooling for your oldest child?

8. How much (total, in Ariary) do you spend each year on your children’s educations?
III. MATERIAL CAPITAL/MATERIAL WEALTH

How many of the following items do you own?

1. Cattle

2. Goats and sheep

3. Pigs

4. agricultural land with government title (hectares)

5. inherited land (hectares)

6. ox carts

7. oxen

8. sailing canoes

9. long distance sailing canoes

10. small-mesh nets over 50 meters

11. small-mesh nets under 50 meters

12. large-mesh nets (for sharks, sea turtles, large fishes)

Which of the following items do you own?

(0 = do not own, 1 = do not own but have access to (can borrow, have sharing or sharecropping arrangement); 2 = own few ; 3 = own many)
13. poultry

14. furniture

15. oxen

16. plow

17. tiller

18. electric generator

19. television, VCD player

20. radio / tape player

21. sewing machine

22. gun

23. fish gun

24. bicycle

25. mosquito net

26. metal storage locker

27. paddled canoe

28. diving mask
29. harpoon

30. trident

31. pot

32. axe

33. Do you run a shop? (Coding: 0 = no, 1 = dokany, 2 = epi-bar)

34. How many houses do you own (including the main house and kitchen)?

35. What is the construction type of your best house? (Coding: 0 = don’t have a house, 1 = expedient lean-to, 2 = grass thatch or bark thatch, 3 = reed thatch, 4 = mud, planks, plaster, corrugated metal, 5 = stone or brick, 6=plank)
IV. SOCIAL CAPITAL

A. How easy would it be for you to obtain the following favors from someone outside your household? (0 = impossible, 1 = difficult, 2 = not difficult, 3 = easy)

1. To find someone to mind your children for a few hours while you complete a task?
2. To find someone to mind your children for several days while you are out of town?
3. To find someone who can feed you a meal?
4. To find someone who can feed you and your children a meal?
5. To find someone to travel with you to the market?
6. To borrow a cow from someone for a ceremony or to curb your suffering?
7. To borrow 2000 ariary from someone?
8. To borrow 10000 ariary from someone?
9. To borrow an oxcart from someone?
10. To find someone to take care of you when you are ill? (short term)
11. To find someone to take care of you when you are old? (long term)
12. To find someone to comfort you when you are suffering or have problems?
13. To find someone who agrees with your opinions?
14. To find someone to talk to when you have problems?

B. Social participation (respond in number)
During the past year, how many ceremonies have you attended?

15. healing festivals (bilo)?

16. circumcisions (savatse)?

17. invocations of ancestors and rites of filiation (soro, soron’anake)?

During the past year, how many ceremonies have you hosted?

18. healing festivals (bilo)?

19. circumcisions (savatse)?

20. invocations of ancestors and rites of filiation (soro, soron’anake)?
V. INCOME

A. Farming: Since the rainy season, what crops have you harvested?

[List activities a, b, c...]

Coding: 0 = none, 1 = less than 1 cartload, 2 = 1-5 cartloads, 3 = 6-10 cartloads, 4 = 11-20 cartloads, 5 = +20 cartloads

Activity a:

1a. How much did you harvest?

2a. How much do you currently have in storage?

3a. How much did you sell?

Activity b:

1b. How much did you harvest?

2b. How much do you currently have in storage?

3b. How much did you sell?...etc...

B. Foraging, including hunting, gathering, fishing, firewood collection, reef-flat gathering, net-fishing, diving: What foraging activities have you done since the rainy season?

[List activities a, b, c...]

Activity a:

4a. How frequently did you do activity a?
(Coding: 0 = monthly/sometimes; 1 = weekly/often; 2 = daily)

5a. Did you eat or sell what you produced?

(Coding: 0 = ate, 1 = sometimes ate and sometimes sold, 2 = sold)

5c. How much did you typically harvest?

(Coding: 0 = very little, 1 = 2-5, 2 = 6-10, 3 more than 10 items, baskets, buckets, gunnysacks)

each: tandrake, tambotrike, birds, octopus, crabs, sharks

basket: ovy, wild melons, silk

bucket: fish, honey

for firewood, (Coding: 0 = small bundle, 1 = large bundle, 2 = a cartload, 3 = many cartloads)

Activity b:

4a. How frequently did you do activity b?

5a. Did you eat or sell what you produced?

5c. How much did you typically harvest?

C. Herding: Since the rainy season... (Coding: 0 = never, 1 = sometimes, 2 = often)

7. How often did you rent out your cattle?

8. How often did you sell cattle?
9. How often did you sell goats, sheep, pigs?

10. How often did you sell poultry?

11. Do you milk your cattle (0 = no, 1 = yes)?

12. Do you consume the milk or sell it? (0 = consume, 1 = sell)
D. Market income: Since the last rainy season, what market sector activities did you practice? (prompt: wage labor, shop income, mobile retailing, craft manufacture).

[List activities a, b, c...]

13a. How frequently did you do activity a? (Coding: 0 = monthly/sometimes; 1 = weekly/often; 2 = daily)

14a. How much money did you earn? (Coding: 0 = none, 1 = 0-400 ariary, 2 = 400-2000 ariary, 3 = 2000-10,000 ariary, 4 = 10,000 – 30,000 ariary, 5 = 30,000-50,000 ariary, 6 = 50,000-100,000 ariary, 7 more than 100,000 ariary)

13b. How frequently did you do activity b?

14b. How much money did you earn?
VI. FOOD INSECURITY AND HUNGER

A. Food insecurity (Coding: 0 = never, 1 = sometimes, 2 = often)

1. How often have you worried that you would run out of food before being able to acquire more?

2. How often have you run out of food before being able to acquire more?

3. Have you had to ask people in other households for food?

4. Have you or your children ever been hungry at a time when you have nothing to feed them?

5. Have you or your children wanted to eat some type of food that wasn’t available? (for example, fatty meat)

6. Did you feel that you were cooking insufficient food for your family, but could not do anything about it?

7. Did you lose weight due to not having sufficient food?

8. Did people in your family lose weight due to not having sufficient food?

9. Did you ever go an entire day without eating?

10. Did you ever go two or more days without eating?

11. Did your household ever go an entire week with nothing to eat apart from carbohydrate staples?

B. Dietary diversity:
In the last week did you eat the following: (0 = no, 1 = yes)

12a. Pulses: Kabaro, lojy, tsaramaso, antake, kapike, antseroko

12b. Did you purchase what you consumed? (Coding: 0 = no, 1 = purchased some, 2 purchased all)

13a. Meats: beef, goat, sheep, pork

13b. Did you purchase what you consumed?

14a. Wild animals: Bushpig, tenrecs, wild guinea fowl, feral cat, mouse lemur

14b. Did you purchase what you consumed?

15a. Seafood: Fish, octopus, crab, shellfish

15b. Did you purchase what you consumed?

16a. Poultry: Chicken, turkey, duck, guinea fowl

16b. Did you purchase what you consumed?

17a. Eggs

17b. Did you purchase what you consumed?

18a. Dairy: Fresh milk, soured milk, yogurt

18b. Did you purchase what you consumed?

19a. Domesticated fruits: Papaya, orange, clementine, mango

19b. Did you purchase what you consumed?
20a. Wild fruits: Renala, governor’s plum, tamarind, jujube

20b. Did you purchase what you consumed?

21a. Vegetables: Onion, tomato, greens

21b. Did you purchase what you consumed?

C. Hunger

22. When was the last time you ate??

23. When you ate, did you have anything with a starch?

24. Right now are you hungry or full?

25. How many days have you gone without eating?
APPENDIX D
PSYCHOSOCIAL STRESS SURVEY

This psychosocial stress survey was developed based on results of focus groups conducted at the beginning of Season 1 data collection. Because the exposure to psychosocial stressors is heavily conditioned by context, and people living in one area may encounter different particular stressors, surveys used vary slightly from site to site.

Andalambazo

1. How often have you felt the need to discuss household subsistence problems with a spouse, children or other family members? (0=never; 1=very rarely; 2=sometimes; 3=very often)

2. Have you or anyone you know needed to seek the aid of a community leader to help you deal with problems in your household? (0=never; 1=very rarely; 2=sometimes; 3=very often)

3. How often have you felt cheated in a business transaction? (0=never; 1=very rarely; 2=sometimes; 3=very often)

4. Have you ever felt cheated by an employer? (0=never; 1=very rarely; 2=sometimes; 3=very often)

5. In your community, do you think there is filongoa? (0=no; 1=yes, but not much; 2=a lot)

6. Does your community have jealousy or olo raty hevitse? (0=no; 1=yes, but not much; 2=a lot)

7. How often do people in your community need aoly for protection? (0=never; 1=very rarely; 2=sometimes; 3=very often)
8. Do you worry about curses (vorike) or ambalavelo? (0=never; 1=very rarely; 2=sometimes; 3=very often)

9. Do you worry about poverty or insufficient livelihoods? (0=never; 1=very rarely; 2=sometimes; 3=very often)

10. Do people in this community respect the ancestors? (0=no; 1=sometimes; 3=always)

11. Do you worry about dahalo or malaso? (0=never; 1=very rarely; 2=sometimes; 3=very often)

Ampijilova

1. How often have you felt the need to discuss household subsistence problems with a spouse, children or other family members? (0=never; 1=very rarely; 2=sometimes; 3=very often)

2. How often have you felt cheated in a business transaction or in employment? (0=never; 1=very rarely; 2=sometimes; 3=very often)

3. Have you or anyone you know ever needed to seek the aid of others (friends, family, gendarmes, etc.) when you felt cheated? (0=never; 1=very rarely; 2=sometimes; 3=very often)

4. How often do you worry that the government will interfere with your life or livelihoods? (0=never; 1=very rarely; 2=sometimes; 3=very often)

5. In your community, do you think there is filongoa? (0=no; 1=yes, but not much; 2=a lot)

6. Does your community have jealousy or olo raty hevitse? (0=no; 1=yes, but not much; 2=a lot)
7. How often do people in your community need aoly for protection? (0=never; 1=very rarely; 2=sometimes; 3=very often)

8. Do you worry about curses (vorike) or ambalavelo? (0=never; 1=very rarely; 2=sometimes; 3=very often)

9. Do you worry about poverty or insufficient livelihoods? (0=never; 1=very rarely; 2=sometimes; 3=very often)

10. Do people in this community respect the ancestors? (0=no; 1=sometimes; 3=always)

11. Do you worry about dahalo or malaso? (0=never; 1=very rarely; 2=sometimes; 3=very often)

Magnono

1. How often have you felt the need to discuss household subsistence problems with a spouse, children or other family members? (0=never; 1=very rarely; 2=sometimes; 3=very often)

2. How often have you felt cheated in a business transaction or in employment? (0=never; 1=very rarely; 2=sometimes; 3=very often)

3. How often do you worry that the government will interfere with your life or livelihoods? (0=never; 1=very rarely; 2=sometimes; 3=very often)

4. Do you worry about poverty or insufficient livelihoods? (0=never; 1=very rarely; 2=sometimes; 3=very often)

5. In your community, do you think there is filongoa? (0=no; 1=yes, but not much; 2=a lot)

6. Does your community have jealousy or olo raty hevitse? (0=no; 1=yes, but not much; 2=a lot)
7. How often do people in your community need *aoly* for protection? (0=never; 1=very rarely; 2=sometimes; 3=very often)

8. Do people in this community respect the ancestors? (0=no; 1=sometimes; 3=always)

9. Do you worry about *dahalo* or *malaso*? (0=never; 1=very rarely; 2=sometimes; 3=very often)

10. Do you feel security for your family? (0=yet, lots; 1=yes, but not a lot; 3=no, none)
APPENDIX E

SEASONAL HEALTH SURVEY

SEASON 1

ENGLISH LANGUAGE VERSION

1. How would you evaluate your health at this moment? (very bad, not bad, very good, etc.)

2. Do you have any health problems right now? Do members of your household currently have health problems? If so, please list and indicate the severity of each.

3. Seasonal health recall:
   a. What are all of the health problems that you have experienced since the beginning of the season? (In following seasons, this will be changed to “What are all of the health problems that you have experienced since the last time we interviewed you?)
   b. For each of these health problems, what steps have you taken? (nothing/no action; rested until symptoms got better; medicated with traditional Malagasy medicine; medicated with drugs purchased in the market; visited a traditional healer; visited a doctor/hospital; etc.)
   c. For each health problem, what is the cause?
   d. For each health problem, has the problem been resolved or continued?
      (0=resolved; 1=condition has changed, but has not been resolved; 2=resolved)

4. How do you rate the health of the members of your household since the beginning of this season? (0 = very bad, 1 = no difficulty, 2 = good, 3 = very good)

5. Since the beginning of this season, has anyone in this household been so sick they could not do work or play normally?
6. What are the main health problems that people experience in your town this season?

7. Do you have any concerns about your health or the health of people in your household right now?

SEASON 1

FRENCH LANGUAGE VERSION

1. Comment évalueriez-vous votre état de santé général en ce moment? (très mauvais, pas mal, très bien, etc.)

2. Avez-vous des problèmes de santé en ce moment? (Si le réponse est « oui », s'il vous plaît faire une liste et de la gravité de chacun.) Avez les membres de votre ménage quelques problèmes de santé?

3. Rappeler de santé saisonnière :
   a. Quel est l'ensemble des problèmes de santé que vous avez vécu depuis le début de cette saison (Dans la saison suivante, cette question sera changé à «Est-ce que sont tous des problèmes de santé que vous avez vécu depuis la dernière fois que nous avons interrogés vous? ») ?
   b. Pour chaque problème de santé, quelles mesures avez-vous pris (rien/pas d'action; reposé jusqu'à ce que les symptômes arrêté; médicamenter avec des médicaments traditionnelles malgaches; médicamenter avec des produits pharmaceutiques achetés au marché; visité un guérisseur traditionnel malgache; visité un médecin/l'hôpital )?
   c. Pour chaque problème de santé, quelle est la cause?
   d. Pour chaque problème de santé, est le problème a été résolu, ou poursuivi?
      (0=résolu ; 1=été changé, mais n’est pas résolu ; résolu)
4. Comment évaluez-vous l'état de santé en général des gens dans votre ménage depuis le début de cette saison? (0=très mal ; 1=pas mal ; 2=bien ; 3=très bien)

5. Depuis le début de cette saison, est-ce que quelqu’un dans cette maison été tellement malade qu’ils ne purent pas faire le travaille ou jouer normalement?

6. Quels sont les principaux problèmes de santé que les personnes dans votre village expérience cette saison?

7. Avez-vous des préoccupations particulières au sujet de votre santé ou la santé des personnes dans votre ménage en ce moment?

SEASON 2

ENGLISH LANGUAGE VERSION

1. How would you evaluate your health at this moment? (very bad, not bad, very good, etc.)

2. Do you have any health problems right now? Do members of your household currently have health problems? If so, please list and indicate the severity of each.

3. Seasonal health recall:
   a. What are all of the health problems that you have experienced since the last time we interviewed you?
   b. For each of these health problems, what steps have you taken? (nothing/no action; rested until symptoms got better; medicated with traditional Malagasy medicine; medicated with drugs purchased in the market; visited a traditional healer; visited a doctor/hospital; etc.)
   c. For each health problem, what is the cause?
d. For each health problem, has the problem been resolved or continued?
   (0=resolved; 1=condition has changed, but has not been resolved; 2=resolved)

4. How do you rate the health of the members of your household since the beginning of this season? (0 = very bad, 1 = no difficulty, 2 = good, 3 = very good)

5. Since the beginning of this season, has anyone in this household been so sick they could not do work or play normally?

6. What are the main health problems that people experience in your town this season?

7. Do you have any concerns about your health or the health of people in your household right now?

SEASON 2

FRENCH LANGUAGE VERSION

1. Comment évalueriez-vous votre état de santé général en ce moment? (très mauvais, pas mal, très bien, etc.)

2. Avez-vous des problèmes de santé en ce moment? (Si le réponse est « oui », s'il vous plaît faire une liste et de la gravité de chacun.) Avez les membres de votre ménage quelques problèmes de santé?

3. Rappeler de santé saisonnière :
   a. Est-ce que sont tous des problèmes de santé que vous avez vécu depuis la dernière fois que nous avons interrogés vous?

   b. Pour chaque problème de santé, quelles mesures avez-vous pris (rien/pas d'action; reposé jusqu'à ce que les symptômes arrêté; médicamenter avec des médicaments traditionnelles malgaches; médicamenter avec des produits pharmaceutiques
achetés au marché; visité un guérisseur traditionnel malgache; visité médecin / hôpital )?

c. Pour chaque problème de santé, quelle est la cause?

d. Pour chaque problème de santé, est le problème a été résolu, ou poursuivi?

(0=résolu ; 1=été changé, mais n’est pas résolu ; résolu)

4. Comment évaluez-vous l'état de santé en général des gens dans votre ménage depuis le début de cette saison? (0=très mal ; 1=pas mal ; 2=bien ; 3=très bien)

5. Depuis le début de cette saison, est-ce que quelqu’un dans cette maison été tellement malade qu’ils ne purent pas faire le travaille ou jouer normalement?

6. Quels sont les principaux problèmes de santé que les personnes dans votre village expérience cette saison?

7. Avez-vous des préoccupations particulières au sujet de votre santé ou la santé des personnes dans votre ménage en ce moment?
APPENDIX F

FOCUS GROUP QUESTIONS—PHASE 3 (2009)

These focus groups were conducted in September 2009 at the time of follow-up visits to focal field sites. Questions 1-4 were asked to elicit reflections about how national political and economic crises, environmental policies, and drought had impacted people in the region in the previous year. Questions 5-7 were asked at the request of Bram Tucker in order to collect information relating to norms of reciprocity.

ENGLISH LANGUAGE VERSION

1. In the past year, what has affected your village the most? (Examples: drought, governmental events, conservation or ANGAP, bandits, rumors about mines or titanium sands, food insecurity, high market prices, etc.)

2. How did people in this village respond to the situations or events that you answered in the first question? What did you do or what do you think?

3. Do you have any particular concerns for your village? Are they always concerns, or are they new concerns?

4. What do you think are the most important things for the future of the people here?

5. What group in this region is most stingy?

6. What is necessary to make someone generous?

7. A man with food meets a man with no food. The first man must give what quantity to be generous? A little? Half? More than half? Or all?
1. Au cours de la dernière année, quelles événements ou situations ont affecté votre village le plus? (Des exemples : la sécheresse, les événements de la gouvernement, de la conservation ou ANGAP (*lehibe anala*), *malaso*, des rumeurs sur mines ou *fasy mainty*, l’insecurité alimentaire, des prix de marché élevés, & etc.)

2. Comment font les gens dans votre village face aux situations que vous avez cités pour la première question? Qu'avez-vous fait ou qu’est-ce que vous pensez à ces événements ou de situations?

3. Avez-vous des inquiétudes particulières pour votre village à ce moment? Est-ce que ces inquiétudes à long terme, ou sont-ils des nouvelles inquiétudes?

4. Selon vous, quelles sont les choses plus importantes pour les gens d'ici d'avoir un bon avenir?

5. Quel type de personne (Vezo, Mikea, Masikoro, etc.) dans cette région de Madagascar est le plus *matity* ?

6. Qu’est ce qu’il faut faire pour être *matarike* ?

7. Un homme avec *sakafo* se rencontre avec un homme sans sakafo. Le premier homme doit donner quel quantité de *sakafo* au le deuxième pour être matarike ? Un peu (mois que demi) ? Demi ? Plus que demi ? Ou, le tout ?