

Palms, Pastures, and Swidden Fields: The Grounded Political Ecology of “Agro-Extractive/Shifting-cultivator Peasants” in Maranhão, Brazil

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This article examines transformations associated with changes in resource use and land cover dynamics in the community of São Manoel, Maranhão state, in the eastern Brazilian Amazon. The shifting cultivator peasants in São Manoel integrate swidden fields for annual cropping, the extraction of babassu palm products, and pastures for cattle ranching. Since the early twentieth century, predominant vegetative cover patterns have been altered from species-rich mature forests to secondary succession with babassu dominant to pasture or swidden fields containing palm stands of various densities. A grounded political ecology of resource use in the area suggests that management strategies and the resulting land cover dynamics integrate site-specific decisions of peasant producers. I discuss the trajectory of production strategies in São Manoel since the establishment of the community in the 1920s, and identify the multiple dimensions affecting resource use and environmental outcomes, with an emphasis on the period following land struggles and the recovery of peasant tenure rights in the mid-1980s. The analysis indicates that socionatural trajectories that optimize resource use and address the socio-economic needs of the community include the maintenance of palm/pastures associations.

KEY WORDS: Brazilian Amazon; babassu palm; shifting cultivation; land use change.

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INTRODUCTION

Significant changes in resource use have characterized the “babassu zone” of the easternmost fringe of the Legal Brazilian Amazon² since the early twentieth century. The resulting transformation of predominant landscapes has been that of species-rich mature forests to secondary succession with dominance of babassu palms, to pasture or croplands containing palms at various densities. By examining the relationships of resource users with the biophysical environment of the central portion of the state of Maranhão, I focus this analysis on the two most relevant social segments in the regional agrarian society: peasant producers, referred to as agro-extractive/shifting-cultivator peasants, and market-oriented cattle ranchers. I investigate how the interaction between these actors in the community of São Manoel (municipality of Lago do Junco), and their insertion into the broader social structure affected their resource management strategies. By combining “political ecology” and “ecology of practice” approaches of ecological anthropology, and a multidimensional framework for the study of land use/cover change, I seek to demonstrate that resource use and land cover dynamics integrate site-specific decisions of resource users organized in their units of production, with their agency in facing broader sociopolitical and economic structures.

In 1986, with a background in agronomy, I began a 3-year contract to assist peasant communities that had recovered tenure rights eroded in the wake of land conflicts that occurred since the 1970s. As it turned out, I lived in the Mearim Valley for 8 years, most of that time working in Lago do Junco. From 1996 to 2002, I returned every year to Lago do Junco to carry out research on the interplay between socioeconomic and biophysical change. Specifically, this article draws on dissertation fieldwork carried out in three periods between 1999 and 2001. Fieldwork methodology included ethnographic and interactive interviews with key informants; the application of a socioeconomic survey to the entire community; and gathering of spatial data on landownership, land use, and land cover obtained through GIS and remote sensing. This article focuses on the qualitative analysis of events and processes leading to changes in resource use and landscape dynamics in São Manoel. A comparative approach to the role of this community within broader political–ecological trajectories and socrionatural transformations in the Mearim Valley, and the spatial analysis of land cover change are presented elsewhere (Porro, 2002).

²The Legal Amazon is a federal planning region that consists of the Brazilian states of Acre, Amapá, Amazonas, Mato Grosso, Pará, Rondônia, Roraima, Tocantins, and the portion of the state of Maranhão west of 44° W. Babassu palms occur in almost 2,00,000 km². The main area of occurrence, the “babassu zone,” lies from 2 to 7° W, and 42 to 48° W.

Maranhão's social indicators are among the lowest in Brazil.³ The state's human population density is the highest in rural areas of the Brazilian Amazon (IBGE, 2001). A large portion of colonists, squatters, and landless families still arriving in other parts of the Amazon are from Maranhão, or were settled there for significant periods. The livelihoods of more than 300,000 households in Maranhão rely on products extracted from babassu. They primarily engage in small-scale, slash-and-burn agriculture in lands covered with palms. In addition, the extraction and sale of babassu kernels carried out by women and children play a major role in household survival. Finally, the "babassu zone" of Maranhão presents a context where resource use is undergoing significant changes that are likely to occur elsewhere in the Amazon.

The next section presents approaches in ecological anthropology that constitute the basis for the theoretical formulation of a grounded political ecology. I then review anthropological research on land use, and present the framework of a grounded political ecology for the study of land use/cover change. The following section introduces the socionatural contexts of the study area: São Manoel, Lago do Junco, and the Mearim valley, including predominant livelihood strategies. And finally I analyze socionatural transformations in the region and apply the grounded political ecology framework to the analysis of land and resource use change in São Manoel.

THEORETICAL FORMULATIONS FOR THE STUDY OF HUMAN/ENVIRONMENT INTERACTIONS

The Brazilian Amazon has been one of the most common sources of studies on political and economic factors resulting in environmental degradation (Anderson, 1990; Andersen *et al.*, 2002; Browder, 1988a, 1988b, 1989; Bunker, 1985; Hall, 1989; Hecht, 1993, 1983; Hecht and Cockburn, 1989; Moran, 1981; Pompermayer, 1977; Schmink and Wood, 1992, 1987; Smith, 1982; Wood and Porro, 2002). In the "babassu zone" state policies, market developments and the structure of a differentiated agrarian society are key factors determining unequal access to and control over the means of production (Almeida, 1981; Almeida and Mourão, 1976; Amaral Filho, 1990; May, 1986; Porro, 1997, 2002; Porro *et al.*, 2003). These factors, often included in political ecological analyses of resource degradation, informed predominant strategies of resource use and the resulting patterns of vegetation. In the last two decades 'political ecology' has been an

³In 2000, Maranhão state presented the worst indices for social exclusion, poverty, formal employment, and social inequality in Brazil. Maranhão's indices for literacy and schooling were among the three lowest in the country (Campos *et al.*, 2003, pp. 151–56).

influential analytical approach integrating environmental and political understandings in social science research, "...encompass[ing] the constantly shifting dialectic between society and land-based resources, and also within classes and groups within society itself" (Blaikie and Brookfield, 1987: 17).

Preexisting social relationships, hierarchies, and agency are central aspects of practice theory, an approach that emphasizes social and cultural contexts as both medium for and outcome of the reproduction of practices by individual actors (Nyerges, 1997:8). Based on the anthropological derivations of actor centered and practice models of human action (Orlove, 1980; Ortner, 1984; Vayda, 1986), the formulation developed by Nyerges (1997, 1993, 1992) appraises individual agency in everyday social life as directly involved in the generation of practices that result in resource competition, control, and exploitation. The approach examines how conflicts emerging over access to and control of resources are incorporated into individual social lives, and alter the exploitation and management of specific resources. Focusing on the ecological significance of local socio-political dynamics, the ecology of practice relates the position of individuals in local social hierarchies to the culturally constructed mechanisms (and productive activities) adopted to exploit natural resources on which they depend (Nyerges, 1996:123, 1997:7–10). The approach assumes that the position of individuals within established social orders will determine outcomes of their relationship with the environment, and the incorporation of processes of ecological adaptation into social interactions and practices (Nyerges, 1997:9–10). Within these hierarchical systems, management strategies are shaped by heavily institutionalized social asymmetries (Nyerges, 1997, 1992).

While I draw on the ecology of practice to explain mechanisms through which resource management responds to local sociostructural conditions, I expand the focus to levels other than the very local. Grounded political ecology employs an analytical framework that is guided by a problem-centered approach, and combines multiple domains of explanation that are able to capture the temporal and spatial cross-scale dynamics involved in sociocultural transformations. I contend that the approach is therefore effective to study the sociocultural and political–ecological dimensions of resource dynamics and land use change.

Grounded political ecology assumes that land use/cover dynamics integrate temporal, spatial, and organizationally specific choices made by resource users who operate within structural constraints. Resource allocation decisions, therefore, are local responses to the conjugation of cultural, ecological, economic, historical, and political factors, often positioned at different levels within the system.

TRAJECTORIES OF ANTHROPOLOGICAL RESEARCH ON LAND USE

Land use is a concept that involves the manner in which biophysical attributes of the land are handled, and the cultural components defining the manipulation. The concept of land cover refers to the biophysical state of the earth's surface and immediate subsurface, while landscape is treated as the perspective and "material manifestation of the relation among humans and the environment" (Crumley, 1994, p. 6). Yet, the concept of land use assumes various disciplinary and paradigmatic orientations.

The use of land is fundamental to human culture and subsistence (Headland, 1997; Little, 1999; Milton, 1997; Orlove, 1980). Historical particularists gathered ethnographic data to elucidate the role of the environment and historical connections that produce cultural customs, traits, and lifestyles of a society (Boas, 1925; Kroeber, 1939; Radin, 1926). Functionalists approached land and resource use as cultural institutions that maintained the stability and cohesion of society, while meeting basic individual needs (Evans-Pritchard, 1940; Malinowski, 1922). Yet, their ethnographies treated land and resource use as passive backgrounds for the operation of culture, with little elaboration of the role played by ecological factors within dynamic contexts.

In the mid-twentieth century, theories and paradigms offered by cultural ecology (Steward, 1955), cultural materialism (Harris, 1968), and ecological anthropology (Rappaport, 1968), all shared the assumption that broader structures or systems constrained human activity. These three research traditions set the foundations for contemporary studies of human/environment interaction, although people's agency in their everyday resource allocation was not yet, itself, a critical object of inquiry (Milton, 1997).

In the 1960s, ethnoecology began to focus on knowledge needed for particular forms of resource use rather than privileging the material effects of such activities. Recent ethnoecological research has incorporated political and economic dimensions influencing the ways people interact with nature, and use the land (Alcorn, 1984; Balee, 1989, 1994; Nazarea, 1999; Posey, 1985). Archaeologists studying thresholds at which cultures change developed protocols with insights gained from the study of contemporary societies (Binford, 2001). The ethnoarchaeological paradigm contends that population density, economic subsistence, and social organization of prehistoric groups can be explained based on the understanding of their environmental and demographic circumstances.

In the last 25 years, concepts and methodologies drawn from cultural ecology, cultural materialism, ecological anthropology, and ethnoecology

inspired anthropologists to document the contributions of specific land use activities to the livelihood, social relations, and identity formation of societies facing diverse cultural and ecological configurations. Anthropological approaches to human/environment interactions and the study of land use dynamics that emerged in this period can be presented according to four perspectives.

The “ecological” research approach focuses on features directly linked to material aspects of land use change. Characterized by a wealth of biophysical data integrated with ethnographic and ethnoecological case studies, this approach is informed by theoretical and methodological bases of human ecology (Bennett, 1976, 1993; Moran, 1979, 1990, 1993). It has incorporated the analysis of households and other institutions involved in resource use (Netting, 1993). More recently it has included the use of remotely sensed data and related techniques on land cover change (Behrens, 1991; Casimir and Rao, 1998; Guyer and Lambin, 1993; Nyerges and Green, 2000; Sussman *et al.*, 1994; Wilkie, 1994).

The “political” approach situates land use change within broader scenarios of structural transformation. The approach considers multiple social actors in conflict over access and control of limited resources. Environmental degradation is analyzed according to the interaction among political and ecological variables broadly conceived, operating at local, regional, national, and global contexts (Little, 1999, p. 255). Common themes are deforestation (Painter and Durham, 1995), frontier expansion (Schmink and Wood, 1992), struggles between ranchers and small farmers (Sheridan, 1988; Stonich, 1993), and conflicts between logging companies and local communities (Peluso, 1991, 1992).

The “applied” approach considers land use dynamics from the perspective of drastic environmental and cultural change, linking theoretical constructions to a focus on social protest against livelihood change provoked by encroachment, relocations, and resettlements of impoverished populations affected by harmful development initiatives (Guha, 1989). Applied land use research assesses social vulnerability, and analyzes the objective (material impacts) and subjective (cultural constructions) aspects of the complex conjugation of physically and socially disruptive forces derived from drastic changes in human/environment interaction (Oliver-Smith, 2001; Oliver-Smith and Hoffmann, 1999).

The “interpretive” approach challenges frames of reference derived from scientific treatments to land use (Dwyer, 1996; Ingold, 1994, 2000). It addresses the subtle meanings, values, and feelings regarding spaces, places, and landscapes perceived, used, and interpreted by people ranging from isolated communities to societies incorporated within modern ways of life (Escobar, 1999).

Land use dynamics is also a central theme to geographers, beginning with von Thunen's (1966 [1875]) spatial model of concentric rings for agriculture around urban centers. Geographers interested in land use change addressed the domestication of crops (Sauer, 1952), and the dynamics of agricultural change (Goldman, 1993). Physical geographers seek to identify and analyze factors that transform natural landscapes and contribute to changes in biogeochemical cycles (Bahre, 1991; Furley, 1994; Singh *et al.*, 2001). Cultural geographers focused on land use as economic strategies (Atkins *et al.*, 1998), produced ethnographic studies on the importance of land use to social relations and cultural survival (Fondahl, 1998), and addressed the concept of landscape as mediated through human experience (Cosgrove, 1985). Geographers' major contributions to the study of land use dynamics include influential theoretical approaches on the political ecology of resource use (Blaikie and Brookfield, 1987; Bryant, 1992; Bryant and Bailey, 1997; Peet and Watts, 1996). In addition, geographers actively engaged in the human dimensions component of global change research (Liverman *et al.*, 1998; Meyer and Turner, 1994; Turner *et al.*, 1990; Walker *et al.*, 2000).

Grounded Political Ecology and Land Use Transformations: Analytical Framework

The framework of a grounded political ecology represents the integration and reinforcement of theories centered on the role of individual action, human–nature interactions, relational–rationality, and the structural effect of social formations. The framework (Fig. 1) considers specific historical moments of socioeconomic and biophysical contexts. “Socioeconomic configuration” is defined as the specific social relationships and related conditions through which individuals interact and produce goods and services. Similarly, elements of the natural environment are referred to as “biophysical configuration.” The framework therefore integrates social and biophysical contexts at distinct historical moments, and their joint configuration is designated as “socio-natural ensemble.”

Because socioeconomic configurations can potentially include distinct, articulated modes of production, they are represented by aggregations of individuals (resource users), and the relationships among them. Resource users' heterogeneity is symbolized by ovals A, B, and C, which correspond to individuals with unique social status (S), economic conditions (E), and political power (P). The aggregate social configuration (at the level of communities or other institutions) will then be characterized by, among other things, particular conditions of social stratification, economic inequality, and political organization.

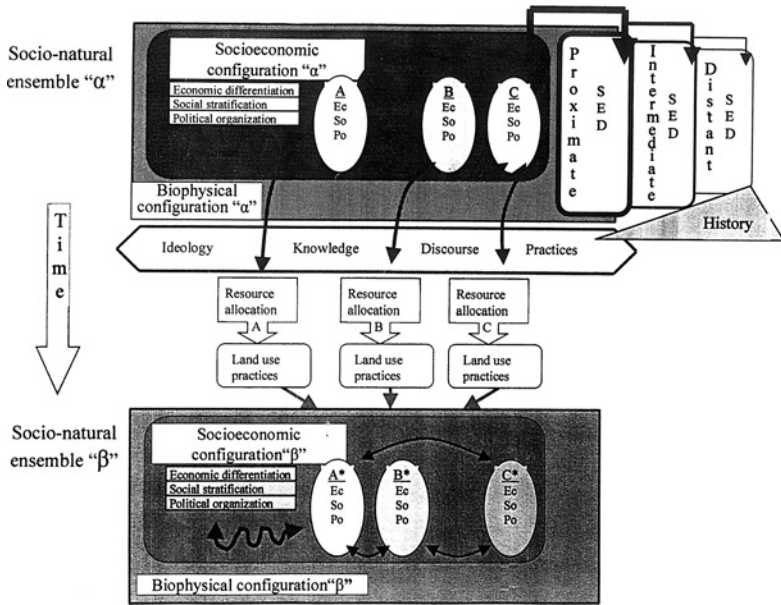


Fig. 1. Analytical framework for the study of socio-natural transformations.

Although the nature of benefits that individuals aim to maximize is the subject of distinct theoretical appraisals, the framework considers allocation decisions based on configurations of socioeconomic variables operating according to hierarchical principles. Figure 1 shows the influence of variables designated as socioeconomic drivers on resource allocation. These socioeconomic drivers are hierarchically conceptualized as operating at proximate, intermediate, and distant spatial and organizational scales. This portrayal is intended to capture the notion that land managers are economic agents who determine how to allocate the resources at their disposal by engaging in complex decision processes that take into account the opportunities and constraints presented to them by proximate socioeconomic drivers. The three-tiered hierarchy is a heuristic device: the focus on three levels is intended to be suggestive rather than definitive. The hierarchy nonetheless reflects the familiar micro, meso, and macro scheme, and is sufficiently detailed to encompass the main arguments explaining land use and environmental change (Wood and Porro, 2001, p. 15).

The framework assumes that resource users share to one degree or another particular combinations of social, economic, and political attributes, and embody specific demographic features (expressed in the diagram via distinct fillings in the ovals A, B, and C). This results in varied perceptions

of structural constraints, in a diversity of benefits to maximize, and, eventually, in distinct underlying principles for resource allocation. These assumptions imply that a land use practice that is rational to individual A may not meet the needs of B.

The dialectic interaction among individuals and the structures of which they are part is captured in the framework. The right-hand portion of the internal boxes in the socioeconomic configuration shows individual conditions. The left-hand side of those boxes (and their filling pattern) portrays aggregate social–structural conditions for those features. The interaction is represented by curved arrows connecting individuals A, B, and C. Structural transformations throughout time are represented in the framework by changes in the strength of relationships and different positions of individuals. The framework, however, perceives history as a necessary, but not sufficient source of information to explain present transformation. Moreover, the presence of humans is perceived as fundamental to the application of what can be gained by assimilating and reflecting on what history informs.

The remainder of this article applies the analytical approach and the critical components of the framework to the study of socionatural transformations in the Mearim Valley, and particularly, the community of São Manoel.

SOCIONATURAL ENSEMBLES OF SÃO MANOEL, LAGO DO JUNCO, AND THE MEARIM VALLEY

Biophysical Configuration

São Manoel is a village in the countryside of Lago do Junco, a municipality in central Maranhão. At the easternmost part of the Brazilian Legal Amazon, Lago do Junco is in the midportion of the 111,000 km² wide Mearim river basin, the largest in the state. Topography throughout the region is flat to slightly rolling, with elevations reaching no more than 100 m above sea level. Local climate features a dry season of 5–6 months (June to November) each with less than 4 in. of rain. Monthly average temperatures range from 24°C to 29°C, with minimum lows at 18°C, and maximum highs of 36°C. Annual rainfall ranges from 40 to 60 in., allowing rain-fed cropping during the rainy season. Soils are mostly of medium fertility, mainly oxisols, ultisols, and alfisols, though lands near waterways have their fertility enhanced by alluvial deposits.

Today, Lago do Junco's vegetation corresponds to the terrestrial eco-region of Maranhão Babassu Forests, included in the tropical moist

broadleaf forests biome (WWF, 2002). Even though babassu forests are not as rich as other Amazonian eco-regions in terms of biodiversity,⁴ these forests play a critical ecological role as a buffer zone between dryer areas of the Brazilian Northeast and the evergreen forests of the Amazon. Species-rich moist deciduous forests were originally featured in the area, but have almost disappeared from the entire valley. Small forest fragments are found only on the hilltops in less accessible terrain. Gallery forests and seasonally flooded grasslands occur at the edges of rivers and waterways.

The most relevant ecological feature of the region is the secondary forest of babassu palms. A species that grows sparsely in the original habitat of primary forests, the babassu palm (*Attalea speciosa*, formerly *Orbignya phalerata*),⁵ proliferates after land clearing, and constitutes a dramatic example of “oligarchic forests” in the Amazon (Peters, 1992; Peters *et al.*, 1989). Initially disseminated by indigenous peoples (Balee, 1988), high-density babassu stands cover more than 100,000 km² in Maranhão. The palm has been described as “tree of life” (Anderson and Anderson, 1985) or “subsidy from nature” (Anderson *et al.*, 1991; Hecht *et al.*, 1988). Recent political economic trends affecting the region, referred to as “the modern tragedy of the non-commons” (May, 1986), dramatically highlighted the importance of babassu to the systems of production and social reproduction of human populations relying on a wide range of its products and services.

Socioeconomic Configuration

Lands near coastal areas and along the Mearim river were inhabited by descendents of indigenous populations, and by descendents of former slaves and tenants from failed sugar cane and cotton plantations. Beginning in the late nineteenth century (although more strikingly from the 1920s to the 1950s), tens of thousands of migrant families originally from the dry Brazilian Northeast settled the central and western portions of Maranhão’s frontier. Presently, over 300,000 families of peasant producers live in Maranhão, primarily engaging in production for household consumption and practicing small-scale shifting cultivation in association with the extraction of babassu products. The majority of these “agro-extractive/shifting-cultivator peasants” settled the land as squatters, but only a fraction of them had achieved

⁴According to WWF (2002), 112 mammal and 268 avian species were recorded in Maranhão’s Babassu Forest eco-region, compared, for example with 149 and 153 mammal species, and 517 and 527 bird species respectively recorded for the Tocantins/Pindaré, and the Xingú-Araguaia moist forests.

⁵Anderson (1983) and Anderson *et al.* (1991, p. 205) describe the taxonomic confusions pertaining to the classification of babassu.

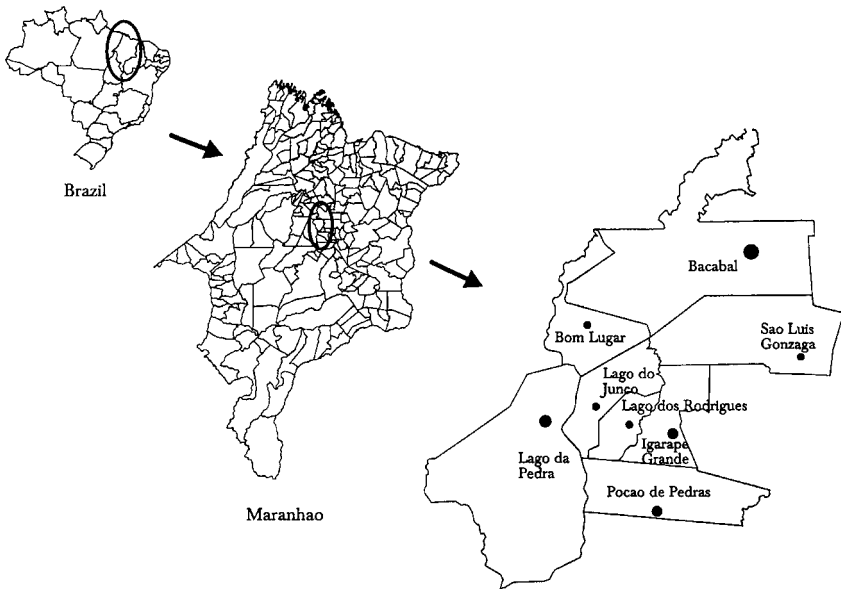


Fig. 2. Location of Maranhão, the Mearim valley, and Lago do Junco.

tenure security by 1996.⁶ In contrast to most “caboclos” (Brondizio and Siqueira, 1997; Nugent, 1993; Parker, 1984), peasants in the “babassu zone” live in relatively large villages (*povoados*), practicing communal resource and labor allocation systems.

Established in the 1920s, Lago do Junco remains a predominantly rural municipality. In addition to the town, Lago do Junco comprises 36 villages, 10 with more than 50 habitations, populated by more than 300 people. In year 2000, the population of Lago do Junco reached 9833 inhabitants (in 597.4 km²), 71% residing in “rural” areas. A rural household in Lago do Junco included an average of 4.7 people, as opposed to 4.3 people for urban households (IBGE, 2001). Pedreiras and Bacabal, less than 100 km from São Manoel, are the largest regional markets and urban centers, with 1996 populations of 45,000 and 70,000, respectively (Fig. 2).

Resource use in Lago do Junco and in most of Maranhão is constrained by a high concentration of landownership. The moderate demographic densities in the municipality and in the entire state (17 inhab./km²) are misleading. In areas that remain occupied by peasants, concentration of landownership critically increases *de facto* population pressure on resources. Table I

⁶According to the 1996 Brazilian agrarian census (IBGE 1998), 122,000 of the 360,000 landholders in the state of Maranhão were classified as landowners, whereas the other two thirds were either squatters (140,000) or tenants (98,000).

Table I. Tenure Security and Concentration of Land Ownership in Lago do Junco

	<1 ha	1–10 ha	11–50 ha	51–200 ha	201–500 ha	>500 ha	Total
Area (ha) of landholdings (%)	361 (1.1)	1,561 (4.6)	3,661 (10.8)	11,772 (34.8)	7,870 (23.2)	8,628 (25.5)	33,854
Number of landholdings (%)	525 (33.5)	689 (44.0)	174 (11.1)	143 (9.1)	29 (1.9)	7 (0.4)	1,567
Landholders with tenure security	32	111	142	129	22	7	443
Landholders with no tenure security	493	578	32	14	7	0	1,124

Note. Brazilian agricultural censuses include four categories of landholders (*proprietários*, *arrendatários*, *parceiros*, and *ocupantes*). Based on these categories, Table I classifies landowners (*proprietários*) as landholders with tenure security, and *arrendatários* (sharecroppers), *parceiros* (tenants), and *ocupantes* (squatters) as landholders with no tenure security.

Source. Instituto Brasileiro de Geografia e Estatística–IBGE 1998.

shows that 89% of Lago do Junco landholdings⁷ were smaller than 50 ha and occupied an area of just 5583 ha. If we assume restriction of access to private property, population density in these areas rises to about 120 people/km². One third of the 1567 landholdings in the municipality were smaller than 1 ha in 1996. Table I also shows that only 20% of the landholdings smaller than 50 ha were held by producers with tenure security. Conversely, seven estates (0.4% of the landholdings) occupied 25% of the land. These numbers reflect the agrarian situation of a municipality where a rural elite of less than 40 landholders (with areas greater than 200 ha) controlled half of the territory.

Since the mid-1980s, peasants have settled on lands expropriated, acquired, or adjudicated by the state, and lands recovered through direct negotiations with landowners or through the mediation of the Church. Prompted by an active social movement, a sequence of land conflicts has reduced the concentration of landownership in Lago do Junco and resulted in the recovery of 18 estates totaling more than 6000 ha, directly benefiting some 450 families (Table II).

The village of São Manoel is partially located in one of these estates. The origins of São Manoel also go back to the 1920s, when nonindigenous occupants settled the lands where the village now is located. Most of the pioneer settlers of São Manoel were northeastern migrants who encountered and interacted with *caboclo* dwellers.

Today, the name São Manoel has three distinct although complementary usages. The first refers to the physical location of one of the largest villages in Lago do Junco, which comprises 88 dwellings and several service buildings. The second corresponds to São Manoel as an institution, or the community of 116 households who live in the village and vicinity. The third usage designates a policy initiative. Since 1989 São Manoel is a settlement project⁸ established on a 470 ha estate, which benefits

⁷Land concentration data were obtained from IBGE's 1995–96 agricultural census and refer to the municipality of Lago do Junco before the dismembering of Lago dos Rodrigues. Landholding is the translation for *estabelecimento agropecuário*, a concept employed by IBGE, defined as “every continuous land area—regardless of size, location, and number of parcels—used by an individual landholder for agricultural purposes” (IBGE, 1998, p. 21). These *estabelecimentos* do not always correspond to the total number of households that live and work in rural areas. The comparative analysis of number and area of *estabelecimentos agropecuários*, however, still is the best proxy to examine land concentration in Brazil.

⁸Settlement project (*projeto de assentamento*) is the terminology that Brazilian land agencies have used since 1985 to name areas under agrarian reform interventions. A single terminology used at the national level, however, did not take into account diverse regional contexts. In areas such as central Maranhão, a substantial portion of these so-called settlement projects were installed on lands with long-term peasant occupation, although such settlements were often neither recognized nor legalized by government agencies. According to the Agrarian Reform National Plan, settlement projects carried out by INCRA include plot demarcation, subsidized credits for food (*crédito alimentação*), housing (*crédito moradia*), supplies (*crédito*

Table II. Chronology of Land Tenure Recovery by Peasant Producers in Lago do Junco

Year	Name of estate/property	Size (ha)	Families	Mechanism for tenure recovery
1980	São José da Conquista	448	32	Purchase/church intervention
1985	Pau Santo	1014	50	Expropriation (federal govern.)
1986	São Manoel	470	31	Acquisition/Adjudication (state)
1987	Aparecida de Ludovico	369	33	Acquisition (state government)
1987	Santa Zita	150	18	Acquisition (state government)
1988	Cajazeiras	125	12	Purchase/church intervention
1989	São Sebastião	230	12	Adjudication (state government)
1989	Centro do Aguiar	203	20	Acquisition (state government)
1990	Centro do Acrísio	194	24	Donation by rancher
1990	O. D'Água (Endrex) Altamira	510	82	Acquisition (state government)
1994	Sítio Novo	231	14	Acquisition (state government)
1994	Macaúba	80	10	Acquisition (state government)
1994	São Domingos	200	15	Acquisition (state government)
1995	Santa Rita	459	15	Expropriation (federal govern.)
1996	Vila São João	268	20	Expropriation (federal govern.)
1996	Vila São Francisco	396	15	Expropriation (federal govern.)
1998	Vila São José (Lagolândia)	90	8	Adjudication (state government)
2001	Fazenda Alegria	565	35	Acquisition (state government)
	Total	6002	446	

Note. Year in the first column refers to the beginning of the land struggle or negotiation.

Source. Lago do Junco rural workers' union (personal communication).

31 long-term occupant peasant families. For three years these families were engaged in a land struggle with a rancher until the state government adjudicated and purchased part of the land. With the settlement project, São Manoel families maintained common land tenure through an association of producers.

Livelihood Components that Affect Land Use and Land Cover in São Manoel

Landscape features in São Manoel are intimately related to human intervention. Patterns of land cover are the outcome of the actions of peasant producers and ranchers who allocate resources among the three most important activities in the region: swidden fields for annual crops (rice, maize, manioc, and beans); extraction of babassu products; and most recently, cattle raising. Preferential adoption and the choice of management

fomento), and productive activities, the latter funded by the National Program for Household Agriculture (PRONAF, *Programa Nacional de Agricultura Familiar*), and the National Program for Credit to the Agrarian Reform (PROCERA, *Programa Especial de Crédito para a Reforma Agrária*). Basic infrastructure in settlement projects should include roads, electricity, water supply, and schools (INCRA, 1984, 2001).

strategy will determine the predominance of advanced, intermediate, or initial stages of secondary succession combined with and subsequent to agricultural fields. It will also determine the extent of land covered by pastures with high, medium, or low densities of babassu palms.

Babassu Extraction

Products and services obtained from babassu constitute a significant portion of monetary and nonmonetary income for local residents. Kernels are sold or traded for basic supplies. Most kernels are then sent to processing plants in Bacabal, Pedreiras, São Luis, or Teresina, and transformed into oil. In Lago do Junco, babassu kernels are partially processed at the Agroextractive Cooperative.⁹ Babassu oil competes with palm oil and palm-kernel oil in the cosmetic and food industries, while oil by-products are suitable for animal feed. Babassu oil is produced domestically by cooking a paste obtained by crushing roasted kernels in wooden mortars. In addition to kernels, a renewable charcoal from the woody fruit endocarp is the cooking fuel most used in Maranhão, with growing markets for industrial use after conversion to coke. The fruit's mesocarp contains 10% starch, and is consumed locally. Thatch and stems are widely used as construction materials and for utilitarian crafts.

Babassu fruits fall naturally on a year-round basis, but higher production occurs from August to January. Babassu extraction is carried out predominantly by women and children. Groups leave the village in the morning to walk to the palm stands to gather fruit. Some spend the day collecting babassu and extracting kernels at the collection sites. Others—mainly those who own draft animals—prefer to stockpile fruits in their backyards, where they will be cracked throughout the week. Provisions for the rainy season are also desirable, when availability dwindles, and the conditions for gathering fruit worsen. Both forms of collection assume free access to resources. When access is not granted, the activity is carried out through more restrictive practices and formal labor relations. In these situations, landowners or contractors pay wage laborers to gather and load fruits onto trucks. Truckloads of babassu are then delivered to villages to be cracked by women who receive half of the market price for kernels. The women have no right to keep the husks for charcoal, as they are sold as fuel to industrial plants. Other situations of constrained extraction involve the payment of labor obligations to landowners (usually clearing pastures),

⁹The Small Producers' Agroextractive Cooperative of Lago do Junco (COPPALJ) began to operate in 1991, and initiated the production of babassu oil 2 years later. In the 1996–2001 period, COPPALJ processed an average of 500,000 kg of babassu kernels/year.

or the renting of babassu stands to a contractor who exploits that area in exchange for a cash payment. In this latter case, access is restricted to the majority of the population.

Cracking babassu is a dangerous operation. Fruits are placed on the edge of an upright hatchet blade and struck with a wooden club several times until the kernels are dislodged. Men often engage in fruit gathering, but only those particularly skilled extract kernels. Other babassu-related activities, however, include a strong male role, such as charcoal production and the cutting of leaves for thatch. The high biomass of the leaves, and the remarkable regeneration capacity of the palm improve conditions for both agriculture and cattle herding.

Features associated with the structure and ecology of babassu populations are critical to the long-term future of this activity. The palm's dominance in regional landscapes consists of a two-stratum population: a lower stratum of seedlings and juvenile palms (periodically eliminated in areas converted to pasture), and a superior layer of adult palms. The elimination of juvenile palms in pastures and short-term-fallow fields makes it likely that the dominance of babassu will be drastically reduced following the senescence of adult palms. To avoid such a drastic transformation, management practices are needed to allow the recruitment of juvenile palms and the consequent renovation of babassu populations.

Shifting-Cultivation

Roça is the most common term for swidden fields in north and north-east Brazil. In the Mearim Valley, roças are a predominantly male activity, cultivated with rice (the main product), maize, manioc, and beans, individually or in different combinations of intercropping. Portions of a roça are occasionally planted with small quantities of other intercropped vegetables such as squash, okra, or watermelon. Large assortments of local varieties are utilized. Producers with sufficient resources establish roças on both upland and lowland areas, thereby reducing their risk of crop failure. Rice production in upland sites is limited in years of lower rainfall, while lowland sites are susceptible to losses in years of high rainfall and floods.

Land clearing begins in June–July. Operations include slashing and lopping the understory with a sickle (*broque*), tree felling using an ax or machete (*derruba*), and the trimming of palm leaves (*desbandeiramento*). To clear land for cropping, fire is set in September or October. Trunks and twigs not consumed by the initial fire are piled (*coivara*) and reburnt. Cropping starts with reliable rains, usually in December. Rice and maize are

planted with a pointed stick or with a hand planter. For early consumption, small areas are cultivated with less productive, 90-day varieties (*arroz ligeiro*). More productive stands have a 120–130 day cycle and are sown in larger areas. Highly productive, water-demanding rice (*arroz lageado*) ripens in 150–160 days.

Weeding is the most labor demanding activity in short fallowed areas. Harvesting is the greater burden in fertile, long fallow fields. Weeding is done with a small, curved sickle (*cotelo*), or a large knife (*colinho*), and begins right after rice is sown or before sprouting. Two or even three passes are needed, in contrast with a light, single pass in longer fallowed lands. No fertilizers are used, and insecticides are seldom applied. Herbicides are increasingly used in sites infested with grass, mainly in lowlands. The harvest of rice starts in April and extends to June in wetlands. Maize is harvested in June/July. If household labor is insufficient for the timely harvest of large fields, laborers are paid by productivity, receiving one third of what they harvest, or cash equivalents. Rice is harvested with a blade adjusted to the palm of one's hand. Rice bunches are cut individually. Grains are stored on the sheaf in a temporary shelter (*paiol*) in the field. Once dried, rice is manually threshed and carried to permanent storage near or inside the house. Some maize is harvested and eaten ripe in March/April, but most stalks are bent over only upon rice harvest, the ears being gathered when totally dry.

Manioc stays longer in the field, and is treated as a safety crop for the provision of food or cash when rice supplies are small. Manioc is also less demanding on soil fertility. *Farinhada*, or the making of manioc flour, occurs on a year-round basis. It involves the entire household, and sometimes even extra labor is required. Roots peeled when harvested and crushed produce a dryer, whiter kind of flour (*farinha branca*, *farinha seca*). Roots immersed for 2–3 days in a water tank or stream produce a more sour, larger-granulated, and yellowish flour (*farinha d'água*, *farinha puba*). Manioc starch, locally known as *goma* or *tapioca* is obtained by squeezing and filtering a paste produced by crushing manioc roots. Manioc flour results from toasting the paste in wood-fueled ovens.

Beans are rarely intercropped in *roças*, but preferably cultivated at the end of the rainy season, when moisture is low. Sites with enough biomass are suitable for a slash-and-mulch system for beans (*abafado*). Neither fire nor weeding is required. In areas of less developed vegetation, beans are cropped under bush-fallow (*lastro queimado*), or in labor-demanding mounds (*leiras*). Except for bean cultivation, fallow periods of at least 5 years should be kept before another *roça* is set on the terrain. Land scarcity in the Mearim, however, reduces these intervals to 3–4 years, prompting decreasing yields and challenging peasant livelihood.

Cattle Ranching

As in other areas of the Amazon, the proportion of land converted to pasture in Maranhão has soared since the late 1960s. Generous offers of state-subsidized capital and fiscal incentives between 1967 and 1984 resulted in the establishment of 115 livestock projects on over 1.3 million ha in Maranhão (Amaral Filho, 1990; May, 1990). In addition, the 1969 “Law of the Land” (*Lei de Terras*) transformed social relations of production in areas of old occupation in Maranhão. The law activated a process of land privatization which was nevertheless limited to the agrarian elite and to a circle of better-off and more entrepreneurial peasants, often migrants from the Northeast combining agricultural and commercial activities. The possession of land titles aggravated a process of social differentiation through which wealthier peasants were entitled to claim rural credit and benefit from state-led development projects. São Manoel is a typical example of this latter process.

Today, ranching is practiced by a wide range of resource users in the Mearim valley, featuring distinct systems of production: from diversified livelihood systems in settlement areas and in small- or medium-sized private landholdings, to the wealthier or elite landowners specialized in this activity. These, in turn, can be distinguished according to whether they employ labor or capital-intensive technologies, and if the unit is specialized in beef cattle, or includes dairy production. All combinations exist in the region, with an important dairy belt near Pedreiras. In Lago do Junco, however, there are no commercial dairy units. Ranching operations also differ from agriculture and extraction given their limited presence in the Mearim up to the 1960s. In the last three decades, however, little land in the region was left in forest fallow, and since the late 1970s most peasant villages are surrounded by pastures devoted to raising beef cattle of Indian (*nelore*) and mixed breeds.

One of the features that best distinguishes ranching systems is pasture management. The African grass *Hyparrhenya rufa*, named *jaraguá* or *lageado*, was the most commonly used in the Mearim. The cost of felling babassu for pasture formation contributed to the maintenance of adult, productive palms within pastures. More recently, however, landowners with greater economic resources eliminated palms and replaced *jaraguá* pastures with the more aggressive *brachiaria* grass, mainly on lands near highways or major cities. Besides greater upfront investment, such replacement requires capital-intensive pasture management. It nonetheless results in lower labor demand due to the ability of the *brachiarias* to suppress the emergence of other plants, including juvenile palms. Conversely, most of the traditional, resource-limited ranchers and peasants still rely on management

systems that include *jaraguá* grass, maintaining moderate to large densities of palms. Indeed, when density is not excessive, the upper layer of adult palms is said to improve microclimatic conditions for raising livestock. Partial shading and a deeper root system allow retention of soil moisture and reduce cattle mortality under extreme heat stress. In addition to microclimatic improvements, income provided to landowners by the sale of babassu kernels obtained in these pastures would suggest the maintenance of adequate palm densities and commercial arrangements for the exploitation of babassu. However, in areas where landownership and the access and control of babassu stands are contested, such practices tend to aggravate conflictive situations. Aiming to reduce the entrance and activity of peasants on their properties, ranchers tend to forgo babassu's beneficial role and restrict extraction. Because babassu is perceived as a symbol of peasant resistance and struggle, well-off ranchers reduce babassu densities to less than 10 palms/ha. As a consequence of the "ideologization" of land use strategies, the otherwise symbiotic interactions between pastures and palms, and between ranching and babassu extraction, turn out to be the source of social conflict.

At the other extreme, peasant producers with access to land increasingly integrate ranching into their livelihood. Small herds of up to a dozen head, but most commonly of just a couple of mixed breed cows, are raised on private or common lands, mainly to provide cash allotments through the sale of calves (*garrotes*). Few genetic improvement or breeding programs are offered in the region, the productive potential of cows is limited, and milk production barely supplies local needs.

Other activities are integrated into the livelihood systems in these communities. Freshwater fishing in streams (*igarapés*) and reservoirs (*açudes*) is seasonally critical. Hunting also occurs, although limited by the scarcity of game. Small orchards and vegetable gardens are restricted to backyards, except for a few banana producers. Retirement benefits (*aposentadorias*) are by far the most relevant source of monetary income, followed by various petty commercial operations, salaries paid to villagers employed in schools and other offices, and occasional wages. Table III shows sources of monetary and nonmonetary income¹⁰ in São Manoel. The data substantiate the existence of multiple economic strategies pursued by local people to provide for their needs. The three activities presented in this section, however, are those that more directly affect landscape composition.

¹⁰Nonmonetary values were based on prices of retail purchase at local stores, and not on values obtained by producers when selling the product.

Table III. Aggregate and Average Income in São Manoel, 2000 ($N = 116$)

Activity-source	Aggregate R\$	n	% of monetary income	Total	Mean R\$	St. dev.	n
Monetary income (mi)							
Agriculture	9,458	66	3.2	2.3	143.31	(196.67)	66
Small livestock	7,976	55	2.7	2.0	145.01	(266.09)	55
Babassu	60,920	98	20.5	15.1	576.09	(471.05)	98
Ranching	43,763	50	14.7	10.9	875.26	(1,116.19)	50
Wage labor	21,264	57	7.1	5.3	373.05	(1,815.52)	57
Stipend	39,625	23	13.3	9.8	1,722.83	(1,560.97)	23
Social security	78,739	26	26.5	19.5	3,028.42	(1,302.91)	26
Remittances	3,082	19	1.0	0.8	162.21	(133.12)	19
Commerce	21,764	17	7.3	5.4	1,280.24	(1,582.36)	17
Other	10,846	25	3.6	2.7	433.84	(661.56)	25
Sub-total (mi)	297,437		100	73.8	2,564.11	(2,759.42)	116
Nonmonetary income (ni)							
Annual crops	54,841	101		13.6	472.77	(415.07)	101
Fruits	15,658	97		3.9	134.99	(219.91)	97
Small livestock	17,982	90		4.5	155.01	(174.33)	90
Babassu	16,848	79		4.2	145.24	(144.85)	79
Subtotal (ni)	105,329			26.2	908.01	(661.22)	116
Total	402,766			100	3,472.12	(3,134.05)	

Notes. Data correspond to annual budgets for year 2000, and are expressed in Brazilian currency (as of September 1, 2001, 1BR R\$ = 0.39 US\$).

SOCIONATURAL TRANSFORMATIONS IN SÃO MANOEL

A full explanation of the specific land use transformations in a particular community may run the risk of conveying the notion that every case is unique and that no broader generalizations can be suggested. While this is true in the narrow sense that each situation does indeed have its particular history, such particularities can nonetheless be conceptualized and understood in terms of configurations of socioeconomic and biophysical factors that together drive many of the land and resource use decisions made by individual households, and that determine the characteristics of the social and natural organization at the more aggregate level of community and region. My analysis considers the detailed environmental and social histories of São Manoel, but interprets this specificity within broader conceptualizations of the relationship between human and social organization, and the natural environment.

The differential engagement of people in babassu extraction, shifting-cultivation, and cattle ranching has been the proximate determinant of major landscape patterns in the community. Over time, combinations of these activities, or changes in the way they are integrated, resulted in categories of land cover that depart from dualistic categorizations such

as forested/deforested or grassland/cropland. Complex and fragmented landscapes emerge in this area of consolidated occupation characterized by babassu-palm succession, and by large-scale conversion to pasture. Table IV summarizes historical developments relevant to transformations in resource use and the dynamic construction of landscapes in São Manoel.

During the period of peasantry formation (1920s to mid-1950s), although *Maranhenses* and migrants from the Northeast had different interactions with the natural environment, the predominant trajectory of landscape transformation was progressive deforestation for shifting-cultivation, and the conversion of primary forests to *capoeiruçu*,¹¹ creating conditions for the dominance of babassu. According to local narratives, people who settled in the area in the late 1940s and 1950s encountered a natural environment already different from that found by pioneer settlers of the 1920s and 1930s. Babassu stands were not the predominant land cover up to the mid-1940s. By 1960, however, most of the primary forests were replaced by species-rich secondary forests. Following the trend for the entire region, the clearing of primary forests and *capoeiruçu* in São Manoel was almost entirely the result of cultivating annual fields, and not establishing pastures.

In the subsequent period of economic differentiation (from the mid-1950s to the mid-1970s), the incorporation of land for shifting-cultivation continued to be the main feature, but at increased rates and intensities. Babassu extraction joined agriculture at the forefront of the regional economy. By then, areas of secondary growth formed by nearly pure stands of palms predominated in local landscapes. Primary forests were mostly gone, and after three to four cropping cycles, the seed bank of forest species was considerably depleted, consolidating babassu's hegemony in the landscape. Selective accumulation of capital originated from merchant exploitation and land privatization opened up prospects for a selected group of producers to further benefit from the labor invested in clearing lands for cropping, and to use this labor to establish *jaraguá* pastures in those lands, mostly in association with babassu.

The expansion of babassu as a major land cover type illustrates feedback effects between socioeconomic and biophysical processes. Market incentives and patterns of land occupation, on the one hand, allowed the massive engagement of peasants in extraction, even for their assuming a leading role in the regional economy. On the other hand, secondary succession of

¹¹ *Capoeiruçu* is the local name for secondary vegetation after roughly two decades of primary forest clearing. Although species diversity in *capoeiruçu* is lower than in primary forests, the remaining seed-bank and the regeneration of multiple species after a single clearing allow for a pattern of succession that is not yet entirely dominated by babassu. The density of palms is therefore higher in *capoeiruçu* than in primary forests, and much higher after successive cropping cycles.

Table IV. Socionatural Processes, and Land-Use/Cover Transformations in São Manoel (1925–2002)

Period	Peasantry formation (1920s to mid-1950s)	Economic stratification (mid-1950s to mid-1970s)	Social differentiation (mid-1970s to late 1980s)	Peasantry transformation (1990 to present)
Major social processes	Establishment of <i>centros</i> ; Expansion of freed slaves and descendants; Migrants from the Northeast; Leveled livelihoods	Land: market integration; Better-off peasants became middlemen; Departure of initial dwellers	Government subsidies; Women's reaction against babassu enclosure; Church support to peasants	Collective action; Producers' associations; Party politics; Community quarrels
Features of social stratification	Cultural differences: <i>Maranhenses/Cearenses</i> ; Dependence on city merchants	Capital accumulation by local middlemen; Land privatization; Extraction of rent	Polarization between ranchers and peasants; Contractual access to babassu	Differential inclusion in settlement projects; Membership in a broad range of local institutions; Social security benefits
Agrarian developments	Lack of landownership; Rough landmarks denoting land entitlements; Land as common good	Demarcation, sale, and titling of "state land"; Illegal titling "grilagem"; Land sales internal to villagers	Land concentration; Land struggles; Settlement projects; Collective land-tenure	Delay to begin settlement projects
Main products	Cotton, rice, maize; Babassu kernels	Peak period of rice; maize; Babassu kernels; Cattle	Cattle; Babassu kernels; Rice, maize, manioc	Cattle; Rice, manioc, maize; Babassu kernels
Predominant forms of land use	Crops on forested lands; Babassu extraction; Use of forest products; Hunting + fishing; Limited cattle herding	Shifting-cultivation; Babassu extraction; Expansion of cattle herding	Cattle ranching; Scarce land for agriculture; Elimination of babassu; Land speculation	"Post-pasture"; Cattle ranching; Shifting-cultivation; Babassu extraction
Predominant land cover types	Mature forest; Forest-fallow (<i>capoeira</i>); Cropland; Native grassland	Forest fallow (<i>capoeira</i>); Babassu forest (palm-land); Cropland; Planted pastures (<i>jaraguá</i>)	Babassu forest (palm-land); Planted pastures (<i>jaraguá</i>); Pasture + babassu; Cropland, fallow	Planted pasture (<i>brachiária</i>); Pasture + babassu; Cropland; Short-fallow

babassu has endowed the region with advantages when compared to other environments.

Ranching was a marginal activity in São Manoel up to the 1960s, limited to small-scale operations. While dense babassu populations served, and were viewed, as subsidies by peasant producers practicing agriculture, ranchers, who began to operate under distinct social and economic norms, saw the sprouting mass of juvenile babassu plants as an additional economic and social burden.

Despite the perceived threat imposed by secondary succession on ranchers' allocation strategy, pasture formation peaked in the following two decades, when differentiation in the social system turned to pronounced social stratification (mid-1970s to late-1980s). The increased rate of pasture conversion was accompanied by critical pasture management strategies that sealed the opposition between ranchers and peasants. Pasture conversion restricted the amount of land left for cropping, and shortened fallow intervals, limiting secondary succession to its initial stage. In addition to the constraints for agriculture, the elimination of babassu palms from pastures, and the replacement of *jaraguá* by *brachiaria* grass in regional landscapes represented a real threat to the integrity of the social and natural systems.

In São Manoel, producers cropped unconstrained until the mid-1960s, *roças* being often set on a 15–20 year forest-fallow schedule. A drastic transformation occurred when a wealthier peasant from a neighboring village, benefiting from land privatization policies, enclosed and converted to pasture most of the common and undocumented lands of São Manoel. Agricultural production was greatly restricted, peasants were charged rents and had to sow pasture grass at the final stages of their cropping.

In the mid-1980s, when restrictions were extended to babassu extraction, São Manoel residents reacted in a struggle that eventually resulted in the recovery of their land tenure rights. Hostilities erupted when the rancher granted rights to a contractor for the exploitation of babassu. Among the practices employed under the deal were the cutting of entire bunches of fruit before ripening, and the hiring of people to gather fruit to deliver to women receiving half the market price for kernels they extracted. Moreover, the contractor had to enforce the order of not trespassing fences. The response of the community was an intense process of social mobilization that provoked the "transformation of a peasantry." With the resolution of the conflict, peasants successfully claimed access to babassu stands in private ranches in São Manoel and in most of Lago do Junco. Local leadership was also critical for wider organizational moves including the creation of a municipality-based women's association of babassu-nutcrackers, and the agro-extractive cooperative.

In São Manoel, rearrangements after land conflict, and internal challenges to the community have been accompanied by reassessments in the role played by pastures, with the likely consolidation of an agro-pastoral/extractive system that balances the maintenance of pasture/babassu associations, in parallel with the reenforcement of areas for shifting-cultivation under new conditions.

The Grounded Political Ecology of the “Post-Pasture Conversion” in São Manoel

Two apparently contradictory processes comprised the main changes in land use/cover dynamics of poststruggle São Manoel. The first was the reconversion of a considerable amount of pasture to fallow and crops. The second was the expansion of ranching activity among peasants. These transformations affected the balance of economic activities in the household, and particularly the role played by babassu extraction.

At the onset of the land conflict, most of the land in São Manoel had been converted to pastures. During the conflict, however, peasants obstructed pasture clearings and the turmoil caused suboptimal pasture management including overgrazing, as cattle stayed longer and in high densities on certain tracts. Suboptimal conditions for *jaraguá* grass turned out to be advantageous for *capoeiras* growing within these pastures. When peasants recovered rights to land, the local association rented pastures to outsiders for cash and a share of the steers born on their land. In addition to the income, the renting of pastures to nearby ranchers served to reconvert the land to secondary growth through a strategy that skillfully exploited characteristics of the *jaraguá* grass.

Jaraguá pastures were viewed as components of landscapes that could very well be reincorporated in the stock of land for agriculture, particularly if reasonable densities of babassu were left within them. By sustaining an elevated grazing pressure over these areas, settlers reduced the competitive effect of *jaraguá* grass against the emergent population of juvenile babassu plants.¹² Although pasture grass was not eliminated from the system, this strategy provided conditions for restoring *capoeiras*, and after 5–6 years allowed shifting cultivation. Such a trajectory did not take place in pastures of *brachiaria* grass.

In the aftermath of the struggle, São Manoel’s association of producers adopted a series of measures targeting land use planning in the 470-ha common area. The first was to identify land that should remain under pasture,

¹²Walker and Abel (2002, p. 299) examine the process through which sustained grazing pressures on rangelands transform a predominantly grassy ecosystem into a wooded state.

instead of being redirected to agriculture. Pastures were kept closer to the village in two plots totaling 75 ha, or about one-sixth of the settlement area. Residents opted for the conservation of a forested tract of 25 ha, with the remainder reserved for shifting-cultivation.

After the recovery of land rights, annual cropping included the rotation of fairly defined tracts of land, which allowed a 4-year fallow period. Each household continued to individually work and harvest their annual fields, but an agreement at the level of the association stipulated a limit of 1.5 ha for these fields. Furthermore, to avoid fragmentation, fields began to be installed in those five contiguous areas, as determined each year by the association. Under this system, even though resources were used almost to the limit, rice productivity turned out to be not much inferior to that obtained in areas of greater land availability but poor planning strategies.

Residents used resources obtained from pasture rental to improve land and to form their own herds. Rental payments supplemented donations from the Catholic Church, and from a rural credit project, to gradually form a collective herd. Although these cattle were partially distributed among households in 1992, and again in 1999, the association maintains a seed-herd that fluctuates in size, serving also to fund common undertakings. Associates take turns working as caretakers of private and collective herds on common pastures. By-laws determine that households owning one, two, or three cattle contribute 12, 18, and 24 days of labor per year, respectively. More recently, associates have been able to purchase small tracts of land in the vicinity.

The engagement in livestock provoked mixed feelings in São Manoel after land conflicts ended. Residents viewed cattle as a symbol of the exploitation and suffering experienced by the community. Yet, because pastures were the predominant land cover in the postconflict period, ranching was identified as a practical choice to be integrated into people's livelihoods. Nowadays few people in the community contest the economic benefits. To summarize, 61% of the settlement project households (19 out of 31), and 43% of São Manoel's total households (50 out of 116) owned cattle by the year 2001. A total herd of 620 in that year included 172 cattle owned by the 31 settler households (average of 5.5), 40 of which were owned by the producers' association.

The widespread establishment of pastures also provoked fundamental changes in babassu extraction. After decades of gathering fruits in pastures—as opposed to previous extraction within forests—people's perception of the activity changed. When long-term fallows were possible, extraction was carried out in areas of secondary succession characterized by dense palm stands, and consisted of extraction “within the forest” (*coleta no mato*). Land privatization and pasture conversion affected extraction in

contrasting ways. On the one hand, palm products became even more critical to the livelihood of dispossessed peasants. On the other hand, arrangements between landowners (or their agents) and peasants allowed the latter to extract babassu within pastures (*coleta na solta*), although with a greater economic burden to extractors.

Closely following changes in land cover, routines of gathering fruits within more open areas gradually replaced the previous forms of extraction. Years of experienced observation gained by extraction within pastures changed the perspective of those engaged in the activity, who noted more favorable conditions in the transformed landscape of palms that grew in association with pastures. In addition to higher productivity of pasture-grown palms, extraction within pastures was also favored by their proximity to villages, the ease of collection with draft animals, and the relative safety of collection. Kernel extraction can thus occur on more flexible schedules, and closer to home instead of during long field journeys.

Residents were asked about their preferred landscape to gather babassu. All but one of the 60 respondents for this question (households engaged in babassu extraction) indicated pastures, as opposed to forested areas. When asked about the preferred site to break (not gather) babassu, 83% of the respondents preferred the house, while 17% preferred outdoor sites. All but one respondent in this subgroup preferred the conditions of the shaded, not as hot, forested sites instead of the sunny conditions provided by pastures.

The recovery of land for agriculture and the maintenance of permanent pastures were the key components of resource-use planning in São Manoel. Rather than isolated events, the parallel dynamics of land use and land cover introduced in the community turned out to be socially sustainable (at least relatively speaking) due to three basic conditions that permitted the continuity of babassu extraction. First, a small but still considerable area of pasture was kept, which assured a minimum level of access to babassu stands regardless of people's access rights to other areas. Second, a grassroots movement that pressured for unrestricted access to babassu was centered and very successful in São Manoel. And third, medium-sized ranchers in the vicinity shared the perception that the palm was important to households and to the regional economy.

ECOLOGICAL SIGNIFICANCE OF SOCIOPOLITICAL DYNAMICS OPERATING AT MULTIPLE SCALES

The grounded political ecology framework is an approach that can be adopted to study the multiple scales and dimensions affecting resource use and land cover change in two very different periods in the existence of São

Manoel: the mid-1980—the end of the military regime in Brazil—and the beginning of the twenty-first century—a period of greater democratization and institutional development. Although democratization of institutions did not fully achieve land distribution in Brazil, the polarization between peasants and ranchers that existed up to the 1980s is significantly smaller. In the last two decades, however, a complex set of sociocultural, political, and economic factors operating at multiple scales has produced an increasingly differentiated peasantry, adding diversity to relations of production, and to their production strategies. The presentation thus synthesizes the multidimensional transformation that constitutes a new set of constraints to peasant livelihood (the poststruggle ensemble), replacing the more directly violent and ideological confrontations between peasants and ranchers (the prestruggle ensemble).

As presented in the framework, socioeconomic drivers affecting practices of resource-allocation in the study area operate at multiple scales, from global to very local ones. The multiple scales that constitute the framework will be exemplified here through the influence, in resource use, of gender relations within the household, community organization, the action of state and federal governments, and the interference of international markets.

Household Relations and Resource Use in the “Babassu Zone”

The household is the first entity mediating the agency of resource users and broader social structures. Distinct perceptions and meanings attributed to babassu forests and babassu extraction within the household are one of the main aspects affecting land cover change in the “babassu zone.” Indeed, the role of extraction for the social system of “agro-extractive/shifting-cultivator peasants” transcends the economic domain. Babassu economic utility assisted in the construction of a suitable and complex “gendered” division of labor along generations of resource use. The sale of babassu kernels is an important source of monetary income that enhances women’s role in the functions of production and reproduction of the household. But foremost, the continuous realization of practices associated with extractive activity has significantly contributed to the definition of cultural attributes of the household and specifically to the empowerment of women (Miyasaka-Porro, 1997, 2002). In most Amazonian and northeastern rural environments, women’s participation in production activities has been limited to domains controlled by men and has allowed only restricted social interaction beyond the domestic sphere. Babassu extraction, on the contrary, embodies an active and enlarged realm for the construction of practices,

discourses, and relations that extend women's participation in wider social arrangements.

Examining the case of São Manoel, I argue that the management of secondary succession forests in the "babassu zone" have been heavily informed by household relations, through "actions of men and women in their daily life as well as the relations between them" (Deere, 1990, p. 326). I contend that Deere's formulations are extendable to the subfield of ecological anthropology and applicable to the environmental context focused on in this study. These formulations recognize variations in land and resource use according to the position of the household in the life cycle, which for agro-extractive peasants in Maranhão are mainly expressed through fluctuations in the size and consequent labor requirements of swidden fields. Moreover, the maintenance of dense palm stands associated with agricultural and livestock undertakings will to a great extent respond to specific arrangements at the household level, and according to whether or not the need for a balanced participation of men and women in providing for household sustenance is recognized by themselves. In São Manoel, the adaptations that most households have been showing in the practice of extraction seem to attest to a shared perception among men and women about the adequacy of labor allotments and related social arrangements provided by babassu extraction.

Women's role was instrumental in the outcome of several land struggles confronting ranchers and peasants as they positioned themselves against the cut of palm trees in pastures thereby preventing the clearing of the fields. More recently, other tensions have arisen in certain communities after tenure recovery, where new production opportunities confront men and women's perspectives on the preferred landscape. The installation of fields for semiperennial crops such as banana or pineapple, and the mechanization of annual cropping are examples of land use activities that push for further reduction of babassu densities. Such cases contrast women's advocacy for the maintenance of palms, this time against the perception of men from their own community, in most cases their own husbands, who view babassu as a constraint to higher productivity.

Collective Action and Land Use Change: The Role of Community and Beyond

Social networks such as the peasant community and its derivations (producer associations, rural cooperatives, and women's groups) are the next entities linking individuals and households to external institutions in

the region. Community organization and collective action were essential for the achievement of benefits by peasants in São Manoel. First and foremost, collective action resulted in land tenure recovery. Second, it was a key factor for the recognition of unrestricted access to babassu stands regardless their location. In addition to empowering the group during struggles for the access to and control over land and resources, community organization and collective action rearranged livelihood strategies after the land conflicts, with significant implications for landscape dynamics. Community organization also altered peasants' demand on land for shifting cultivation through their engagement in the processing and commercialization of local production. In areas where land is not yet a constraint, peasants do not necessarily crop larger fields in direct response to their consumption needs, nor as an expression of their desire for accumulation. Rather, in situations that are still observed in the southwestern portion of the Mearim and Grajaú valleys, the cropping of large fields, and the sale of most of what is harvested, represent alternatives peasants can count on to cope with the exploitation imposed on them by merchants (Porro, 1997, p. 296). Conversely, fields remained comparatively smaller when community mobilization served to purchase local production and provide basic supplies at lower costs, and with the acquisition of equipment for the processing of rice and manioc that further enhanced local terms of trade.

The operation of Lago do Junco's agro-extractive cooperative, established in 1991, in purchasing local production and providing basic supplies at lower costs significantly reduced the burden imposed by middlemen. In addition, the producer association acquired mills for the processing of rice and manioc that enhanced local terms of trade. Lower requirements for the size of swidden fields allow fallow schedules that improve the use of biomass provided by babassu leaves. When contrasted to communities with greater availability and better quality of land, households in São Manoel kept a significantly higher proportion of the rice harvested (Porro, 1997, p. 297). The combination of collective planning with mobilization for commercial and processing operations was effective in sustaining socially defined management goals.

Although several communities in the Mearim Valley had their land and resource use significantly altered by processes carried out at the community level, such alterations were not always positive. Internal tensions and competing leadership have resulted in mismanagement of resources. The status of future siconatural ensembles in the area will thus depend on priorities given to individual undertakings after the recovery of tenure rights by peasants, and the often associated process of social stratification.

Settlement Projects and State Policies

In the case of communities that recovered their tenure rights, allocation decisions, and their impact on the local environment, are to a great extent related to governmental policies. Households and communities receive differential treatments according to their categorization by the state. A progressive distinction exists between lands and communities associated with struggles resolved through (a) federal-led and (b) state-led settlement projects; between these two and (c) unofficial agreements mediated by institutions such as the Catholic Church or related organizations; and between all the above and (d) groups practicing common land and resource use that were able to resolve land conflicts with their own means. Communities conforming to these four social situations were likely to present similar trajectories until two decades ago. Yet, the form through which their struggle evolved and the mechanisms adopted in conflict resolution suggest radically distinct entitlements for future activities.

In this context of unequal treatment, peasants inhabiting lands characterized by the last two categories have practically no rights in any sort of localized land reform policy, while those living in the first two are entitled to some (for the state-led projects) and several (federal-led projects) benefits. The provision of subsidized rural credit or similar financial programs are undoubtedly the main factors resulting in landscape alterations in areas of localized agrarian reform. In São Manoel, for example, limited resources were invested in cattle ranching, although land had been converted to pasture previous to the conflict. Indeed, several of the “settlement projects” in the Mearim valley are characterized by degraded pastures formed in the 1970s and 1980s, and to which resources are allocated for recovery and stock acquisition. Producers from other settlement areas received greater allotments that in several cases were used for clearing lands, partially eliminating palms and installing perennial crops or mechanized annual agriculture. While pasture conversion is a familiar technique in the region, the other alternatives are constrained by the lack of experience of both local producers and extension service agents. As a result, what was supposed to be a perennial undertaking, in most cases has resulted in short-lived initiatives, a perennial sink of financial resources, and a disruptive event for the local environment.

Although settlement projects initiated as early as 1982 are still under way, there is conjecture over the emancipation of older projects to constitute autonomous units and forgo preferential treatment from the government. Whether peasant producers will maintain current systems of production once the “settlement” process ends is an intriguing question.

Local Dimensions of a Global Economy

The effects of a global economy on the landscapes in the “babassu zone,” and on peasant livelihoods, are also pronounced. Although constituting the basis for the livelihood of nearly one million people, babassu extraction recently lost even the modest government support that it received until the early 1980s. Industrial and agricultural developments replaced babassu oil by synthetic products in the food, cosmetic, and hygiene industries. Babassu and cottonseed oils were the most consumed edible oils in Northeast Brazil until the 1970s. Today, babassu oil maintains only a small portion of this market, as it has been replaced by soybean oil. In the 1990s, soybean plantations were installed in southern Maranhão, supported by state projects with Japanese cooperation. In 2001, 210,000 ha of soybean were cultivated in Maranhão, producing the second highest agriculture-based revenue for the state. In 1995, the Brazilian government reduced import tariffs for vegetable oils from 18 to 2%. This measure allowed increased imports of plantation–originated lauric oils (from palm, palm-kernel, copra) from Southeast Asia, and particularly from Malaysia. The imports replaced extractive-based production of babassu oil, and further undermined the incentives for babassu extraction.

The operation of multiple-scale drivers affecting resource-use trajectories in Lago do Junco also shows that these scales are linked through combinations that do not always reinforce hegemonic trends and hierarchical orders. Since 1993 the Agro-extractive Cooperative of Lago do Junco sells babassu oil to the UK-based Body Shop. Through this partnership, the cooperative has been able to raise the price paid to all the extractors for each kilo of babassu kernel by an average of 25% (\$0.36/kg in February 2000). In addition, since 1999 the cooperative has been redistributing financial profits among its more than 150 members. Beyond that, alliances with nongovernmental organizations, cooperation agencies, and engagement in “fair trade” transactions have been important arenas for the spread of the struggle of agro-extractive/shifting-cultivator peasants in Lago do Junco. Although restricted to one small municipality in Maranhão, this initiative illustrates the extent to which the agency of these peasants in the dynamic generation of practices directly interferes in resource use, and in landscape trajectories.

Biophysical Features and Human–Nature Interactions in the “Babassu Zone”

The predominant presence of babassu in secondary succession formations in the Mearim Valley, and the recent history of land use in

the area, are important factors that influence resource-allocation decisions today. Strategies and practices adopted by peasant producers considered the cumulative knowledge acquired, not only from their own agricultural and extractive experiences, but also from the observation and learning of the management systems adopted by ranchers. In the pre-struggle period, most of the land in and around São Manoel was converted into *jaraguá* pastures. In the poststruggle situation, peasants were compelled to adopt practices to reconvert the landscape to forms that would allow their habitual form of interacting with nature, mainly with respect to agricultural undertakings. These forms consisted of patches of fallowed fields at different stages of regrowth, after the cultivation of *roças*. At the same time, however, people were attentive to the opportunity to maintain the integration of palms within pastures, as they perceived such association as advantageous to babassu extraction. In addition, *jaraguá* pastures were not viewed as an impediment to eventual flips of the landscape back to the agriculture domain. Major differences in land use trajectories that peasants adopted poststruggle were, therefore, with respect to the relative weight given to these two alternatives. The fact is that the presence of babassu palms in the landscape, and the use of babassu-friendly *jaraguá* grass as the predominant species in planted pastures since the 1960s, are relevant drivers that defined present land use strategies and land cover outcomes.

“Relational Rationality” Perspective

A great deal of social interaction permeates day-to-day practices in communities in the Mearim. Attitudes and decisions of individual resource users in these communities, therefore, are far from being the outcome of isolated agents who maximize their benefits given a conjugation of socioeconomic and biophysical factors. The notion of economic rationality adopted here includes a continuous and dynamic reassessment of social relations that are directly and indirectly implicated in the attainment of specific practices. Patterns of habitation, traditional systems of labor exchange for agriculture, and practices related to the performance of babassu extraction, all promoted repeated contact among villagers. In addition, the still recent history of economic differentiation and social stratification allows interactions across social classes. General conditions of social relations within and among communities; and among communities, ranchers, and powerholders, influence resource-allocations. Extended-family groups and kinship networks, for example, play an important role for collaborative land use initiatives in São Manoel.

Social-Structural Determinants

Departing from explanations based on individual attitudes and choices, even when relational perspectives are considered, the framework also explains trajectories of resource use and land cover outcomes through constraining structures of the social system. Indeed, for the case being examined, the definition of activities that are adopted today by peasant producers cannot be dissociated from the legacy of hierarchical power and authoritarian social relations in rural areas of a state in the Brazilian Northeast, and the historical components that have shaped the formation of the peasantry in the Mearim valley. Throughout their historical trajectory, the alternatives presented to peasant communities to allocate their resources have been constrained by the operation of mechanisms of exploitation that included commercial extraction, the violent dispossession of people from their land, and the subsequent charging of rent. The succession of such mechanisms resulted in highly concentrated conditions for wealth and landownership, only attenuated by the partial recovery of peasant tenure rights in the late-1980s. These latter developments attest that certain structural constraints, though still restrictive, can be modified, increasing production possibilities, and consequently, land use/cover outcomes.

Interpretation of Transformative Practices

Recent events in Lago do Junco provoked contrasting perspectives by which local resource users perceive economic alternatives in their discursive and practical domains. Certain dispositions that were hitherto hegemonic according to local peoples' relational standpoint began to be undermined by their own tangible acts. This discontinuity between discourse and practice is manifested in the objective conditions of babassu extraction, and in the changing assessment of cattle ranching.

Despite growing acceptance of raising cattle within communities in Lago do Junco, political conditions that still prevail in rural Maranhão at large make undesirable the deliberate expression by peasant producers of their preference for babassu extraction within pastures. In the confrontational environment of rural Maranhão, babassu extractors that have enhanced their political and socioeconomic condition subordinate their preferences (in respect to the ideal landscape to perform the activity) on behalf of broader negotiations over access rights and control of resources for a more comprehensive social group. The disparity between practice and discourse related to this preference is overly manifested by the leaders of communities and grassroots movements, as well as by most of the institutions

that support their cause, when addressing external audiences. In their discourse in support of the continuity of babassu extraction, these leaders and their supporters condemn cattle ranchers, cattle, and pastures. However, upon their return to the communities, they are confronted with the paradox in the day-to-day decisions and acts of those engaged in babassu extraction, who prefer to perform the activity within palm–pasture associations than in the forested domain.

As occurred elsewhere in Lago do Junco, once land conflicts are resolved, the reversed trajectory towards the elimination of pastures significantly enhanced tensions within communities, and even at the household level (Porro, 2002). In some instances, when men decide to crop and eliminate palms from previous pasture–palms associations, women struggled to maintain access to this important source of economic sustenance.

CONCLUSION

Social and environmental histories of peasant communities in Maranhão have been defined by the combination and shifts in the relative importance of agriculture, ranching and extractive activities. The changing profile of these forms of land use—and the environmental implications in terms of land cover—were closely tied to the forms of access to resources and property rights that prevailed in the region; to the character of domestic production in the countryside; to peasant mobilization; to the response by state agencies and institutions; and to unique gender relations derived from the babassu economy that emerged from the struggle for land and livelihood. Ultimately, it was the interplay of such factors that influenced the choice of land use and management strategies, with significant implications for the sustainability of resource use, and for the quality of life among people living in São Manoel.

São Manoel is an example of the trajectories peasants can undertake in their quest for continuity and for systems of survival that would improve their livelihood. The maintenance of socially resilient landscapes, however, requires a critical management component that, although acknowledged by most resource users, has seldom been practiced. Despite being critical in the long-term, practices seeking the systematic establishment of new populations of babassu have not yet been carried out in São Manoel, or anywhere else in Lago do Junco. Babassu palms are not the only component of resource users' livelihood in the Mearim Valley. Some resource users are rather opposed to the continuity of these palms. Babassu may not even be critical for biodiversity conservation or fit into prestigious ecological categories. The recent history of peasant communities such as São Manoel

has shown, however, that a concrete socionatural trajectory to optimize resource use and address the socioeconomic needs of the community includes the maintenance of palm/pastures associations.

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