

Experiments in Forest-Based Development in Western Amazonia

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The state government of Acre, Brazil, has integrated ecological, cultural, social, and economic forest values into a comprehensive forest policy to manage Acre's abundance of comparatively pristine forests, while couching specific goals and the processes for achieving them within a broader sustainable development framework. Inspired by the rubber tapper culture and social movement, policy implementation has been advanced with broad support from national and international allies. While these experiments in forest-based development serve as a hopeful alternative to the steady deforestation observed in Amazonia, many long-term ecological, economic, cultural, and political challenges remain for sustaining and adapting these policy initiatives.

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The future of Amazonia, with the possibility of achieving a more sustainable and appropriate development for the region, is the subject of important recent debates (Arnt 1994; Barbosa 2000; Clusener-Godt and Sachs 1995; Hall 1991; 1997; Nepstad et al. 2002; Schneider et al. 2000; Scholz 2002). On the one hand, Amazonia is increasingly threatened by expansion of industrial logging, ranching, mining, and growing population pressures that drive deforestation (Wood and Porro 2002). Furthermore, *Avana Brasil*, a massive national development policy program designed to address the real need for infrastructure improvements in Amazonia, is expected to lead to the conversion of hundreds of thousands of hectares of forest (Laurance et al. 2001). On the other hand, a great deal of experimentation is underway with resource management policies, arrangements, and practices that support forest development versus conversion, often focusing on alternative community-based innovations (Allegretti 1995; Arnt 1994; Hall 1997; Nepstad et al. 2002). Examples of this kind of experimentation include extractive reserves whereby nonindigenous forest residents are given land use rights and assigned management responsibilities for sustainable resource extraction and conservation on government-owned property (Allegretti 1992). Such models provide a framework for the development of “productive conservation” practices that support resident livelihoods while promoting conservation of the natural resource base on which they depend (Hall 1997, 2). Similarly, alternative policies such as those currently promoted by the Ministry of the Environment are creating a greater platform of support for innovative community-based initiatives (IAG 2002).

Under what circumstances can these alternative policy experiments and local grass-roots initiatives provide real alternatives to development-as-usual? In his analysis of grass-roots action in sustaining Amazonia, Hall (1997) argues that the success of these initiatives depends on strong social movements focused on socio-environmental issues; effective local self-governance of resources; and true community participation in designing and executing productive conservation strategies. Long-term success also hinges on the ability of these local groups, often with substantial support from national and international allies, to negotiate the changing and often conflictive development policy arena in the region (Hall 1997; Schmink and Wood 1992; Silva 1994). The extractive reserves and the other “productive conservation” initiatives cannot thrive without compatible planning for the broader landscape of which they are a part.

One region in which grass-roots initiatives and broader development policies are merging in novel ways is in the Brazilian state of Acre located in the western Amazon basin. Forest policies of the Acrean state government reflect a clear intent to manage Acre’s abundance of relatively pristine forests, while couching the specific goals and the processes for achieving them within a broader sustainable development framework. In governor Jorge Viana’s words, “Our goal is to demonstrate to present and future generations that development does not depend on the destruction of the forest, but rather on its survival” (Government of Acre 1999).

This sustainable development philosophy is a radical departure from early Amazonian development strategies of the 1960s and 1970s that focused on mining, ranching, and colonization, and that equated progress with deforestation (Hall 1991;

Hecht and Cockburn 1989; Schmink and Wood 1992). By the mid-1980s, both domestic and global environmental criticism of these development schemes converged with condemnation from human rights activists, who noted that in addition to the negative ecological impacts of these planned projects, they also blatantly disregarded the rights of indigenous and traditional peoples living in the Amazon basin. This convergence of environmental and social concerns, along with growing resistance movements among local Amazonian groups, resulted in a search for development alternatives (Anderson 1990; Arnt 1994; Clusener-Godt and Sachs 1995; Hall 1997; Nepstad et al. 2002; Schmink and Wood 1992; Schneider et al. 2000).

During the past two decades, a multitude of grass-roots initiatives have challenged the dominant paradigm, constituting a “quiet revolution” in Amazonian development (Hall 1997, xxiv). Local and international nongovernmental organizations (NGOs) have worked effectively with local forest-based groups to develop promising alternatives, and funding has been forthcoming from the massive PPG7 Pilot Program for the Amazon Rainforest, among other sources. For the first time, substantial support has emerged for smallholder and collective production systems, increasing the number and diversity of actors engaged in developing alternative management strategies. Consequentially, there has also been a widening of values (both products and services) for which the forest is managed, from traditional timber products to nontimber products, agroforestry systems linked with organic agricultural production, community-based ecotourism, handicrafts, cultural preservation, biodiversity conservation, and carbon storage. Twenty-five years ago, few if any of these values were recognized as significant contributions from Amazonian forests. As recently as the early 1980s, no attempt was even made to salvage tropical hardwoods from Amazonian forests destined for pasture conversion (Arima and Uhl 1997). These relatively rapid changes in tropical forest values have also been accompanied by an increased ecological understanding of tropical forests and how to manage them for various outputs, as well as more support for participatory processes to stimulate more effective and equitable development.

It is within this dynamic milieu that the Acrean “forest government,” as it is popularly known, has emerged. The main objective of this article is to analyze the background and prospects for Acre’s experiments in forest-based development. Beginning with an historical discussion of Acre’s sociopolitical landscape that led to the current forest policy environment, the article next addresses the government’s vision of forest-based development, including several key policies that it has adopted. Finally, the article closes with an analysis of critical challenges and dilemmas for sustaining and adapting these policies for long-term ecological, economic, cultural, and political success.

Sociopolitical Context for Acrean Forest-Based Development

Delayed Development

Bordering Peru and Bolivia in the far western corner of the Brazilian Amazon (Figure 1), the Acrean landscape is dominated by forest. Acre was not accessible year-round via ground transport until 1992, when the stretch of BR-364 was paved that connected Acre to the more populated and market-oriented states of southern Brazil (Shankland 1993). This delayed linkage to the rest of the nation partially

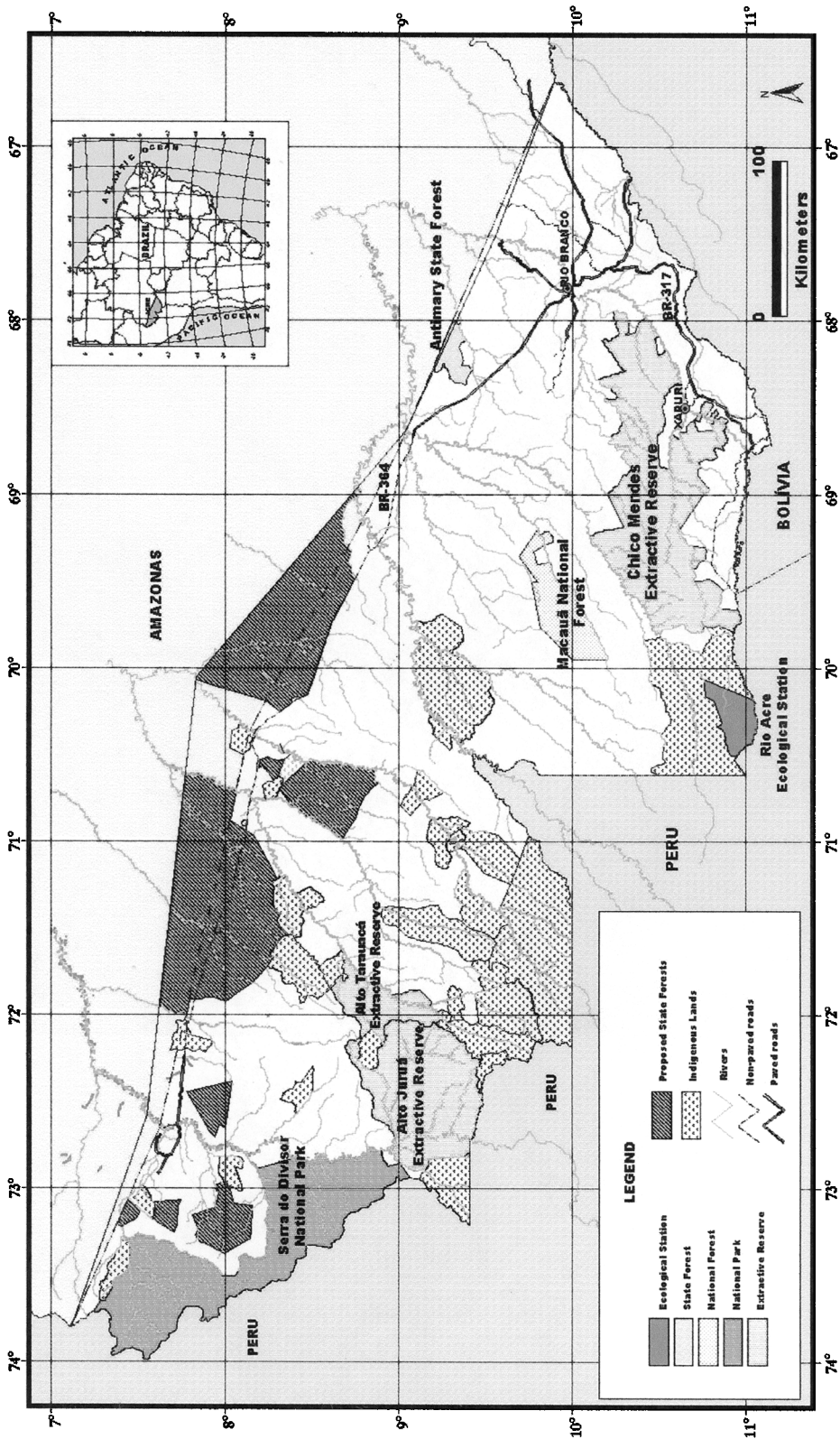


FIGURE 1 Forests of the Amazonian state of Acre, Brazil, are classified as humid, moist tropical forests. Almost one-third is considered protected, although in many cases this classification does not prohibit extractive activities. These forests are geographically isolated; however, road infrastructure is expanding.

explains why deforestation in Acre has been limited to less than 10% of the total state area of 153,149 square kilometers (INPE 2000).

Being literally at the end of the road meant that the forest-transforming initiatives that defined Amazonian development in the 1970s and 1980s, including mining, the expansion of cattle ranching, and large-scale Amazonian colonization projects, were not fully implemented in Acre.¹ Like the forests, the forest-dwelling people of Acre still dominated the state's population in the late 1980s, when organized rubber tappers of Acre emerged as the strongest grass-roots movement in Amazonia. Similarly, relatively undisturbed swathes of forest still existed during this same period when the federal government began creating indigenous reserves and other protected areas in Amazonia. Consequently, over one-third of the state of Acre is currently under some form of governmental protection (Table 1 and Figure 1) (Government of Acre 2000b).

A Forest Culture and Economy

People who reside in and around Acre's forests often are categorized into three distinct groups: agricultural colonists, rubber tappers, and ethnically distinct indigenous peoples.² Despite significant variations within these groups, there are clear historical differences in resource use patterns and cultural identity. While colonists have a less intimate forest relationship, and are more oriented to sale of agricultural crops, the indigenous and rubber tapper groups have a strong cultural identification with the forest as their home and historically have depended heavily on the forest for their livelihoods. However, natural resource values and practices in all of these communities are undergoing rapid changes parallel to the decline of rubber and the expansion of agriculture and pasture.

Over several generations, rubber tappers have developed as a unique, if diverse, cultural group that identifies strongly with the commercial extraction of liquid rubber from individual trees dispersed naturally throughout the rainforest. However, in recent years, many "tappers" have abandoned rubber production because of the removal of the federal price supports that had maintained rubber prices up to three times that offered on the international market (Hall 1997). This rubber crisis is

TABLE 1 Conservation Units and Indigenous Lands in the State of Acre, Brazil

Protected area type	Area (hectares)	Percent of state
Conservation units		
Extractive Reserves		
<i>Cazumbá</i> (750,794 hectares)		
<i>Chico Mendes</i> (976,570 hectares)		
<i>Alto Juruá</i> (506,186 hectares)		
<i>Alto Tarauacá</i> (151,199 hectares)		
Total	2,384,749	15.57
Antimari State Forest	66,168	0.43
Macauã National Forest	173,236	1.13
Serra do Divisor National Park	843,012	5.50
Rio Acre Ecological Station	77,500	0.51
Indigenous lands (28 distinct groups)	2,167,146	14.15
Total protected areas	5,711,811	37.29

seriously testing the entire extractive production system, as tapping has been at the core of social, economic, and cultural activities within Acrean forests for a century.

The Rubber Tapper Social Movement

The tens of thousands of nonindigenous residents currently dispersed throughout Acre's forests can be attributed to two massive migrations from 1870 to 1920 (Bakx 1988; Weinstein 1983), and again from 1942 to 1945 to extract rubber in support of the allied war efforts (Martinello 1998). After the war, the Brazilian government continued to provide some support for natural rubber extraction in response to pressures from Amazonian economic elites and large industrial interests in southern Brazil. However, later policies subsidized synthetic rubber production and reduced barriers to lower priced Asian plantation imports, undermining the Amazonian rubber industry (Costa Sobrinho 1992; Dean 1987, 108–127; Martinello 1998, 285–312; do Rêgo 2002; 369–373). Some tappers abandoned the forest, and others continued their extractive activities alongside expanded subsistence production.

Traditionally, Acrean rubber-producing lands had been divided into rubber estates, in which typically local estate owners or *seringalistas* provided tappers with industrialized goods that were paid for in rubber by tappers at the end of the harvest. Over the 1950s, 1960s, and 1970s, social relations changed as many of the former *seringalistas* abandoned their concessions, independent merchants expanded, and rubber tappers began to diversify production and to develop autonomous market links. The suspension of the national rubber credit program in 1971 was the final blow to the traditional rubber system, in keeping with the ambitious Amazon development plans of the military government to transfer political power and control over land from local elites to capitalist investors from southern Brazil who could use their excess capital to exploit the region's natural resources more profitably (Schmink and Wood 1992, 58–66).

As part of these plans, a federally appointed governor of Acre opened the doors for the sale of state lands to outsiders, called *paulistas* due to their origin from the wealthy state of São Paulo. Investors were attracted by low land prices, the possibility for speculation, and abundant, easy credit available for forest clearing enterprises such as cattle ranching (da Silva 1982). With the arrival of the *paulistas*, eastern Acre suffered a wave of forest clearing, accompanied by a "clearing" of forest inhabitants. Many rubber tappers migrated across the border to Bolivia, were absorbed in the agricultural colonies, and filled the towns, especially Rio Branco.

The isolation and more personalized, though not necessarily friendly, relations between tappers and the local "patron" had given way to even more difficult, violent struggles against outside investors with no appreciation for the forest and its people. Esteves (1999) noted that tappers, now facing an enemy who represented the polar opposite of their traditional culture, learned to defend themselves using nonviolent confrontations to stop forest clearing. They also formed broad political alliances, and with initial support of the Catholic Church and CONTAG (the national rural workers confederation) in the 1970s, they began to organize and articulate their land rights and cultural heritage (Bakx 1988; Barbosa 2000; Costa Sobrinho 1992; Esteves 1999).

Political Struggles and Alliances

During the 1980s, Brazil's gradual political democratization coincided with growing mobilization of resistance movements across Amazonia (Schmink and Wood 1992,

95–135). The rubber tapper movement emerged as the most innovative force among these movements. One part of the rubber tappers' strategy was to invert the modernist, *paulista* discourse about "empty lands" and "technological backwardness" by promoting the value of their forest knowledge and the standing forest as a viable development alternative (Esteves 1999, 130–179). This strategy generated growing sympathy from national and international environmental groups, who began to support the movement with resources and information. These alliances also helped project innovative tapper proposals to a broader audience (Hall 1997, 91–133; Schmink and Wood 1992) to the extent that tapper leader Chico Mendes gained international fame when he was awarded several global environmental prizes and gave depositions before the World Bank and the Inter-American Development Bank in the United States.

The National Rubber Tapper Council (CNS) was formed in 1985, with the help and support of key allies in Brazil and elsewhere (Hall 1997). Incrementally, the rubber tappers' need to preserve the forest in order to ensure their own survival led the CNS to fight for the creation of extractive reserves. In 1987, the National Institute for Agrarian Reform (INCRA) declared the first agro-extractive settlement (PAE), in the place where well-known leader Chico Mendes and his family lived; after this victory, Mendes was assassinated by a rancher in 1988. Legal declaration of IBAMA (Brazilian Institute for Renewable Resources and the Environment)-regulated extractive reserves (RESEX) came shortly thereafter, in 1990.

Emerging from a strategic base within the organized rubber tapper movement, the Worker's Party (PT) formed in Acre (Fernandes 1999, 64, 86) in 1990. By 1992, the PT had consolidated a political niche with the election of the charismatic Marina da Silva—a daughter of rubber tapper parents—to the Senate, and of Jorge Viana, a young forester, as mayor of Rio Branco. In 1998, he was elected governor of Acre and his brother, Tião Viana, was elected to the Senate. Both brothers were successfully reelected for second terms, through 2006, and Marina da Silva was named the Brazilian Minister of the Environment in 2003.

A Vision of Forest-Based Development

The policies of Acre's Forest Government thus emerged from a grass-roots social movement whose participants had a strong dependence on Acre's abundant forest resources for their livelihoods, and a well-defined common identity as rubber tappers. The movement also had wide-reaching alliances and networks with national and international organizations, both governmental and nongovernmental. These characteristics are important reasons why the rubber tapper movement has had a significant policy impact in the region (Hall 1997). The gubernatorial election of Jorge Viana, a forester and close ally of the rubber tappers, presented the challenge of going beyond support for rubber tappers to implementing a broader vision of alternative development for all the regions and social groups of the state of Acre.³

To what extent the government will be capable of marshaling the technical resources and political support to carry out this vision remains to be seen. From the limited social and human resources available in the state, the government has hired many talented people from the university and NGOs, leaving these organizations short-staffed at a time when state policies have placed greater demands than ever for their collaboration. Even if material and human resources were sufficient, there are few road maps for sustainable development, and the very concept is laden with

uncertainties. Controversies surround many of the government's proposals, including the notion of sustainable management of timber resources, and the extractive reserve model (Arnt 1994; Browder 1992; Homma 1992; Pearce et al. 2003; Rice et al. 1997). Most daunting of all are the relentless pressures that stem from ongoing Amazonian realities: road construction; market pressures; expansion of logging and ranching; and conflicts over land and resource tenure. The success of the government's experiment in sustainable development will depend on the ability to successfully address these issues concurrently, while maintaining the political support to pursue their vision through its many uncertain paths.⁴

Acre's Forest Government "understands the forest as the basis for a new economic model. Forest products should constitute the differential trademark with which the State will be able to compete in national and international markets" (Government of Acre 1999). The government's guidelines also emphasize human development and the strengthening of organized civil society. "The Forest Government is seeking a radical change in the models of regional development and in the style of management of public policies by the State" (Government of Acre 2000b). Four policy initiatives are particularly illustrative of the state's strategies to operationalize forest-based development: the Chico Mendes Law; neoextractivism; ecological-economic zoning; and timber-based development. To understand the underlying objectives and desired outcomes of these policy initiatives and the mechanics of their implementation, interviews were carried out with forest government officials from 2000 to 2002.

The Chico Mendes Law

The Chico Mendes Law was the first major policy implemented by the Forest Government, aimed at its primary constituency, the rubber tappers. The law provides rubber tappers with an additional payment (R\$0.60 or US\$0.25 as of 2/6/02) per kilogram of rubber produced. This payment is in recognition of the economic value of environmental services rendered through forest cover retention. To receive the monetary benefit, tappers must be members of a producer association or cooperative. The new law was aimed at stabilizing extractivist populations by supporting their main income-earning activity, rubber tapping. This was a bold and controversial move, investing scarce state funds in a dying industry. However, the multiple goals of the policy included:

- To stem rural-urban migration, which has been increasing since the mid 1980s due to the steady decline in rubber prices. The objective is to retain a rural workforce for current and future sustainable forest development. It also responds to the difficulty in expanding municipal services and urban employment opportunities triggered by rural exodus.
- To promote organization of local producer groups. The primary intent is to facilitate forest product marketing while reaping benefits of the comparative advantages of economies of scale, and to build administrative capacity of rural institutions and individuals.
- To improve rubber quality. It is expected that more intensive monitoring and documentation of individual rubber transactions will result in enhanced rubber quality.
- To facilitate official documentation of rubber tapper service. Documentation of rubber transactions serves to legally authenticate tapper service required to receive future federal retirement benefits.

There is some evidence that the Chico Mendes Law is achieving its desired objectives. Since the law was enacted in January 1999, state rubber production has more than tripled. The total 1998 production of 962,000kg supporting 1480 families (SEPLAN 1998) increased over 200% by 2001, to 2,980,000kg, supporting 6154 families (SEFE unpublished data). The measure also has been successful in stimulating producer organizations that make up the state-level COOPERACRE to market extractivist products: 30% of all 87 extant cooperatives or associations were created since the Chico Mendes Law. Rubber quality has increased to the point that new investors are being attracted to Acre, such as Pirelli, the Italian-based tire manufacturer, and Farmanginhos, a Brazilian condom manufacturer. To date, there is no quantitative evidence of stemming rural to urban migration.

Since enactment of the law, rubber prices paid to producers have increased 154% from R\$0.50 to R\$1.27 (US\$0.21 to US\$0.52 as of 2/6/02) (unpublished data based on average prices of 10 cooperatives). While most of that increment comes directly from the incentive payment, the rest can be attributed to producer group success in negotiating higher selling prices as the groups gain some monopoly power, an increase in rubber quality, and a decline in world natural rubber supply because of a gradual abandonment of Asian plantation production. The impact of this income increase at the tapper household level is substantial. On a state level, the government calculates that 70% of the incentive payment investment is recaptured through state taxes. The remaining 30% is far below the urban infrastructure investment that would be needed to support an equal number of tapper families. These financial calculations moved lawmakers to increase the original payment from R\$0.40 to R\$0.60 as of January 2002.

Despite these successes, there is little doubt that the decline of rubber tapping is virtually irreversible. Evidence from recent studies in Acre consistently shows that many producers have stopped tapping rubber, and few, especially among younger men, wish to return to this occupation (Campbell 1996; Gomes 2001; Salisbury 2002). Thus, the future of forest-based development will depend on finding ways to diversify extractive systems, within the concept of “neoextractivism.”

Neoextractivism

The concept of “neoextractivism,” articulated by the state’s former Secretary of Production, José Fernandes do Rêgo, refers to an alternative vision of forest use and conservation that builds on the cultural, political, and economic context under which these activities are taking place (do Rêgo 1999). Neoextractivism stretches the limits of the more strictly defined “extractivism,” which typically refers to natural resource collection activities in which primary animal or vegetation products are extracted from wild populations and sold on the market. Extractivism has been criticized as an economically unviable land use option for various reasons: Over time, extracted natural products are often replaced by synthetic ones; wild extracted resources are often eventually domesticated for more intensive, efficient production; and extracted products decline in quality over the years (Homma 1992).

Rêgo fundamentally rejected this fatalistic vision, taking a broader view of human interactions with the forest and its resources: “Extractivism is not just a way of making a living; it is a way of relating to the forest, to people, and to spiritual things” (do Rêgo 2001). According to do Rêgo (1999), neoextractivism includes all human activities that add value to the product and/or land base in which extraction occurs, such as forest enrichment with native species, cultivation of intensive

agroforestry systems, value-added processing of primary extracted products, and establishment of high-productivity forest “islands” as evaluated by Fadell (1997). It embraces the use of appropriate, modern technology to improve productivity and product quality, explicitly seeks product diversification, and facilitates marketing and commercialization. Neoextractivism contends that the lack of forest research, extension, and policy initiatives to support nontimber extractive activities has undermined extractive livelihood and marketing efforts—initiatives that are now being addressed by the Forest Government’s policies.

Acre’s Forest Government has adopted neoextractivism as one of its guiding forest policy principles. It considers extractivists, who have lived in the forest for generations, as key assets in protecting forest ecosystems while furthering wise resource use for income generation and improved living conditions. Under this premise, the state acted to facilitate successful production, processing, and marketing of Acre’s nontimber forest products, creating the Executive Secretariat of Forests and Extractivism (SEFE). SEFE has drawn upon the expertise and support of a multitude of university, nongovernmental, and private-sector partners to compile ecological data regarding potential products, promote product diversification with a focus on 10 new nontimber species with established markets, hold workshops to improve product quality, develop forest management plans with extractivists, and support value-added processing within and near production forests. So far, development protocols have been developed for 22 nontimber forest products, and two Brazil nut processing factories have been built to increase the value-added from 5% to 50% of the Brazil nut harvest (Viana 2002).

Another major facilitating role the state has taken on is to link forest producers and their products with potential buyers. To this end, SEFE has assisted in developing a network of cooperatives and producer organizations within the COOPERACRE framework. It has also identified traditional markets and buyers, and responded to many inquiries from emerging national and international “green” markets. However, while the concept of neoextractivism provides a philosophical basis for the Forest Government’s ambitious investments in nontimber forest products and diversified forest-based production, the uncertainties in market linkages and the details of ecological, social, technical, and policy needs to support these efforts are not as well defined nor as easy to attain.

Ecological–Economic Zoning

A third major initiative undertaken by the Forest Government during its first year was a state-level analysis of the environment, the resources it provides, and relationships between these two natural components and Acrean society. After 15 years of languishing in government offices, the economic–ecological zoning was completed in less than a year by incorporating existing studies, and recognizing the “real, historical zoning that exists” (Viana 2000). A three-volume publication provides important tools for planning, and its maps can be seen daily in the hands of government functionaries.

Zoning has been mandated in Amazonia since 1990, and often is cited as the solution to planning issues for the region, although little progress had been made by the late 1990s in any of the Amazonian states (Hall 2000). The World Bank-supported effort in neighboring Rondônia demonstrated the inherently political nature of zoning efforts: Far from a merely technical exercise to indicate appropriate solutions, zoning involves a process of negotiating among different—often con-

flicting—sectors of society (Mahar 2000). The Acre government sought to learn from the experiences in other states to develop a focused zoning effort with clear goals and broad participation; the zoning effort was guided by principles of participation, equity, sustainability, holism, and a systems approach (Government of Acre 2000a, 2). A commission with ample representation from the government, private interests, and civil society was created to guide the process. To incorporate diverse opinions, and so that the zoning would reflect real conditions throughout the state, approximately 150 local and regional leaders were interviewed, and each municipality held public forums on zoning (Government of Acre 2000a, 7). The documents produced are defined as a preliminary phase of a long-term labor, a first version, which serves as a subsidy for democratic negotiations among governmental agencies, the private sector, and civil society over a set of public policies oriented to sustainable development. While still limited in the scope of participation, particularly by more marginalized residents in remote areas of the state, the zoning represents both a very useful tool and an important beginning in the process of negotiation about land use and other policies.

Timber-Based Development

Currently, the wood sector in Acre is small, contributing less than 1% to the state economy and directly employing approximately 2236 full-time workers (SEFE 2001). Yet 34% of the state is characterized by high value forests, including open forests rich with mahogany and dense terra firme forests with lesser value tropical hardwoods (Government of Acre 2000c). Little roundwood or processed wood is exported from the state, and in 1998, 84% of the 212,000m³ produced was consumed in state (Brilhante 2000). Only 6% of timber comes from forests under management plans, with the vast majority originating from areas converted to pasture and/or other agricultural uses (SEFE 2001). These statistics reveal that the wood sector is in its incipient stages of development.

On one hand, there are pressures for the state to respond swiftly in developing timber-based forest policies due to exhaustion of traditional tropical timber supplies in Malaysia and Indonesia (Lele et al. 2000). However, timber-based development is a very controversial proposal in Acre due to the strong tradition of nontimber extraction and historical conflicts between tappers and logging companies. Furthermore, the jury is still out on the potential for sustainable forest management in contributing to global forest conservation (Pearce et al. 2003; Rice et al. 1997). The polemic nature of this issue has caused the state government to exercise caution in pursuing timber management proposals. However, at a meeting of extractivists from municipalities all over Acre in 2001, both Governor Viana and Mary Allegretti, Secretary for Amazon Coordination of the Ministry of the Environment, spoke forcefully in favor of timber development as an economic alternative for extractivist communities. Given the decline in rubber tapping, the shift to nonforest activities, and the continued uncertainties in development of alternative nontimber forest products, some role for timber management appears to be a necessary component of the state's dream of forest-based development.

As a first diagnostic step, the state carried out a large-scale analysis of the timber sector, with participation from more than 250 stakeholders representing various forest interests (SEFE 2001). The guiding principle of these meetings was to promote the importance of using a large diversity of forest resources, by a wide range of actors, in a sustainable manner. The resultant diagnosis outlined three areas in which

government intervention was appropriate: (1) public policy, (2) information acquisition and disclosure, and (3) market linkages (SEFE 2001). Specific actions might include supporting value-added processing, facilitation of credit availability for all forest users, provision of technical assistance to forest communities and industry, dissemination of economic and environmental data, and strengthening of management and marketing capacity in the public, nongovernmental, community, and industry sectors. The government's goal is to manage 2 million hectares—15% of the state's forests (Vicente 2002).

One policy initiative that captures the state's strategy for developing and conserving its timber resources is concurrent paving of highway BR-364 and establishment of state production forests along its border (Figure 1). BR-364 is essential to link the western portion of the state that is currently accessible only by river or air transport. Desired outcomes from this strategy to locate state forests adjacent to BR-364 include: (1) to ameliorate anticipated deforestation by establishing government lands that are clearly demarcated and continuously worked, and (2) to provide a cost-effective transportation system for timber extraction and management. The state is also taking the first steps to pursue third-party, Forest Stewardship Council certification of these proposed production forests, with a goal of 700,000 m³ per year of certified timber, mostly for the growing market in São Paulo (Vicente 2002). However, road construction will also increase access to relatively pristine forests, the first step in accelerating deforestation. Another great challenge for the Forest Government is to implement land use plans and controls in order to protect indigenous areas bisected by roads and those forests located in close proximity.

Sustainable timber management is highly experimental and is one of the most controversial components of the Acre government strategy. Newly paved roads may easily lead to further deforestation, illegal logging, and invasion of indigenous lands. Despite improved understanding of the compatibility of tropical forest logging and biodiversity protection (Putz et al. 2000), and some evidence of costs and benefits when employing best logging practices (Barreto et al. 1998), other scientists advocate "logging off" to halt industrial logging altogether (Gullison et al. 2001). Community-based logging of forests is also uncertain, and still is in its infancy in Brazilian Amazonia (Amaral 2000; Macedo 2001). Even while the first community-based certifications in Brazil were granted in Acre in 2002 and 2003, the high costs of certification, the difficulties of monitoring, and the multitude of market uncertainties have led many to be skeptical of its long-term success. The timber experiments underway in Acre will face all of these challenges.

Challenges and Dilemmas

Acre's "Forest Government" has embraced a novel, comprehensive approach to forest use and conservation, drawing on local culture and development philosophy, a transparent approach to policymaking, and a wide network of collaborating individuals and organizations to carry out their vision of forest-based development. The government seeks to provide infrastructure for smallholders and the private sector while also supporting these groups in their efforts to organize and modernize. It has drawn on cutting-edge ideas and models to move directly into the globally connected world in a way that could improve the livelihoods of the state's population.

In contrast to many Amazonian policies that have heavily subsidized large and corporate producers, the Forest Government has opted to invest in the small and

middle-sized extractivists and other forest users. Their philosophy draws from local cultural history and the rubber tapper movement, as well as home-grown intellectuals such as do Rêgo and the many other people who have worked as functionaries or advisors of the government. The culture of the government agencies is permeated by a consistent vision, despite internal disagreements that exist over such issues as timber extraction. There is also a remarkable transparency across government departments, allowing them to coordinate their work more effectively.

Still, many opportunities and challenges remain for sustaining and adapting these policy initiatives for long-term ecological, economic, cultural, and political success. Challenges include many complex technical issues such as ecological aspects of harvesting, forms of social organization, governance and marketing, and the political negotiations required to continue experimentation long enough to learn from the results. For example, there is limited information on distribution, population dynamics, and natural history of most species with commercial potential in Acre. There is little empirical data on timber and nontimber yields for basic determination of whether harvests are adhering to the sustained yield principle. To discern broader ecological impacts of forest manipulations, there is a great need for enhanced understanding of ecosystem and landscape dynamics. Likewise, there is still very little understanding of the forms of social and economic organization appropriate to use resources, market products, manage conflicts, and distribute benefits.

A major economic premise behind the state's desire to base future development on sustainable management of the state's rich forest resources is that standing forest is more attractive economically than converting that forest to other land uses such as agriculture and ranching. Yet studies in Acre and neighboring Rondônia have shown the opposite, and also demonstrate a trend toward more cleared land and less forest among colonists and extractivists (Carpentier et al. 2000; Gomes 2001; Salisbury 2002). The deforestation pressures will surely intensify with current road-paving initiatives for the two state highways, BR-364 and BR-317, which are part of the federal government's *Avança Brasil* policy and also a key part of the Forest Government's strategy to revitalize the forest economy.

Many current state policies and strategies directly address the need to increase income from standing forests, including several highlighted in this article: the Chico Mendes Law, neoextractivism, and timber-based development. In addition, payments for forest externalities not typically tied to markets (soil and water protection, carbon storage and sequestration, biodiversity conservation) may also play a larger role in future forest conservation in the region (Fearnside 1997). Lele et al. (2000) argue that innovative monetary transfers (such as the Chico Mendes Law) are needed to significantly affect Amazonian conservation. However, such novel mechanisms to correct for market and policy failures in support of sustainable tropical forestry are complex and often involve difficult global negotiations (Richards 1999).

Local capacity building and institutional development are other issues of utmost importance. SEFE is exploring creation of a permanent state forest service, recognizing the temporary nature of their existence and the need for institutional continuity. However, SEFE and other local institutions are constantly challenged to identify and retain experienced individuals capable of managing the complex ecosystems, institutions, and groups involved in forest development and conservation.

With the early political support from Acre's highly-respected Senator Marina da Silva (now Minister of the Environment), the Acre state government earned national

credibility that has only increased after the 2003 election of President Inácio “Lula” da Silva, the PT candidate. Similarly, international support for the government’s sustainable forestry agenda has been forthcoming. The Inter-American Development Bank (IDB) has invested US\$79.2 million “to promote environmentally sustainable economic growth and productive diversification for long-term quality of life improvements and preservation of the natural patrimony of the State” (IDB 2001), including US\$7.1 million to support forest management and extractivism.

A combination of political, cultural, and ecological factors in Acre’s history accounts for the current favorable conjuncture. The state’s isolation has favored the maintenance of an intact forest and forest-dwelling peoples. As in many other parts of the tropics, another key element is the existence of strong social movements focused on the defense of their natural resource base for future generations, and rooted in local knowledge and livelihood practices (Hall 1997). What is more unusual is that enlightened policies at the state and national levels, reflecting in part the penetration of grass-roots social movements into the political mainstream, provide some hope of addressing the institutional and policy failures that have been the main problem for community forestry in Latin America (Richards 1997). The political convergence of social and environmental groups is an important element of the future potential for experiments in community-based natural resource management (Schmink and Wood 1992; Silva 1994). Yet effective local self-governance and community participation still must be achieved if these experiments are to succeed in Acre (Hall 1997), and a daunting array of technical and economic problems still remains to be resolved. Finally, the success of the Forest Government’s long-term forest-based development vision will depend on the continued abiding support of grass-roots social movements, and a broad alliance of supporters to help them face the many uncertainties and challenges of the future.

Notes

1. In Acre’s neighboring state of Rondônia, these development activities not only had dramatic environmental impacts, they also transformed the social profile of the state such that traditional peoples and indigenous populations native to the region became a minority to the new majority of immigrants: colonist farmers, ranchers, loggers and miners (Brown and Rosendo 2000). In the eastern state of Pará, massive migration, deforestation, and social conflict accompanied a displacement of regional elites who were linked to forest extraction activities, by outsiders involved in ranching, logging and mining (Hall 1991; Schmink and Wood 1992). In neighboring Amazonas, promotion of the Free Trade Zone in Manaus stimulated migration to the capitol and supported new commercial and industrial elites, leaving the vast hinterland largely unaffected. In contrast, in Acre, there was far less in-migration of outsiders and displacement of traditional and indigenous peoples from the landscape.

2. The majority of Acre’s forests are inhabited by people, albeit at low population densities. Based on the 2000 census (IBGE 2002), approximately 34% of Acre’s total population of 557,526 currently lives in rural areas (Government of Acre 2000b). The very low mean rural population density of 1.2 people per square kilometer masks significant variation throughout the state; higher densities are concentrated near roads and urban areas. While not all the rural population lives in the forest, the best data available from 1999 indicated that only 18,500 rural Acreanos clearly lived outside the forest on ranchlands or in rural districts (FNS 1999). In contrast, 84,038 people lived on old rubber estates (FNS 1999), 9343 in indigenous reserves (Government of Acre 2000b), and 83,217 in settlement projects and colonist areas (FNS 1999). People in the first two settlement types clearly reside in the forest, and those from the third are also likely to live in or adjacent to their own forest holdings.

3. To address this challenge, Viana's team articulated a coherent, integrated and innovative vision for forest-based development in Acre. The vision contemplated many dimensions of sustainability, basing actions on the following principle (Viana 2002):

- Democratize access to opportunities (social sustainability).
- Use our natural resources according to ecological indicators: for example, forest management (ecological sustainability).
- Stimulate and support competitive productive enterprises (economic sustainability).
- Respect the values, traditions, and ways of living of traditional populations (cultural sustainability).
- Promote networks, linkages, partnerships and participatory processes (political sustainability).
- Truth and honesty (ethical sustainability).
- Life (human sustainability).

4. In 1999, the government along with the Ministry of the Environment brought together representatives of Acre's social groups—indigenous people; rural workers; loggers; ranchers; researchers; NGO representatives—to discuss and approve the “Positive Agenda for Acre: Alternatives for Development of Sustainable Activities” (MMA and Government of Acre 1999). Among the most important goals articulated in this document was the Conversion Pact Program that focused on intensification of production and increase in productivity in degraded areas, and a decrease in deforestation rates over the next twenty years until reaching a maximum of 14–18% (from 9% in 1999). What was remarkable about this outcome was that, although the ranchers did not agree to the government's goal of 14% maximum deforestation, they did agree to the slightly higher figure of 18%.

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