OF MARKETS AND FORESTS: CERTIFICATION AND SUSTAINABLE FORESTRY IN BOLIVIA

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> We are remodeling the Alhambra with a steam-shovel, and we are proud of our yardage. We shall hardly relinquish the shovel, which after all has many good points, but we are in need of gentler and more objective criteria for its successful use.
>
> Aldo Leopold. A Sand County Almanac p. 263

Abstract
Bolivia is seldom thought of as a country in the vanguard, but she currently leads the developing world in the certification of well-managed forests, and in efforts to develop a national forest certification infrastructure. While the Bolivian experience with certification largely bears out conventional expectations regarding the behavior of firms in response to market demand for certified products, events in Bolivia over the past three years have more original story to tell. In Bolivia, certification has been pushed not just by markets demand, but by a confluence of institutional initiatives and new laws. The most important of these is a 1996 forestry law that essentially requires all logging operations to practice sustainable forest management. Firms pushed towards sustainable forest management by the new law are increasingly relying on certification to help gain markets for lesser-known species. Also significant is the development of national certification standards and the emergence of a Bolivian certifier. The Bolivian experience with certification offers important lessons to other countries currently striving to promote certification; these lessons are distilled down to four simple design principles. Finally, preliminary comments are made on the lessons offered by the Bolivian experience regarding the long-term viability of certification as a tool for achieving forest conservation.

I. Introduction

This case study documents an intriguing and potentially promising response to the problem of deforestation and degradation of tropical forests—the growing success of efforts to promote the certification of well-managed forests in Bolivia. Certification, as described in more detail below, is a strategy for creating market incentives for environmentally and socially sound logging practices by rewarding responsible forest managers with a “green seal" that they can use to differentiate their products in the marketplace.

In one of the interviews conducted for this study, a North American businessman who makes his living trading in certified wood told me that he sees Bolivia as "the only tropical country in the world really gearing up to take advantage of the business opportunities implicit in certification" (Fuge pers. comm.). The data are certainly there to support him: Bolivia, with 410,123 hectares of certified natural tropical forest, has more than any other nation in the world (Saravia pers. comm.; FSC 1998). Judging by the number of companies (both landowners and concession holders) that have taken serious steps towards certification, this number will probably more than double by the end of 1999 (CFV 1998a). At the same time, Bolivia is developing national institutions capable of making certification relatively inexpensive and well adapted to local realities. Bolivia is the first non-European nation to develop a set of national certification criteria, and is one of the few tropical countries to have an up-and running national certifier.

Why is certification happening in Bolivia? How did Bolivian environmentalists, logging companies and indigenous rights advocates achieve consensus about what constitutes “certifiable” forestry? What does the

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Bolivian experience have to teach to other nations striving to design and implement national strategies for promoting certification? Is certification helping meet forest conservation goals in Bolivia?

Before trying to answer these questions, allow me to briefly describe how I became aquatinted with efforts to promote certification in Bolivia. I spent a total of three months in Bolivia in mid-1998, as part of my activities as a Fellow of the Thomas J. Watson Foundation. The information presented below was gathered during a review of files and internal documentation shared with me by Bolivian institutions, through a review of published literature on certification and sustainable forest management in the tropics, and through interviews with a wide range of individuals involved in efforts to promote certification (see Appendix 1).

II. Forest certification and the structure of the FSC system

The basic assumption underlying forest certification is that relatively wealthy, relatively well informed consumers prefer not to buy wood that comes from environmentally destructive logging enterprises. Conventional wisdom holds that these consumers will choose forest products credibly certified as coming from well-managed forests over products of an unknown source. Indeed, some studies have shown that consumers may even be willing to pay more for certified wood (ITTO 1996b). Even if consumers will not pay a premium, profit-seeking firms are expected to opt for certification to gain market share and access to new markets. Thus, public concern over the fate of the forests will translate directly into market incentives for better forest management. In short, certification constitutes an authentic effort to harness market forces to promote forest conservation. This market basis bodes well both for the strategy's cost-effectiveness and for its success once donor dollars have dried up.

For now, however, certification is a forest-conservation strategy of choice among a surprisingly diverse group of donors, including the World Bank, big picture environmental organizations like the WWF, and major philanthropic interests like the MacArthur foundation. Indeed, the World Bank and the WWF recently announced a strategic alliance that has as one of its goals the certification of 200 million hectares by the end of 2005 (CFV 1998a). While this is certainly an admirable goal, little progress has been made towards its realization. Indeed, the partners in this alliance currently lack a firm strategy regarding how to get all this forest certified—reason in part why the Bolivian experience is significant (M. Kiernan pers. comm.).

The credibility of forestry certification is guaranteed by a Mexico-based international organization called the Forestry Stewardship Council (FSC).[1] A series of meetings between environmentalists, representatives of workers' and indigenous groups, and logging companies in the early 1990s gave rise to the FSC. Representatives of these three groups now compose the FSC's Board of Directors, and a small secretariat carries out the day-to-day operations. The primary activity of the FSC is accrediting and monitoring the certifiers that actually evaluate logging companies (i.e., watching the watchers). As of September 1998, the FSC had endorsed six certifiers, including both environmental organizations and profit-seeking firms, and several more were seeking endorsement. In addition, the FSC approves locally developed standards that specify regional or national certification thresholds, and provides a forum for conflict resolution. The vision of responsible forestry that informs all the FSC's activities is articulated in ten principles of good forest management, and further detailed in attendant criteria (referred to collectively as the FSC Principles and Criteria, or the FSC P&C).

Certification is completely voluntary, and is initiated by the firm seeking certification. The certifier typically begins the certification process by making a preliminary visit to the managed forest in question, followed by a more extensive evaluation by an interdisciplinary team of experts. These teams have tended to include forest ecologists, professional foresters, sociologists, anthropologists, and economists. The criteria they use to evaluate the forest vary from place to place. If FSC-approved regional or national standards exist, the certifier is obligated to use them. If not, the certifier uses in-house standards, which would have been approved by the FSC as part of the accreditation process.

After completing the field evaluation, the certification team assembles a report of their findings and circulates it for peer review. If the certification team judges that the forestry enterprise lives up to the relevant criteria, certification is granted. In many cases the certification team and peer reviewers propose improvements in the

[1] For an overview of some of the principle criticisms of the FSC system see Kiekens 1997.

management scheme, and the certification is conditional on compliance. Certificates generally last for five years, and require annual audits by the certifier. Certifiers also issue chain-of-custody certificates, which guarantee that wood sold as certified actually comes from certified forests. The forestry enterprise seeking certification pays for the certification process. Costs vary in accord with the size, complexity and location of the forest in question (for more on certification see Viana et al. 1996; Kiker and Putz 1997).

III. Rich forests and poor forestry

Though one of Latin America's poorest nations according to traditional measures of economic development, Bolivia possesses a rich diversity of forests. Roughly 53.4 million hectares, or about 48% of Bolivia's total area, is covered with woodlands, divided among four very broad forest types (see Table 1). A mission from the ITTO which visited Bolivia on several occasions in 1996 estimates that Bolivia has the potential sustainable annual harvest 24 million cubic meters of tropical hardwoods from 14.4 million hectares of lowland forest currently appropriate for productive uses (i.e., ignoring indigenous lands, protected areas, and very remote forests) . This figure contrasts with an estimated annual average harvest in the early 1990s of less than 900,000 cubic meters (ITTO 1996a.). If this potential were realized, Bolivia would rank among the world's four most important tropical timber producers (along with Brazil, Malaysia, and Indonesia; WRI 1998). Despite the vastness of the resource and despite the historical magnitude of timber concessions, the forestry sector accounted only for 1.35% of the GDP in 1996 (Pacheco 1998). Legally, the government owns all this forest, even forest on private land, and virtually all the underlying property rights are also technically in public hands (ITTO 1996a).

Table 1: Bolivia's Forests

Region	**General forest type**	**Area (millions of hectares)**
Amazon	tropical lowland moist and seasonal	22.2
Chiquitania	tropical mid-altitude	7.5
Chaco	tropical lowland dry	10.1
Andino	tropical high altitude	13.7
Total		53.4 (about 48% of Bolivia's total area)

Source: Superintendencia Forestal 1998, Pacheco 1998.

The same ITTO report cited above also underscores the biological richness of Bolivia's forests. Bolivia as a nation possesses some of the highest species counts on earth: over 20,000 vascular plants; about 320 species of mammals; and roughly 1375 species of birds, or about 16% of the world's total bird species (ITTO 1996a). The World Resources Institute reports that in Bolivia at least 21 mammal species, 27 bird species, and 49 flowering plant species are currently considered endangered (WRI 1998). Another recent study concludes that roughly 44% of Bolivia's forests are large, intact ecosystems which lie beyond the expanding frontier of intense human use, and that 97% of this "frontier forest" is threatened (Bryant et al. 1997).

While estimates of deforestation differ drastically depending on whom you ask, it is quite clear that Bolivia's forests are disappearing at a significant rate. According to figures generated within Bolivia, annual deforestation rate averaged about 150,000 hectares for the past 20 years (Pacheco 1998, citing a study carried out by the Bolivian Government). Calculations published by the World Resources Institute estimate a loss of about 550,000 hectares per year over the past 10 years (calculated from WRI 1998). Data on forest area degraded by poorly designed management practices simply does not exist, though some rough measure of the magnitude of logging activities is implied by the fact that at the beginning of 1996 short-term logging rights affecting 22 million hectares had been granted in 185 separate concessions (Lizarraga and Helbingen 1998).

Careful scholarship addressing the forces driving the destruction of these precious forests is very scarce, but anecdotal evidence and conventional wisdom points to the usual suspects: slash and burn agriculture by subsistence farmers; large-scale cattle ranching; and mechanized cultivation of soybeans, sugarcane and other cash crops (ITTO 1996a; Pacheco 1997). In other words, traditional logging practices, which entail the selective harvest of two or three of the sixty or more tree species found in a given stand of lowland forest, does not directly cause deforestation. Indeed, according to at least one study, the direct environmental impact of traditional logging practices is relatively low, due to the fact that only one or two large, valuable trees are typically harvested per hectare (Gullison and Hardner 1993; see also ITTO 1996a for a discussion of

traditional forest practices). Historically, mahogany (*Swietenia macrophylla*) and, to a lesser extent, Spanish cedar (*Cedrela* spp) and roble (*Amburana cearinsis*) have been the target of most logging activity in the lowland forests of eastern Bolivia (ITTO 1996a; Pacheco 1998).

Old-school selective logging practices are not entirely innocent in the crime of deforestation, however. By robbing the forest of future economic value and by leaving behind a network of roads, unsustainable selective logging often opens the way for the farmers and ranchers who actually clear the forest. Once logging companies have cut down all the valuable trees, they have no incentive to keep settlers from moving in. The resulting pattern is as simple as it is common: logging companies build roads, take out the valuable trees, and abandon the devalued forest to farmers and ranchers (Pacheco 1998; Colchester 1993). Nobody knows exactly what percentage of the millions of hectares of forests cut in the last thirty years fit this pattern, but interviewees in Bolivia agree that it is quite common (e.g., Quevedo, pers. comm.; Fredericksen, pers. comm.). From a strictly preservationist point of view, the most appealing way to break this pattern is to refrain from granting the concessions in the first place. However, given the prevalence of illegal logging and corrupt officials, and given the dire need and aggressive greed that drives deforestation, such preservationist policies have little chance of success.

The idea behind conservationist strategies like certification is that well-managed natural forests are capable of rendering the economic benefits that Bolivia desperately needs without decimating her rich forests. Proponents of sustainable forest management envision forests that provide a steady flow of valuable tropical hardwoods while maintaining biological diversity and ecological complexity (Buschbacher 1990; Putz 1994; Hartshorn 1995). Tropical foresters use a variety of management tools to move towards the goal of sustainability; a complete discussion of these techniques lies beyond the scope of this essay (see Buschbacher 1990 for a helpful survey). Conceptually, the key to sustainable forest management is to cut no more than the forest grows, and to make sure that harvesting does not alter the biological composition and physical structure of the forest in the long term (though short term alterations may be needed to ensure the regeneration of shade-intolerant species; see Fredericksen 1998). Table 2 summarizes key differences between selective logging and reduced-impact sustainable forest management as it is being promoted in Bolivia.

It is important to differentiate between management approaches that just aim to sustain the flow of usable timber produced by a given patch of ground (*sustained-yield forestry*) and approaches that strive to sustain both yields and the basic ecological integrity of the forest (*sustainable forest management*). An example of the former is clear-cut logging in the Pacific Northwest of North America. The approach to forest management promoted by certification, which explicitly incorporates practices designed to reduce the environmental and ecological impact of logging, fits into the second category. As I discuss in the conclusion to this case study, however, the long-term ecological ramifications of even sustainable forest management are largely unknown, particularly in tropical forests. Thus, while I henceforth use the phrase *sustainable forest management* to refer to certifiable forestry practices in Bolivia, it is with some trepidation that I use the word *sustainable*.

Table 2: Differences between extractive logging and sustainable forest management in Bolivia.

Extractive logging	**Sustainable forest management ***
Select target trees and species according to purely short-term economic criteria	Select target trees and species so as to provide economic benefits now and in the future (i.e., ensure a future harvest).
Harvest 2 or 3 species.	Harvest 10 or more species (out of the 60 or more found in a given stand).
Harvest an average of 1 cubic meter per hectare.	Harvest 10 or more cubic meters per hectare (equal to the expected growth before the next harvest, based on inventory data and growth rates; the idea is to ensure volumetric sustainability by cutting no more than the forest grows).
Harvest all commercially valuable specimens of target species.	Choose target trees are to promote regeneration and the economic viability of future harvests (i.e., leave seed trees, respect minimum cutting diameters).
Rarely re-enter forest after all valuable trees are cut (though it may take several years to completely log a given stand, and multiple harvests may occur in order to cut smaller trees of the same species as stocks dwindle elsewhere).	Log a given stand periodically, in accord with a polycyclic 20+ year cutting cycle selected to optimize future harvests.
Harvest valuable trees when and where they are found.	Cut only within annual harvesting area, which corresponds to the size of the forest under management and the cutting cycle.
No advance planning of harvests (other than sending out tree hunters who cut trails to valuable boles).	Cut according to detailed management plans and annual operating plans that are based on inventories and on estimated growth rates of target species.
No steps taken to minimize environmental impact.	Care taken to reduce impacts (no cutting on steep slopes and in riparian corridors, plan roads and skid-trails, explicit measures to protect key wildlife habitats and to limit hunting by work crews).
After harvest, the forest is stripped of all valuable timber and is therefore vulnerable to land-use change.	Leave valuable timber in the forest, providing forest managers with an incentive to prevent deforestation by farmers and ranchers.

*As stipulated in the law, and as actually practiced by logging firms included in this study.
(Sources: ITTO 1996a; MDSMA 1997; Gullison et al. 1996; Guzmán pers. comm.; R. Quevedo pers. comm.; Gil pers. comm.; Fredericksen, pers. comm.).

Sustainable forest management renders conservation benefits when it prevents land-use change. In contrast to selective logging, which robs the forest of all value, sustainable forest management generally requires leaving economically valuable timber in the forest, both to promote regeneration (seed trees) and to insure the economic viability of future harvests (respecting minimum cutting diameters). Proponents of sustainable forest management hope that productive forests will be more or less immune land-use change, because forest managers (be they large corporations or local communities) will have an incentive to ensure a return on their investment in future harvests by keeping farmers and ranchers away. As I discuss in the conclusion to this case study, the long-term ecological and economic viability of this vision of sustainable forest management is largely unknown.

IV. Pushing certification: the role of institutions.

The shift from selective logging to sustainable forest management—a necessary precondition for certification— is an expensive and difficult process. So why is certification catching on? To a large extent, certification is booming in Bolivia because it has received indirect support from the new forestry law and significant backing from an array of institutions. Indeed, this is one of the main lessons suggested by the Bolivian experience: certification stands to gain a great deal from a firm legal and institutional foundation. In

the following pages I sketch out the principle players that have laid the groundwork for certification in Bolivia, and analyze how they have contributed to its success.

It is key to recognize that the emergence of certification in Bolivia has coincided with a larger shift in the nature of prevailing forestry practices in Bolivia (though the "informal" segment of the sector has not altered much; Mancilla pers. comm.). Over the past six years or so unsustainable selective logging has begun to give way to sustainable forest management. This transition has occurred for a variety of reasons, including dwindling stocks of target species, new regulations and government programs designed to promote sustainable forestry, and international market pressure. To a large extent, the same tangle of forces that has brought about significant changes in forest practices has also promoted certification, directly or indirectly.

4.1 The 1996 forestry law (Ley 1700)

In 1996, after more than five years of heated polemic, the Bolivian congress passed a comprehensive new forestry law that drastically alters the legal landscape faced by forest managers in Bolivia. Article One states that the objective of the new law is to "enforce the sustainable use and the protection of forests for the benefit of present and future generations, thereby harmonizing the social, economic, and ecological interests of the nation." (BOLFOR 1997b) More specifically, the new law requires that all logging enterprises develop management plans that "include a clear, solid and explicit strategy guaranteeing the long-term sustainability of both volume and quality" (BOLFOR 1997b; Article 69 of DS No. 24453).

The actual forestry practices designed to meet the sweeping goals of the new forestry law are presented in a series of technical norms issued by the Ministerio de Desarrollo Sostenible y Medio Ambiente (Ministry of Sustainable Development and Environment, known by its Spanish acronym MDSMA). These technical norms vary in accord with region, the size of the forest and the nature of the organization doing the management (i.e., local and indigenous communities are governed by slightly different technical norms than concession-holders and landowners). A complete analysis of the content of these norms lies far beyond the bounds of this case study, but for a synopsis of the basic management principles espoused, see Table 2.

The seriousness of the new law is illustrated by the number of companies that held concessions in the old system, but that have declined to request harvesting rights under the new law. This has led to a sharp drop in the area under concession (from 22 million hectares to 6 million hectares) and in the number of concessions (from 122 to 88) (Lizarraga and Helbingen 1998; CFV 1998a). The companies that have requested concessions under the new law tend to be well-capitalized firms with some degree of vertical integration (Matkovic pers. comm.). Perhaps more importantly still, they are willing to change. Indeed, managers at several firms I spoke to see the new forestry law as a wake-up call—they themselves had realized the selective harvest of a small number of species was growing less viable as accessible unlogged forests dwindled.

Of course, the law is only effective when enforced. A key component of the new forestry law was, however, the creation of an independent institution—the Superintendencia Forestal— empowered to monitor and enforce compliance with the law. While the Superintendencia lacks the resources to closely watch all of Bolivia's woodlands, they are making a good-faith effort (Quevedo, pers. comm.). This is a big step forward; the institution formerly charged with overseeing forest management was rift with corruption (Andaluz et al. 1998). While illegal logging certainly continues, most large companies are in the process of shifting their management techniques to conform to the law (Guzmán pers. comm.).

These changes have helped promote certification in two fundamental ways. First and foremost, the new law and Bolivian national certification standards demand essentially the same thing: that logging operations practice sustainable forest management.[2] In other words, the technical requirements of the forestry law are, for the most part, in harmony with the technical requirements of certification (see CFV 1998b; MDSMA 1997). Certification is therefore a relatively small—and therefore inexpensive—step away for law-abiding companies.

[2] The significant exception to this is certification's more stringent set of requirements regarding labor conditions and relations with neighboring communities (Pierront, pers. comm.).

In addition, the new forestry law indirectly requires that firms harvest a much broader range of species than before. As I describe in more detail in section six of this case-study, firms increasingly see certification as an important strategy for developing markets for these new species. The law is causing a shift to a broader range of species for two reasons.

First, the law dictates a shift from volume-based taxes to area-based taxes. Where Bolivian concessionaires formerly had to pay based on the quantity of wood they extracted each year, they now pay US$1 per hectare under concession.[3] This means that it is no longer profitable to maintain the vast concessions needed to find commercially significant quantities of mahogany, roble and Spanish cedar (Matkovic pers. comm.). Second, the law has given rise to a strict set of technical norms that effectively prohibit unsustainable selective logging. One key norm requires that forest managers divide their property or concession into a series of annual harvesting areas, in accord with the length of the cutting cycle (required to be at least 20 years). Harvesting in a given year is only allowed within one such area (MDSMA 1997). Traditional target species like mahogany are too sparsely dispersed to make it worthwhile to harvest only them within such a restricted area (Quevedo, pers. comm.; see Gullison et al. 1996; WWF 1996).

Some observers hope that certification will repay its debt to the law. Right now a great deal of attention is focused on the Superintendencia Forestal and their efforts to monitor compliance. As time passes, however, the attention of those who watch (and fund) the watchers will likely shift elsewhere. Since certification gives companies an incentive to comply with the law, certification makes the government's job much easier. At the same time, to the extent that certification renders significant marketing benefits, it will help ease the financial sting of compliance.

4.2 BOLFOR

It is difficult to overestimate the role played by the BOLFOR project in promoting both certification and sustainable forest management. BOLFOR is a unique joint effort between the Bolivian Ministry for Sustainable Development and the Environment, USAID, and a handful of Bolivian private sector organizations (ranging from to an indigenous-rights group to a forestry sector-funded technical assistance provider). Administered by the Washington DC based consulting firm Chemonics International and funded by the US and Bolivian governments, the BOLFOR team works to promote sustainable forest management in eastern Bolivia (BOLFOR 1997a).

BOLFOR quickly identified the Forest Stewardship Council (FSC) certification as a key component in its strategy to promote responsible logging. Strategists at BOLFOR saw FSC certification as a way to reward companies that successfully completed the transition to sustainable forest management with improved access to foreign markets, as well as a way of gauging and demonstrating their own effectiveness in promoting good forestry practices (Nittler, pers. comm.). They also quickly recognized that certification would not thrive without careful nurturing. In hindsight, BOLFOR has contributed to the success of certification in Bolivia in the following six ways:

- *Getting the ball rolling.* In 1994 BOLFOR hired Richard Donovan, then a forestry consultant, to come to Bolivia and recommend strategies for promoting certification. His visit culminated with the 1994 meeting that launched the *comité impulsor*, or the organizing committee charged with designing and implementing a national certification system.
- *Harmonizing certification and the new forestry law*. As I have already noted, the forestry law passed by the Bolivian Congress in 1996 provided a massive impetus for certification. The technical foundation for this law was to a large extent developed by BOLFOR (Lizarraga and Helbingen 1998). Their commitment to incorporating tough standards into the law has reduced the gap between legal compliance and certification. In fact, two BOLFOR foresters (William Cordero and Richard Mancilla) played key roles in the formulation of both the 1996 forestry law and the development of national standards, as did Antonio Andaluz, an environmental lawyer hired by BOLFOR to facilitate the standards development process (Mancilla, pers. comm.).
- *Providing technical assistance to firms.* BOLFOR has helped eleven forestry enterprises develop and implement sophisticated forestry management systems (Nittler, pers. comm.). Not all of BOLFOR's

[3] Though up to 30% of the concession can be designated as tax-free ecological preserves (BOLFOR 1997b; Ley 1700, Article 29).

client firms have opted for certification, but all of the firms that have taken serious steps towards certification have received assistance from BOLFOR (CFV 1998a; Nittler, pers. comm.).

- *Developing marketing networks* that allow certified firms to capitalize on their certification. Without aggressive marketing overseas, certification is unlikely to render significant financial benefits. BOLFOR has worked with Bolivian firms and overseas buyers in an effort to develop markets for certified woods, with a particular focus on lesser-known species. This in turn helps to make sustainable forest management economically viable, and to provide firms with a sound business reason to invest in certification.
- *Promoting the formation of the Consejo Boliviano para la Certificación Forestal Voluntaria (CFV).* As I describe in more detail below, the CFV is a non-profit organization formed with the specific goal of promoting certification in Bolivia. Among other things, they have been instrumental in developing national certification standards. Though it now has its own funding, staff, and office, the CFV was originally founded and funded by BOLFOR.
- *Lending credibility to the certification system.* Less tangibly but not to less effect, BOLFOR has done a great deal to bolster the credibility of certification in Bolivia. Thanks in large part to their support, certification is well known and considered important by a broad range of government, environmental and industry players.

In sum, BOLFOR has done a remarkable job of laying the institutional and technical foundation for certification in Bolivia. The competence of the BOLFOR team in a range of disciplines (e.g. forest management, ecology, policy design, and marketing) has allowed them to develop cross-cutting strategies that are capable of surmounting, at least in short term, the diverse set of challenges facing certification in Bolivia.

4.3 The *Consejo Boliviano para la Certificación Forestal Voluntaria*

In early 1995, with the financial and logistical support of BOLFOR, *el comité impulsor* transformed itself into the board of directors of an autonomous non-profit organization called the Bolivian Council for Voluntary Certification (commonly referred to by its Spanish acronym CFV). According to its first annual report, the objective of the CFV is to provide institutional support to the development of certification in Bolivia by developing local standards and disseminating information. Thus, while dedicated to good forestry by way of certification, the CFV does not see itself as a potential certifier. It has, however, proven to be quite adept at capturing funds; current funding sources include WWF, BOLFOR, the MacArthur Foundation, the FSC, and the Dutch Government. Formally recognized as a working group of the FSC in 1996, the CFV replicates the structure of its parent organization; it is controlled by a board of directors composed of equal numbers of environmentalists, loggers, and representatives of social interests. The CFV membership elects the board of directors at annual meetings, and a small professional staff carries out day to day operations.

The CFV's contributions to the success of certification in Bolivia have been threefold. First and most concretely, the CFV provided an institutional platform for the development of national standards for wood certification, and is currently doing the same for standards for Brazil nuts and palm heart—Bolivia's most important non-timber forest products. The CFV will continue to play an important role in the certification of all these products by providing a forum for resolving conflicts and revising national certification standards. Second, the CFV has served as an information clearinghouse; they have organized workshops on everything from markets for certified timber to the potential for certification in indigenous communities. Finally, like BOLFOR, the CFV has done much to legitimize the idea of certification by creating a solid institutional backing for the idea (Quevedo, pers. comm.; various CFV internal documents).

4.4 CIMAR/SmartWood

Certification in Bolivia has also benefited from the presence of a local certification organization. CIMAR/SmartWood is the result of an alliance between the US based non-profit certifier SmartWood and a university-affiliated Bolivian organization called CIMAR (*Centro de Investigación y Manejo de Recursos Naturales Renovables*, or the center for study and management of renewable natural resources). With funding from BOLFOR, a representative from CIMAR participated in a 1995 SmartWood training workshop in Mexico, where the idea of a Latin American network of SmartWood affiliated local certifiers arose. When SmartWood staff visited Bolivia the following year looking for a Bolivian partner, CIMAR was high on their list, and in April of that year CIMAR and SmartWood signed an agreement designating CIMAR as SmartWood's Bolivian representative. Thus, while CIMAR itself lacks FSC endorsement, they are able to act

under SmartWood's umbrella. Accordingly, CIMAR staff have received extensive training from SmartWood, much of which was funded by BOLFOR. CIMAR now organizes and carries out the entire certification process using teams of both Bolivian and foreign experts; SmartWood's only role is to give the seal of approval to the final documents (Pierront, pers. comm.).

This in-country capacity significantly reduces the costs of certification, particularly in the case of chain-of-custody certificates. CIMAR/SmartWood's presence in Bolivia also means that enterprises undergoing certification have easy access to information; rather than having to communicate with someone overseas, they can dial a local number and talk to someone well-versed in the realities of the local situation. At the same time, CIMAR's formal links with a foreign organization lend it a level of credibility that a fledgling Bolivian organization probably would not command. Finally, CIMAR/SmartWood has conducted numerous workshops aimed at educating a broad range of people (the general public, indigenous communities, concessionaires and landowners, potential members of evaluation teams, etc.; Pierront, pers. comm.).

V. Developing national certification standards

The development of national certification standards in Bolivia is significant for several reasons. First, the resulting national standards are sensitive to local social, economic and ecological realities in a way that the externally generated standards could never be. Second, the process was an important mechanism for cultivating the support of logging companies, local communities and environmental advocates for the notion of certification. The participatory nature of the standards development process brought representatives from each of these groups to the negotiating table and gave them partial ownership of the certification idea. Thus, the development of national standards transformed certification from something imposed from without to something uniquely Bolivian. Finally, and more broadly, the process itself provided an important space for normally divergent interests to achieve consensus about the highest and best use of Bolivia's forest resources.

The following discussion of the norms and the process that generated them is divided into three sections. First I lay out the basic structure of the process. Then I try to isolate the key tensions and conflicts, and make some preliminary observations about the discussions and compromises that led to their resolution. Finally, I briefly discuss the standards themselves.

5.1 The structure of the process

The first decisive steps towards national certification standards occurred in October of 1994, when BOLFOR and the Bolivian Ministry of Sustainable Development and the Environment organized a day-long certification workshop in Santa Cruz. More than 70 representatives of government, logging companies, environmentalists, and indigenous groups participated. This meeting gave rise to surprisingly concrete outcomes. First, participants voted to promote voluntary certification in Bolivia. Second, an organizing committee—the *comité impulsor*—was elected, and charged with creating an institutional framework capable of effectively and efficiently promoting certification (BOLFOR 1994). This organizing committee eventually became the CFV.

From the very beginning, the organizing committee focused on two activities: selecting a standards committee; and developing an autonomous institution responsible for overseeing the development of local certification standards and for serving as a nexus for information about certification. Members of the organizing committee nominated candidates for a standards committee, and twelve people were eventually selected (three representatives of social interests, seven representatives of environmental interests, and two representatives of economic interests). Individual members of the standards committee were selected on the basis of their professional reputation; the idea was that much of the credibility of the standards would flow from the credibility of the committee members. It is worth noting that the *Camara Forestal*, Bolivia's forestry industry group, was asked to participate, but declined the invitation (Olivera, pers. comm.).

The committee included forest and wildlife ecologists, an anthropologist, several professional foresters, a sociologist, and the manager of a large logging company. All were established professionals with significant experience in their field. In keeping with FSC requirements for national standards processes, the composition of the standards committee was meant insure that the interests of all those effected by certification were represented.

BOLFOR contracted Antonio Andaluz, an environmental lawyer, to develop a conceptual framework for the process and facilitate the first few meetings of the Standards Committee. Dr. Andaluz is an articulate and passionate believer in the power of negotiation; he compared his role to that of Henry Kissinger (another lawyer, albeit of a different persuasion) negotiating to end the Vietnam war. In March 1995 the standards committee met for two days at a Santa Cruz hotel, and came up with a first draft of the national standards. These standards were distributed to roughly seventy companies, scientists, environmentalists and advocates of social causes in Bolivia and around the world (CFV internal documents).

While little of the language from the first draft survives in subsequent drafts, it was significant for several reasons. First, it allowed the standards committee to adopt the conceptual framework that has guided the entire process of standards development in Bolivia. Specifically, this draft established that logging must be environmental appropriate, socially beneficial, and economically viable. While this trinity is hardly original (e.g. see Buschbacher 1990), the move to state it formally and explicitly in the indicators helped to establish and to disseminate these key notions in Bolivia. Second, the first draft of the standards adopted the following four principles (all proposed by Dr. Andaluz):

- *Principle of legality*, which states that the "essential goal" of certification is to promote full compliance with national laws and international agreements.
- *Principle of gradual change*, which admits that good forest management will be achieved over time and by way of a gradual process.
- *Principle of caution*, which dictates that forest managers cannot invoke scientific uncertainty in order to perpetuate activities believed to have grave or irreversible environmental impacts.
- *Principle of best available technology*, which requires that logging companies use “the most environmentally recommendable technologies,” within the limits of economic feasibility.

As I spell out in more detail below, these principles have proven essential to eventual compromise regarding the final form of the standards. Finally, this first draft was significant because it generated a great deal of feedback, much of it critical, from reviewers in Bolivia and around the world. By April 1995, the standards committee had met to incorporate these responses into a second version of the standards.

Further progress towards a final set of standards did not occur until early 1997, when the standards committee restructured the standards to conform with the FSC principles and criteria. Members of the standards committee report that this restructuring was necessary in order to ensure eventual FSC approval of the norms. In this stage two new members were incorporated into the committee, both of whom were managers at logging companies undergoing the process of certification. As described below, their practical experience with certification helped focus and tighten the norms. In late 1997 the Bolivia based certifier CIMAR/SmartWood carried out a field test of the revised standards and made extensive, detailed technical suggestions directed primarily at making the norms clearer and easier to implement. In other words, the certifier’s recommendations did not touch on the actual content of the norms. In March 1998 these recommendations were incorporated, and the resulting standards were again circulated, this time to roughly 450 recipients in Bolivia and around the world.

After a final round of meeting to incorporate comments on the penultimate draft, the standards committee submitted a final version of the standards to the Board of Directors of the CFV. This version was unanimously approved by the CFV, and sent to the FSC for official approval. The Bolivian standards were approved in late September 1998, making Bolivia the first tropical country to achieve FSC endorsement for national certification standards.[4] Again under the auspices of the CFV, standards committees are currently working to develop standards for sustainable harvesting of Brazil nuts and palm hearts—two economically important non-timber forest products.

5.2 The dynamics of the process

This section is concerned with the issues, tensions and conflicts that the standards committee had to grapple with, and with how the committee achieved consensus despite these complications. The information presented below is based on interviews with 9 of the 14 members of the standards committee and an exhaustive review of the CFV’s files.

[4] Approval by the FSC Directory is conditional on a handful of relatively minor changes.

The single issue that all the committee members I interviewed mentioned as being difficult and contentious is the tension between the rights of local indigenous communities and the rights of concessionaires. According to Roberto Balza, an anthropologist who works with a Santa Cruz indigenous support organization, the issue was not simply land tenure (i.e. who owns the forest), but rather one of respect, participation and standing. He wanted the certification standards to recognize the validity of indigenous territorial claims, and to guarantee communities a spot at the negotiating table.

Representatives of economic interests who participated in the process acknowledged that under some circumstances indigenous rights must be recognized and accommodated. In the words of Gerd Resnikowski, who joined the standards committee after his company went through a long, trying certification process made difficult largely by confusion regarding the relationship between his firm and neighboring communities, "standards must be clear and precise about who does and who does not warrant a place at the negotiating table. If there's a community next door that's fine, but if the community in question is 100 km away, then they shouldn't have the right to affect the logging operation" (Resnikowski pers. comm.).

This tension, and how it was resolved, can be clarified in part by a careful look at the evolution of the Bolivian standards and at how they differ from the FSC P&C. Early drafts of the national standards require that managers "recognize and respect the permanent right of indigenous peoples over their territories ...whether or not such rights are legally documented" (4.3.2 of the first publicly circulated draft). This language echoes FSC criteria 3.1 and 3.2 which stipulate that "Indigenous peoples shall control forest management on their lands and territories unless they delegate control with free and informed consent to other agencies; [and that] forest management shall not threaten or diminish, either directly or indirectly, the resources or tenure rights of indigenous peoples" (FSC 1996).

This is exactly the sort of language that businesspeople like Gerd Resnikowski find problematically vague, but that representatives of social interests hope will insure respect for indigenous rights. While the final standards for Bolivia do not differ greatly from the criteria quoted above, there are some subtle but significant changes. First, where the FSC P&C require indigenous control of forest management, the Bolivian standards require that there exist "an agreement within the indigenous community to carry out forestry management" (CFV 1998b, 3.1.1). Similarly, where the FSC P&C require forest management not threaten indigenous tenure, the Bolivian standards require that the management plan contain "written mechanisms for conflict resolution" (CFV 1998b, 3.2.3). Thus, these changes strike a compromise by limiting the responsibility of firms without negating the rights of communities. More significant still, both Sr. Resnikowski and Sr. Balza report that they are content with the outcome.

Committee members report that the tensions between business interests and environmental interests were minimal. As discussed below, much of this concordance seems to grow out of the fact that both businessmen and environmentalists accepted the FSC P&C and the new forestry law as the general framework for certification. In other words, they saw their job as fitting the FSC P&C to the social, economic and ecological peculiarities of Bolivia. At the same time, environmental interests that participated in the process had a decidedly conservationist, as opposed to preservationist, philosophy. In other words, there were many Pinchot disciples and few Muir disciples.

Another issue that the standards committee grappled with was the appropriate level of detail to include in the standards that relate to forestry management practices. The original draft was highly detailed, and included specific requirements regarding things like the width of stream corridors and the sampling intensity for inventories. Feedback on this draft, particularly from North America, was highly critical of this. One respondent questioned the effectiveness of the first draft's focus on " detailed bureaucratic requirements rather than...general principles." (John Robinson; June 5, 1995). Another commented that "what is asked for [in places] appears to be draconian" (Joshua Dickinson; July 30, 1995). Largely in response to these concerns, the standards committee reduced the level of detail substantially, and the final standards are largely devoid of detailed requirements.

Finally, the standards committee had to sort out the appropriate relationship between Bolivia's standards and the FSC P&C. Once again, progressive drafts show a distinct trend. The first draft had a unique organization and style, and only mentioned the FSC P&C in the preamble. Successive drafts came to mimic the FSC

document more closely, and the 6th and penultimate draft saw a complete restructuring of the Bolivian standards to reflect the layout of the FSC P&C (Quevedo, pers. comm.). In this and subsequent drafts the Bolivian standards where framed as a series of indicators that attend the FSC P&C; for each criterion in the FSC document, the Bolivian standards committee specifies one or more indicators. Interestingly, this drastic change in layout did not entail a significant change in the content of the Bolivian standards; early drafts had come to follow the FSC P&C in spirit if not in form. Committee members I questioned about the decision to shift format were believed that the change was necessary to ensure complete harmonization between the FSC P&C and the Bolivian Standards. While the shift in format certainly had that effect, it is worth noting that other national standards that do not explicitly follow the FSC P&C have received the FSC's official approval (e.g. the Swedish standards).

5.3 Achieving consensus

In interviews, committee members attributed their ability to achieve consensus to the following seven points. Note that the first four are characteristics of the process itself, while the remaining three have to do with qualities and capabilities of the individuals involved. Also, participants disagreed about which of the following points played important roles.

- The neutral but highly knowledgeable facilitator structured a sound conceptual framework for the process, and created an atmosphere of negotiation.
- The FSC P&C also contributed to a clear framework for the process, and set firm parameters for acceptable levels of environmental impact and corporate responsibility to communities. Indeed, one participant characterized the task of the Standards Committee as “adapting the [FSC] P&C to Bolivian forests” (Antelo pers. comm.).
- The participation of scientists gave rise to basic vision of how to manage forests. This scientific consensus was largely immune to attack from economic interests, who did not have access to scientific arguments to bolster their position. Thus, to some extent the job of the standards committee was seen as simply articulating a body of applied science.
- BOLFOR, and subsequently the CFV, served as neutral environments dedicated to sustainable forestry. This meant that the process’ organizers did not have a vested interest in anything other than its success. In the eyes of one committee member at least, this environment fostered cooperation and negotiation.
- All those involved started with the premise that certification would ultimately be in their best interests. To the representatives of indigenous people, certification offered recognition and a place at the negotiating table. To businesspeople, certification offered the prospect of markets for lesser known species—a key factor in their ability to survive the changes mandated by the 1996 forestry law. To environmentalists, certification represented a way of promoting good forestry, and therefore a way of checking deforestation.
- The professionalism of participants led to fewer clashes based on pure self-interest. In other words, the committee members did not see the standards process as a forum for self-aggrandizement.
- Finally, all committee members I spoke with underscored the fact that all participants in the process shared a willingness to try to understand the reality of their colleagues.

5.4 The outcome

What in the end do the Bolivian standards say and do? In essence, they map the FSC Principles and Criteria onto Bolivia's unique ecological and social topography. The final version of the Bolivian standards takes the form of a series of indicators that attend, and in many cases modify, the criteria of responsible forest management laid out in the FSC P&C. For each FSC criterion (of which there are 44, divided among the nine principles that pertain to natural forest management), the Bolivian standards propose one or more indicators.[5] The Bolivian standards list 109 indicators for the 44 FSC criteria, or an average of 2.5 indicators per criterion.

These indicators relate to the FSC criteria in a range of ways (see Table 3). Some indicators simply repeat the FSC requirement, while others propose more detailed tests that certifiers must use to determine whether the performance threshold set forth in the FSC criteria is being met. For example, FSC criterion 6.3 states that "vital ecological functions must be maintained intact, improved or restored..." The Bolivian standards committee proposes three attendant indicators: 6.3.1 simply repeats the FSC criteria; 6.3.2 requires that there

[5] In addition, the Bolivian standards lay out 5 indicators for community managed operations that are not linked to FSC criteria.

be "measures to prevent and reduce the impact on key species for frugivores (like bibosi, azucaró, paquió and various palms), and hollow trees that can be important refuges for many species of animal; and 6.3.3 specifies that "silvicultural and harvesting practices are not considered risky for the biodiversity of the forest (elimination of species and genetic erosion)." While admirable in vision, these indicators do not provide certifiers with concrete guidelines regarding how to measure the elimination of species and genetic erosion, or how to detect forestry practices that lead to the loss of biodiversity.

Table 3: Relationships between FSC criteria and Bolivian standards.

The indicators for a given criteria...	**FSC criteria thus modified**	
	(number)	(percent)
• simply repeat the FSC criteria	12	27%
• are more specific than the FSC criteria, but represent no significant change in the desired outcome.	15	34%
• require a higher level of performance than the FSC criteria.	8	18%
• require lower level of performance than the FSC criteria.	8	18%
• are mixed (more demanding than the FSC criteria in some aspects, less so in others).	1	2%

Source: author's analysis of CFV 1998b

Other indicators actually demand more of certified loggers than do the FSC criteria. Where FSC criterion 2.3 requires that certified forestry enterprises "must use appropriate mechanisms to resolve disputes regarding land tenure and land use," the Bolivian standards demand that firms maintain "policies of open relations" with neighboring and otherwise affected communities (Indicator 2.3.3). Conversely, some indicators lower the certification threshold. For example, FSC criterion 6.6 requires that management systems promote the development of non-chemical methods for pest-control, while the attendant indicators proposed by the Bolivian standards committee contain no such requirement. This is an example of the way in which the Bolivian indicators adapt the FSC P&C to local realities; in Bolivia, chemical pest-control agents are virtually unused by foresters (Mancilla, pers. comm.).

In the long run, the most appropriate method for judging the success of the Bolivian standards is not how they relate to the FSC P&C, but rather how well they strike a balance between ecological sustainability, economic viability, and social feasibility in light of Bolivia's unique conditions. It is too early to form these judgments, though one interviewee who helped carry out the field-testing was optimistic (Pierront, pers. comm.). Furthermore, the standards committee has the power to revise the standards as experience reveals weaknesses in the existing version.

Finally, in the long run, the process that generated the standards may prove to be as significant as the final product. By providing a space for a results-oriented discussion of the highest and best use of forest resources, the standards process did a great deal to generate consensus between environmentalists, logging companies and indigenous groups. The fact that throughout the three-year process the committee was always able to make decisions without resorting to a formal vote testifies to the remarkable degree of dialogue that was achieved. Equally significant is the CFV made a good faith effort to distribute the standards as widely as possible. Even where the standards fail to go far beyond the FSC P&C, they succeed in giving the impression of something made in Bolivia—an important image to cultivate if forest managers are going to increasingly opt for certification.

VI. A firm's eye view of certification

While the president of the National Forestry Chamber insists that certification is like making bystanders at a bank robbery pay lawyer fees to prove their innocence (Roig, pers. comm.), individual members are one by one opting for certification. One businessman I interviewed foresees that in two or three years half the large logging companies in Bolivia will be certified. Why? What is it about certification that compels firms to pay tens of thousands of dollars for a lengthy evaluation process that may or may not result in a seal of approval? In an effort to answer this question I interviewed managers and foresters from the four firms in Bolivia that have actually undergone evaluation by an FSC endorsed certifier. Of these, three have had at least some of

their woodlands certified; the fourth has just been evaluated. I also spoke to marketing experts at BOLFOR, representatives of firms considering evaluation, and international buyers of certified timber.

Interviewees concur that the single most significant reason that certification is attracting the attention of large logging companies in Bolivia is that the gap between certification and the law is very small. As I described above, law-abiding firms are largely in compliance with FSC certification standards. Certification is therefore relatively cheap; for the most part, the costs of certification don't go far beyond the fees charged by certifiers (Pierront, pers. comm.). Even if certification is expected to only yield modest benefits, it is still in the interest of profit-seeking firms.

The second reason that firms are opting for certification is also intertwined with the new law, but in a slightly more subtle way. As I have described above, high value species (particularly mahogany) have grown increasingly scarce, and the forestry law has undergone drastic changes. Together, these two factors are driving a paradigm shift in the way forests get managed. In the old days, the market demanded high quality woods from a very few species. To meet this demand, loggers would enter the forest and search high and low for valuable trees—a profitable practice only because they paid taxes on the wood they cut, and not on the massive concessions they maintained. The fundamental mismatch between what the market demanded (high-quality wood from two or three species) and the diversity of the forest was overcome by highly selective logging practices.

Now the law requires that forestry—and therefore the wood brought to market—reflect the composition of the forest. Management plans, the law stipulates, must be based on the results of detailed inventories, and "must include a clear, solid and explicit strategy that guarantees sustainable production in the long term" (BOLFOR 1997b). As described above, firms are now only allowed to cut in a small fraction of their concession each year. Since mahogany, cedar and roble tend to be very dispersed the only way to turn a profit is to harvest a much wider range of species. Rather than responding to market demand, firms are now required to respond to the biodiversity of the forest.

Most of the companies that have kept their concessions under the new law are to some degree vertical integrated, with investments of up to $20 million in sawmills, and carpentry and cabinetmaking shops (Matkovic, pers. comm.). For firms like this, the exit costs of leaving the industry were too high to jump ship when the new forestry law was promulgated. In order to turn a profit under the new forestry law, firms have to develop products and markets that utilize a representative slice of the rainforest's diversity, and not just the cream of the crop. Where logging companies used to harvest two or three species, they are now harvesting ten or more and frequently leaving formerly harvested species untouched. Finding markets for these new species presents major challenges, since many are new to domestic and international buyers alike.

This is where certification becomes important. According to the managers and marking specialists I interviewed, buyers of certified wood are more likely to be open to new species and to products that find creative uses for what was formerly considered waste-wood. In the words of Fernando Aguilar, the Director of the CFV, firms in Bolivia

> have received visits from several US and European buyers of certified products during the last 12 months, and some clear opportunities have been opened to increase Bolivian exports of certified value added products, more than ever before. Providing some workshops can be [chain of custody] certified in the next 10 months, the volume of trade of value-added products could easily reach 5 million board feet per year (Aguilar, pers. comm.).

At the same time, traditional markets for tropical woods are not nearly as inviting. According to one account, exporters of uncertified Bolivian mahogany were met with a blockade at a trade show they attended in Germany. Only certified producers of tropical hardwoods were allowed through the door. On their return home, they contacted BOLFOR and asked how to begin the certification process (Sainz, pers. comm.). While these accounts obviously only constitute anecdotal evidence, they do illustrate a key point: international buyers are interested in certified wood, and in some cases are willing to purchase material that would otherwise be worthless. And it is on the basis of this sort of anecdotal information that many business decisions get made in Bolivia.

While the jury is still out on the long-term financial viability of sustainable forest management, two thing are clear: (1) it depends on finding uses for previously unused species and qualities of wood; and (2) certification helps find such uses. Little by little, logging companies in Bolivia are coming to see certification as key to the transition away from a system where a few high value species were sold as commodities, and towards a system where the biodiversity of a given forest is carefully analyzed and utilized, and where firms create high-value finished products that have a very specific market. Thus, even where price premiums for certified wood are not evident, certification may offer significant economic benefits.

It is worth reiterating that firms view certification in the context of larger changes in the legal framework and the attendant transformation of forestry practices. Table 4 attempts to sort out the costs and benefits experienced by firms as a result of these changes.

Table 4: Costs and Benefits to a Firm of a Switch to sustainable forest management.

Costs	Benefits
• Opportunity cost of leaving commercially valuable wood in the forest to ensure future harvests (likely to be low at present due to bottlenecks in industrial processes that limit firms' ability to process the increased yields implied by harvesting a wider range of species).	• Increased efficiency in harvesting (consolidation and planning of operations implies fewer machine hours, fewer men, fewer roads, less waste).
• Direct costs of inventories, commercial censuses, mapping and other pre-harvest planning (including costs of training workers in new techniques).	• Increased efficiency in industrial and marketing efforts (due to better planning permitted by advance knowledge of the coming year's harvest).
• Product-development and Marketing necessitated by new species (including certification).	• Much higher annual yields due to wider range of target species (a benefit only if markets for new species can be developed).
	• Marketing benefits that attend certification.

Source: interviews with foresters and managers from certified firms; Putz 1994; Rice and Reid 1997; Markopoulos 1998.

In short, certification provides firms that have invested in sustainable forest management a marketing advantage precisely when and where they need it most. Certification alone would probably not provide ample incentive to convince a significant number of firms to re-engineer their management practices to meet international standards, and the new forestry law alone may well be an insurmountable economic hurdle for many firms. Taken together, however, the two seem to add up to a set of legal and economic incentives capable of altering behavior. In the long run, certification may not offer a panacea to the Bolivian timber industry. As always, firms that are innovative and efficient will be the ones that thrive. Increasingly, however, these most innovative and efficient firms are opting for certification.

Finally, in addition to these strictly economic reasons for pursuing certification, firms see it as offering a handful of other benefits. Managers I interviewed mentioned the following possibilities:

- *Exemption from periodic audits by the Superintendencia Forestal*. Uncertified firms will be subjected to such audits every five years, over and above normal efforts to measure compliance. In a country where encounters with government bureaucracy are almost always costly, time-consuming and unpleasant, avoiding such audits is expected to provide real benefits (Resnikowski pers. comm.).
- *A way of gaining employee support for the transition to sustainable forest management*. According to one manager this was important because the success of the transition towards sustainable forest management rests on the willingness and ability of individuals to change well-established procedures. Invoking an outside authority—the certifier—helped win the support of employees, from skidder drivers to sales representatives.
- *Changing public perception of the timber industry in Bolivia.* Tacit in this point is the notion that the public image of the sector will have a significant impact on the outcome of future political battles, including the battle for long-term land tenure.

- Some outside observers assert that concession-holders see certification as a *long-term strategy for ensuring land tenure in the face of a chaotic tenure situation*. The idea is that certification will be used as a way of demonstrating to the Bolivian government that a given firm is capable of doing sustainable forestry—an important thing to demonstrate, given the interest of donor governments in promoting forest conservation.

In sum, the costs of certification are fairly low (thanks largely to the requirements of the new forestry law) and the benefits, while uncertain, are potentially handsome. Primary among these benefits is market access for lesser-known species, which the new forestry law effectively requires be harvested.

VII. Lessons learned

As I established at the beginning of this essay, certification is enjoying remarkable success in Bolivia, in terms of hectares of forest certified and in terms of progress towards a credible certification system. I have spent most of this essay explaining why certification is catching on. This last section is concerned with two tasks: condensing the factors that explain the emergence of certification in Bolivia into a concise set of lessons for other countries seeking to promote certification, and speculating about the degree to which certification is proving to be an effective tool for promoting the conservation of forest ecosystems.

7.1 What the Bolivian experience has to teach to certification initiatives in other countries

The biggest single factor in the success of certification in Bolivia is the 1996 forestry law that essentially requires all forest managers to do sustainable forest management. This means that certification is within easy reach of most law-abiding firms. In addition, a significant share of the credit must be given to the credibility and institutional support lent to certification, first by BOLFOR and more recently by the CFV. By providing information about the notion of certification and by supporting the development of standards, both institutions have contributed a great deal to the development of a credible and transparent national certification system.

The emergence of a capable in-country certifier has lowered the costs of certification and provided firms interested in certification with a local contact. Along the same lines, the development of local standards has created a space for constructive, results-oriented discussion of socially and ecologically acceptable forestry, as well as producing certification standards apt for Bolivia's unique situation. All this suggests that certification is not yet fully a market driven process—to a large extent it will succeed to the extent that it is promoted and legitimized by new and existing institutions.

From a firm's point of view, the most important factor is, once again, the harmony between the requirements of the 1996 forestry law and certification standards. In other words, once a logging company complies with the law, getting certified requires few changes in logging practices. The fundamental forestry practices required by the law (an inventory, a management plan, a commercial census, an annual operating plan, reduced-impact felling and extraction techniques, respect for seed trees and a minimum cutting diameter, use of all commercially valuable species, and so on) coincide perfectly with the forestry practices demanded by certifiers. Certification offers a handful of benefits to firms, but far and away the most significant is help finding markets for hitherto unused species that must be sold if sustainable forest management is to be profitable.

In Bolivia, the emergence of certification has coincided with and contributed to a fundamental transition in prevailing concepts of forest management. The transition is in part donor-driven, in part market driven, and in part politically driven. This suggests that certification is an important ingredient in a cocktail of policies and initiatives. Taken together, this mixture seems to effectively promote a significant shift towards sustainable management of forest resources. Taken alone, certification would probably have much less effect.

In conclusion, I propose the following four simple design principles suggested by the Bolivian experience with certification. The success of certification in a given country will, of course, depend on unique local conditions.

- *Harmonize certification with forestry laws.* Events in Bolivia suggest that certification works best as a compliment to, not a substitute for, sound regulation. Nothing in Bolivia suggests that the economic incentives offered by certification would be sufficient to compel a large number of profit-seeking firms to

re-engineer their forestry practices. When the law and the market ask for the same thing, however, firms begin to take notice.

- *Make certification local*. Local standards and local certification capacity make for a certification system attuned to local ecological, economic and social realities. When developing local standard, look for an unbiased institutional home, a skilled, neutral facilitator, and highly qualified committee members.
- *Find institutional backing for the certification* in order to gain credibility, to distribute information, and perhaps most importantly, to coordinate the search for markets for certified woods.
- *Win the support of all players* (environmentalists, loggers, and communities) for the certification idea by showing how certified forestry serves their interests (if indeed it does—see below).

7.2 On the usefulness of certification as a conservation tool.

The most urgent problem facing Bolivia's forests is not the environmental impact of logging, but rather the transformation of forest to farmland. The success of certification as a conservation tool hinges on its ability to promote sustainable forest management as an alternative to deforestation for cultivation and ranching. If sustainable forest management is to truly conserve forests, it must be economically viable and ecologically sustainable. While sustainable forest management has historically had difficulties on both counts, experiences in Bolivia suggest that certification may indeed have something valuable to add.

Economic viability

If sustainable forest management is to slow deforestation in the tropics, it must be more profitable than alternative land-uses like farming and ranching (Reid and Rice 1997; Rice et al. 1997). This is particularly true in developing countries, where government policies are routinely disobeyed. Is sustainable forest management profitable compared to ranching and farming? The answer to this simple question is surprisingly evasive. Firms are midway through the transition to sustainable forest management, and none that I spoke to had calculated the costs and benefits of the shift. They are not to be blamed for this omission; uncertainty regarding markets makes it very difficult to forecast earnings.

The results of the few published economic analyses of the profitability of sustainable forest management are not very promising, however. A recent discounted cash-flow analysis using data from the Chimanes forest in north-eastern Bolivia concluded that unsustainable logging would be two to four and half times as profitable as sustainable forest management. On the other hand, this study finds that sustainable forest management is "highly profitable, yielding a rate of return in excess of the average real rate of return from commercial activities in Bolivia in recent years" (Howard et al. 1996, 56). A residual value analysis using the same data showed that harvesting lesser known species was only profitable when "subsidized" by high returns on mahogany (Rice and Howard 1996). These findings roughly coincide with a study done in Guatemala, which finds that silvicultural treatments are not economically justifiable when discount rates are high (as they are in Bolivia; Kent et al. 1996). According to a fourth analysis, high prevailing interest rates, static prices and the modest pace of tree-growth mean that the future-discounted returns on investments in regeneration (a prerequisite for sustainable forest management) will almost always be low (Reid and Rice 1997).[6]

But as I argued in Section six of this essay, certification may make sustainable forest management more profitable by helping develop markets for lesser-known species. If certified forestry corporations can add value to and export a significant portion of the wood they harvest (or if they can form partnerships with companies that do), the economic picture painted in the studies cited above may change drastically. In addition, the findings cited above do not incorporate savings experienced by firms that result from more efficient harvesting practices and industrial processes (Matkovic pers. comm.; see Putz 1994; this benefit was also mentioned by all the businessmen I interviewed in Bolivia). In short, uncertainty about markets means that it is too early to accurately assess the long-term economic viability of sustainable forest management, but it appears that certification will help.[7]

[6] Note that Howard et al. (1996) assume that high-grading for mahogany is an option—a false assumption in most of Bolivia, due to depleted stocks. Furthermore, Reid and Rice (1997) basically argue that the opportunity-cost of leaving wood in the forest (in the form of seed trees and trees left to grow for the next harvest) is high. Where this is likely to be the case where forests contain limited volumes of a small number of very high-value species, it is much less plausible when per hectare yields of a wide range of species outstrip manufacturing capacity and/or market demand.

[7] This discussion of the profitability of sustainable forest management assumes that traditional measures of return on investments (e.g., net present value, or NPV) accurately reflect the economics of forest management. A growing body of economic literature attacks this assumption, arguing instead that accounting practices should incorporate the positive externalities supplied by the rainforest.

In order to prevent deforestation, sustainable forest management will have to expand to become a prevailing land use. Where well-capitalized, export oriented vertically integrated firms may find it in their interests to do sustainable forest management, it may be unrealistic to expect actors in the informal forestry sector to follow suit. Certified forests currently account for only .008% of Bolivia's forest area (CFV 1998a; ITTO 1996a; ignoring deforestation since the ITTO estimated forest cover). Optimistic projections see this number rising to roughly .017% by the turn of the century (ibid.). Even if all current logging concessions were to get certified, only 11.3% of Bolivia's forest would be affected. If certification is to have a significant impact on deforestation rates, new strategies will have to be found to make it attractive to a much larger range of loggers (i.e. small-scale operations and *informales* who log illegally), and indeed, to make sustainable forest management attractive to a larger range of landowners and investors. It would behoove organizations that want to use certification as a conservation tool to identify lands which should be certified—lands with forests apt for sustainable forest management that are vulnerable to conversion in the short term. At the same time, forests that are not appropriate for logging should be identified (perhaps most of the frontier forest identified in Bryant et al. 1997).

Ecological sustainability

Very little is known about the long-term ecological sustainability of sustainable forest management. Ecological sustainability is taken here to mean maintaining structure, function, and genetic, species, and landscape diversity of forest ecosystems. This notion contrasts (at least on the surface) with silvicultural sustainability, which is concerned with sustaining the forest's productive capacity. Silvicultural sustainability is generally thought to be attainable, though not necessarily attained, in most managed forests (see Putz 1994).

While the magnitude and the duration of the ecological impacts of sustainable forest management are poorly understood, both common sense and an emerging body of literature suggest that logging does have an effect on relative abundance of species and size class frequency (see Putz 1993); on the physical structure of the forest (and therefore on microclimates in the understory) (see Johns 1985); and on the composition of forest wildlife communities (see Frumhoff 1995). Little is known about the effect of logging on less charismatic but highly significant organisms like insects and mycorrhizae (see Hartshorn 1995).

Much of the remaining scientific uncertainty stems from the fact that the effects of logging are likely to be highly site-specific. For example, one literature review catalogues how the effects of logging on wildlife will vary in accord with the nature of the forest under management, the intensity and methods of timber harvesting, subsequent silvicultural treatments, size and location of unlogged refugia, and hunting activity by logging crews—all conditions that vary between logging sites (Frumhoff 1995). This implies that efforts to measure and mitigate the ecological impact of sustainable forest management must be, at least to some degree, stand-specific (see Putz 1994).

Another source of uncertainty is the simple fact that tropical forest ecosystems are vastly complex, poorly understood, and sometimes slow to change. For these reasons, logging "may result in alteration of a variety of interactive webs within a community, the effects of which may not be immediately obvious" (Johns 1985, 366). Ecologists largely concur that this lack of understanding in the face of great complexity opens the way for grave ecological errors (e.g. Putz 1993, 5).

If it is indeed possible, ecologically sustainability will be the result of extensive research into stand-specific patterns and processes, and of adaptive management. Bolivian certification standards call for neither. Certification criteria proposed in the Bolivian standards (and in most other certification standards around the world) focus on management practices— the pressure exerted by human activity—and not the state of the forest before and after harvest.

The failure of certification standards to incorporate adequate tests of ecological impact does not mean that certification itself has nothing to contribute to the search for ecological sustainability. First, and most concretely, Bolivian certification standards join the new forestry law in calling for logging techniques thought to reduce environmental impact (e.g. directional felling, minimum impact haul-roads). While the long-run effectiveness of these measures as guarantors of ecological sustainability is poorly understood, they are clearly steps in the right direction.

Second, certification may provide a mechanism for translating the results of new research into ecologically sound management practices, and for distributing these new insights to forest managers. The Bolivian experience with certification suggests three ways in which this might happen:

- The comparatively lean organizational structure of national FSC working groups like the CFV may be able to absorb new scientific information more quickly, and to translate it into appropriate management criteria more accurately, than can government bureaucracies(see Putz and Viana 1996). The prospects of this sort of learning process are further enhanced by three factors: (1) both the FSC P&C and the Bolivian national standards contain vague but idealistic statements regarding the need for ecological sustainability (2) the Bolivian standards contain an explicit mechanism for revision; and (3) several well-regarded ecologists sit on the standards committee which is responsible for future changes.
- The nature of the relationship between certifiers and firms is conducive to information transfer. Highly trained professionals from certification organizations visit managed forests once a year to audit management practices. One young forester I interviewed stressed that he saw these reviews not just as a duty to be performed, but as a chance to incorporate outside expertise into management practices. While the exact nature of the relationship between the auditor and the foresters responsible for a given forest depends on many factors (not least of which is the personalities involved), these periodic visits provide a unique opportunity for learning at the firm level.
- Several businessmen and private-sector foresters I interviewed described how the certification process forced them to think more critically and openly about the ecological challenges implicit in sustainable forest management. This change in attitude may open the way for learning and more adaptive management.

Once again, due to the site-specificity of logging impacts, new scientific insight will probably not result in recipes for forest management. Better understanding will likely lead to the identification of new variables to consider and data to gather—and not specific practices to follow. Of course, if certification is to help loggers learn how to move towards ecological sustainability, sound science must generate the information and ecological insight needed to steer them in the right direction.

It is important to remember that certified forestry is still logging; it invariably means stumps and skidder trails and roads. No amount of scientific insight will eliminate tradeoffs between ecological quality and economic benefits from the forest (see Robinson 1992). While even the best-managed forests may not measure up to standards of ecosystem integrity set by wild forests, it is hard to imagine a managed forest that is not more ecologically intact than a pasture or a soybean field. This is not to say that we should passively accept sub-optimal forestry practices. Where conversion threats are high and preservationist strategies unfeasible, however, concerns about the long-term ecological sustainability of logging practices should not derail efforts to promote forestry as a land-use alternative.

While one can neither predict nor control the behavior of the complex ecological, cultural and economic systems that will evolve into the Bolivia of the distant future, those concerned with the welfare of ecosystems and people must try to navigate towards sustainability. Is certification likely to result in correct steering? Perhaps, but there is also cause for caution.

> Conservation is paved with good intentions which prove to be futile, or even dangerous, because they are devoid of critical understanding either of the land, or of economic land-use.
>
> Aldo Leopold. A Sand County Almanac p. 263

Bolivia's emerging certification system is not devoid of critical understanding of the land and the economics of land use, but it has a great deal to learn if it is to serve the needs of people and forests in the long-term.

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Appendix 1

Interviewees:
1. Fernando Aguilar (economist, CFV/BOLFOR)
2. Antonio Andaluz (lawyer, Sociedad Bolviana de Derecho Ambiental)
3. Pablo Antelo (businessman, La Chonta)
4. Jorge Avila (lawyer, Camara Forestal)
5. Roberto Balza (anthropologist, APCOB)
6. Ivan Basso (agronomist, director of Sustenta XXI, Chile)
7. Patricia Caffry (environmentalist, WWF)
8. Richard Donovan (forester, director of SmartWood)
9. Todd Fredricksen (forest ecologist, BOLFOR)
10. Paul Fuge (businessman, Plaza Hardwoods)
11. Carlos Gagliardi (businessman, CIMAL)
12. Pablo Gil (forester, La Chonta)
13. Carlos Glogau (businessman, Amazonic Sustainable Enterprises)
14. Kevin Gould (graduate student in ecology, University of Florida)
15. Abrahm Guillén (marketing specialist, formerly BOLFOR, now SmartWood)
16. Rudy Guzmán (forester, Superintendencia Forestal)
17. Nils Häger (forester, SCANDICONSULT)
18. Richard Mancilla (forester, consultant)
19. Damir Matkovic (forester, Director of PROMABOSQUE)
20. John Nittler (economist, director of BOLFOR)
21. Amado Olivera (forester, formerly APCOB)
22. Katerine Pierront (ecologist, WWF, formerly CIMAR/SmartWood)
23. Lincoln Quevedo (ecologist, former director of the CFV, currently University of Florida)
24. Roberto Quevedo (forester, La Chonta)
25. Gerd Resnikowski (businessman, empresa Tarumá)
26. Guellermo Roig (businessman, president, Camara Forestal, empresa Marabol)
27. Roberto Sainz (marketing specialist, BOLFOR)
28. Pedro Saravia (forester, CIMAR/SmartWood)
29. Robert Simione (forester, businessman, Sylvania Hardwoods)
30. José Urañari (indigenous rights advocate, CIDOB)
31. Fernando Velarde (forester, empresa CIMAL)

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