Concepts and Practices of Community Forest Enterprises: Economic and Institutional Perspectives from Mexico

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ABSTRACT

Few examples exist in the common property literature of community-managed forestry enterprises (CFEs) operating in competitive markets. Yet, in Mexico there are hundreds of such examples operating at varying levels of productive and processing capability. At a time when the devolution of rights to forest resources is expanding worldwide, collective management of timber operations presents a new twist in the community forestry policy option. This paper examines the community forestry phenomenon in Mexico from an institutional economics perspective, analyzes the place of CFEs within theories of the firm, and discusses the distinctive management issues which emerge in CFEs. It also discusses the implication for the distribution of capital stocks and flows generated through the forest resource in the Mexican case. The emergence of CFEs from preexisting matrices of social and economic relations requires the elaboration of rules and organizations to meet new needs.

Key words: community forestry enterprises; theories of the firm, poverty alleviation, rural development, resource management, Mexico, Latin America

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Introduction

Community market-oriented enterprises, particularly those based on a common property natural resource, are historically rare birds. However, a large community forest enterprise (CFE) sector in Mexico, which has emerged in the last three decades, and currently emerging CFEs elsewhere in the world, highlight the importance of understanding the theoretical implications and empirical impacts of this rather dramatic rearrangement of traditional community institutions. CFEs have unusual institutional and economic features and may have special importance in poverty alleviation and economic development. However, in most times and places, it would appear that the costs of collective action in mounting market-oriented enterprises administered by communities, particularly impoverished communities in less-developed countries, are greater than any perceived benefits. This would appear to be particularly the case with community *forest* enterprises (CFEs) dedicated to the commercial production of timber. Commercial timber production at its simplest requires substantial investments and the administration of complex industrial processes. Despite these daunting challenges, Mexico presents a still little-known case where there are hundreds of such CFEs (Antinori et al. 2000; Bray et al. 2003).

The potential significance of CFEs is large when one considers the current world-wide trend toward devolution of forestlands to local communities (White & Martin 2002). Communities managing forests for timber production would seem to be the next step that would enhance local economic benefits and the incentives for forest preservation (Wunder 2001). Clusters of CFEs are emerging in many different places in the worlds (Gretzinger 1998; Vosti et al. 1998). There is also an older but little documented sector of community managed commercial forests in Europe (Jeanrenaud 2001). Given the challenges in the sector, there are also increasing accounts of failed CFEs (Richards, 1997; Irvine, 2002).

Mexican common property, community forestry and CFEs have three unusual features: 1) the history and characteristics of the common property regime on which it is mounted, 2) the magnitude of the sector and, 3) the commercial sophistication and competitiveness of a small percentage that are vertically integrated into sawnwood and secondary products and are internationally competitive. First, the Mexican common property system may be unique in the world in that it is a massive, state-directed and regulated system that has emerged and been consolidated since the third decade of the 20th century (Durán et al. forthcoming in press). With

varying rhythms throughout most of the 20th century, massive transfers of natural forest assets were made to local communities from state and private hands (Klooster & Ambinakudige in press). This transfer allowed Mexico's community forestry sector to emerge. In the course of the 20th century, Mexican forest communities and urban allies, alternately hindered and supported by official policy, have had to struggle against bans, concessions, and corruption to achieve more autonomous management of their forests (Bray and Wexler, 1996; Klooster, 2003).

Second, well over 50%, possibly as high as 80%, of Mexican forests belong to communities (Bray et al. 2003), making them an important source of raw material for a national forestry industry. Finally, a new national study is underway to document how many communities in Mexico have logging permits, but it is clear that it is well over 1,000 (Antinori et al 2004). It is still an open empirical and definitional question how many of the communities with logging permits can be considered CFEs and what is their level of processing capability, but it is surely in the hundreds.

Most attention to community management of natural resources has focused on subsistence or individual sales using the common property resource. The rise of community timber production occurs at a time when doubts have been raised about the efficacy of non-timber forest products (NTFPs) and payments for environmental services in poverty alleviation and economic development (Richards 2000). This convergence of new research and policy trends has placed more attention on the real and potential role of communities in producing timber, usually the most valuable forest product (Wunder 2001). Communities gaining access to forestlands, as *de jure* or *de facto* common properties, for commercial timber production raises the virtually unexplored issue of community members organizing themselves to take advantage of market opportunities based on a common property natural resource asset (Antinori 2000). As the new global alternative of CFEs emerges, it becomes important to understand how they arise from traditional structures of community governance and from responses to economic opportunities to form possibly unique economic institutions. Given the historical evolution of Mexican CFEs, the large amounts of forest resources under their control, and a state-regulated common property system, an analysis of Mexican CFEs sheds light on key questions with global implications: Do community forestry operations combine "democratic participation" and economic efficiency? Do they achieve economic, development and environmental goals? Can they survive within a market economy?

In this paper we will take an economic institutional perspective to suggest how CFEs in general and Mexican CFEs in particular are distinct from other forms of enterprise organization. By an institutional perspective, we mean an analysis of the pattern of ownership and control rights as manifested under agrarian law and expressed through the particular decisionmaking processes and distribution of benefits. An institutional perspective is distinct from neoclassical economics which focuses on the technological basis for why and where production occurs. In contrast, institutional economics focuses on contractual arrangements and governance modes among buyers and sellers, owners managers and workers as they exist within an institutional environment of legal rules and customs. We argue that community forestry enterprises represent a possible third way of economic development between direct public regulation and control of natural resource exploitation and conventional privatization (Boyce & Shelley 2003). The community institutional framework rests on social, cultural political as well as economic motivations that become reflected in their design of decisionmaking processes or governance structure. While shades of the public and private still exist, that is, public regulation does not disappear nor the element of profit-oriented incentives based on tenure security, the collective control of forests by a community of individuals facilitates the channeling of tangible and intangible benefits to the local area. The participatory development literature recognizes the potential of local control, but CFEs offer a concrete example that can be studied to make explicit what and how forms of local control function successfully both for the local and global communities of interest and communities of space.

Our paper is outlined along the following themes:

a) Describe how Mexican CFEs emerged and the tensions between traditional community governance and emerging enterprise management.
b) Review the theoretical implications of the unusual intersection of community, enterprises and common property, and show how the related literatures are insufficient to analyze communities with forest enterprises, and propose a theoretical definition of CFEs as firms.
c) Present a variety of organizational choices in ownership and control over stocks and flows of the forest as found in Mexican CFEs.
d) Analyze the economic dimensions and benefits of CFEs in the Mexican case.
e) Draw out general themes that can be channeled into further research on CFEs.

The problem of civic and economic governance

Mexico is rich in indigenous forms of communal organization forms that were both overlaid and imitated by the massive agrarian reforms arising from the Mexican Revolution (1910-1920) and enshrined in Article 27 of the Constitution of 1917. The resulting agrarian law led to the implementation of two unique forms of common property, *ejidos* and *comunidades*[2], which have come to cover about half of the national territory. Executive power, acting through the national ministry, *Secretary of Agrarian Reform*, thus created essentially corporate entities with specific membership rules and governance system organized around a community land base (Ibarra Mendivel 1996). The agrarian sector was reformed in 1992, giving local community members the opportunity to privatize individual land use, but privatization of common property forests is still prohibited (*Ley Agraria* 2002). The 1992 reforms and other shifts in forest policy may be thought of as a form of devolution or decentralization of control over natural resources, as it is occurring elsewhere, but marked by the particular agrarian history of Mexico. In an era when many governments are trying to institute new forms of common property and local decisionmaking mechanisms (Arnold 1998; Arnold & Perez 2001), Mexico instituted reform, but not dissolution, of an early, massive, state-directed effort to create common property within a capitalist economy.

The interplay between liberalized economic opportunities and the traditional *ejido* and *comunidad* governance systems provide the social matrix for the emergence of CFE management institutions. *Ejido* and *comunidad* governance derive from more ancient indigenous institutions and thus do not have classically capitalist roots in that they are products of cultural, social and political customs rather than trade among individuals or firms. Therefore, incentive structures familiar in conventional firms may not be effective in the present setting. Logging communities in Mexico range from traditional indigenous communities whose agrarian claim is based on pre-colonial land occupation to much more recently organized *mestizo ejidos* with few communal traditions (Bray & Merino Perez 2003). Many *comunidades* in particular practice a system of

[2] The literal translation of "*comunidades*" is "communities" but in Mexico it is understood to mean indigenous communities with demonstrated long occupation of the land, in contrast to *ejidos* which are based on a group's new claim to land redistributed from breaking up the large landholding *hacienda* system. Hereafter, when we are referring to the specific Mexican agrarian category we will use the Spanish term *comunidades.* When we use the term "communities" in English, we are referring to both *ejidos* and *comunidades* as a general category.

rotating civic and religious responsibilities among registered community members based on merit accumulated by service in a rising hierarchy of civic positions, called *cargos* (Segura 1988). Votes on major decisions affecting the community are taken in the General Assembly in which each registered member of the community, called an *ejidatario* or *comunero,* has one vote. Voting can be by consensus or majority rule and elections to office are held every three years, or more frequently by community decision. Common property management responsibilities fall to authorities named in the agrarian law, the *Comisariado Ejidal* or *Comisariado de Bienes Comunales.* These offices can be unsalaried and unspecialized towards forestry or any other management skill. Assemblies meet a minimum of twice a year, or more frequently depending on needs.

In communities with forestry management plans, civic forms of organization have been adapted to the creation of a CFE in stages corresponding to their particular circumstances *and* the degree of participation along the production chain from stumpage to transformed wood products (Antinori 2000; Antinori and Rausser, 2003). Therefore, enterprise forms are grafted onto indigenous/common property governance in various ways which may include structures where 1) the *Comisariado* is the enterprise manager and all administrative posts are as community assignments, fully integrated into the *cargo* system, 2) managers are appointed from the community to auxiliary positions to support extraction and processing operations, 3) professional managers are hired from outside the community, 3) paid administrative positions exist on a semi-permanent basis and are not part of the rotational *cargo* system, and/or 4) experienced or respected members of the community form of a sort of "Board of Directors" with General Assembly reunions as "shareholder's meetings" (Antinori 2000; Bray & Merino-Pérez 2002). The "Board of Directors" function can be filled by the *Consejo de Ancianos* in Oaxaca or more recently invented forms like the *Consejo de Principales* in El Balcon, Guerrero (Bray & Merino Perez 2003).

Given the inherent conflicts between enterprise authorities and the General Assembly, the relationship between community traditions and emerging CFEs has been described as a "permanent tension" (Arzola et al. 1993). Here we highlight some of the typical governance issues that communities must face:

a) Hierarchy vs. "democratic" governance. Community general assemblies may not understand the technical, financial and management issues involved in the CFE, yet they may

make key decisions on personnel issues, forest management, and marketing. Community members who are also employees may not appreciate the demands of the job. This point has been a formidable obstacle in other resource-based cooperatives, such as the Basque Mondragon system (Taylor 1996) and Native American enterprises (Jorgensen & Taylor 2000), where competing philosophical approaches have led to drastic change or dissolution of the communal enterprise operation. In Mexico, most commonly, the locus of the tension is between the General Assembly, individual community members, and the *Comisariado*, which has a degree of legal authority, but may be given little space to operate in practice. As one frustrated community enterprise authority as noted, "For example, I'm the Forest Foreman-that gives me authority over you-and I yell at you. Then, you say to me, Listen, don't yell at me, this is my enterprise too" (Gijsbers, ms). The more vertically integrated communities have greater delegation from the General Assembly, empowering their managers to manage (Antinori & Rausser 2003) which has been considered a basis for their success (Bray & Merino Perez 2003; Bray et al 2003). There are also serious limits to "democratic' governance within the General Assembly, since, for example, few women are legal community members and therefore do not vote in general assemblies.

b) Multiple objectives. CFEs have a different "logic" from a profit-maximizing firm. Many General Assemblies see the CFE as a source of jobs and profit-sharing and not as a profit-maximizing enterprise. Tensions over wage policy have also been reported. Some communities pay by volume produced, encouraging productivity, while others pay a daily wage, leading some workers to reduce productivity (Alatorre Frenk 2000).

c) "Inefficiency" of traditional practices. Because governance posts must legally change at least every three years, most communities follow this tradition in changing managerial positions in the CFE in even less time. "Typically, the entire management team of the communal forestry enterprise changes each year…so while a general knowledge of logging techniques and traditions is widespread, *comuneros* rarely get a chance to develop expertise" (Secretaría de Medio Ambiente 1998). While regarded as an important measure against corruption, it implies costs as experienced people leave and inexperienced and sometimes incompetent people enter.

d) Corruption and mismanagement. It can be easy for political elites in the community (known as *caciques* in Mexico) to manipulate and dominate the General Assembly and thus carry out a "covert privatization" of the enterprise (Klooster et al, in press). Poor training can also lead

to poor bookkeeping and money management, creating confusion and suspicion even where corruption has not occurred (Platteau and Gaspart, 2003).

Communities, enterprises, and common property

Communities are not often analyzed as economic entities outside of the household and small private enterprise strategies pursued by its inhabitants. A recent deconstruction of the concept of community as used in the phrase "community-based conservation" argues for a focus on competing institutions and actors rather than harmonious communities and proposes federations of communities as a strategic need, but does not discuss a particular strategy for community enterprise formation (Agrawal & Gibson 1999). The common property literature focuses on the dynamics and the characteristics of long lasting common property management regimes (CPRM). Some of Ostrom's design principles relate directly to institutional features that address problems noted above, like accountability mechanisms, collective choice arrangements, and nested organizations with multiple layers of decisionmaking (Ostrom 1990). But much of the common property studies are of individual exploitation of a common resource, rather than collective production which generates revenues claimed by local stakeholders.

Whether a traditional rural community can organize itself as a commercial enterprise would appear to depend heavily on the pre-existing forms of land tenure, social organization, and market integration. For example, most recent efforts to promote CFEs in the Amazon Basin among indigenous peoples, many of whom were until relatively recently nomadic hunters, have failed. In these cases, most prerequisites for forest management were to be accomplished in the same time period: develop a road infrastructure, develop management plans, secure land titling, develop new forms of social and enterprise organization, and all with no prior experience in commercial logging (Irvine 2000). As well, indigenous hunting and gathering peoples in the Amazon have few institutions that prepare them for genuine collective management of a common property resource (Richards, 1997; Smith 1997). The commons and participatory development literature justly identify these factors as important prerequisites. Social capital theorists (Ostrom and Ahn, forthcoming; Coleman 1990) are pushing the field further in exploring the networks among individuals which facilitate collective action. Yet these works do not deal with the additional aspect that community forestry enterprises are productive organizations with similar if not more complicated institutional issues like access to technical

expertise, owner-manager-worker relationships, access to capital and distribution of revenues. Placing the CFEs within a framework used to analyze other productive organizations can disentangle the fundamental properties that distinguish CFEs from or plague other forms of organization to pinpoint problems and challenges, suggest which of the available analytical tools may apply and where we need to push our theories and research further.

Institutional economics has been the economist's tool for analyzing the environment in which markets, firms and other governance organizations operate. Institutions themselves refer to a set of rules, patterns of behavior or mechanism that coordinates the actions of different agents (Menard 1995). In the Mexican case, they would be the set of agrarian laws that specify civic governance in the communities and property rights systems where each community forestry enterprise is a specific arrangement within this environment. As we get further into the meaning of the enterprise, we may turn to the theory of the firm, where definitional issues have long been debated. Coase (1937) and Williamson (1975) treat a firm as a hierarchical, authority relationship among managers and workers designed to economize on transaction costs of continuously writing, negotiating, monitoring and enforcing contracts. Alchian and Demsetz (1972) define a firm as a "nexus of contracts" among individuals rather than as an authoritative scheme, where the manager receives a portion of the residual profits and thus has an incentive to monitor workers. The firm's boundary in scope and size is the point where monitoring is as efficient within the firm as in the marketplace. These views would have implications for determining the level of vertical integration of CFEs, that is, the scope of the enterprise, in the forest industry where the transaction costs of monitoring outside private contractors to operate in community forests can be high (Antinori 2000).

As we open the black box of the firm, we find a tension between who makes decisions and the owners for whom they make decisions, a tension which leads to deviations from the profit-maximization model. Jensen and Meckling (1976) argue that it is misleading to identify the firm as an individual and speak of a "firm's objectives" when its decisions come about by a more complicated process than individual decisionmaking. While retaining the idea of a profit-maximizing individual, their model finds that the "firm" is not necessarily profit-maximizing. Agency theory brings another perspective on the problem of information sharing with its emphasis on the separation of ownership by "principals", including outside investors, from control by "agents" who makes daily decisions in the firm. Such separation allows for a more

efficient allocation, it is hypothesized, of risk bearing, management expertise and other specialized skills. Whether the emphasis is on contracts or legal rules, institutional economics is fundamentally a study of collective action to achieve greater economic efficiency (Williamson 1975) where the distinctions of ownership and control often are the starting point of individual economic interrelationships.

Table I provides an illustrative example of how CFEs compare with other productive organizations within the context of the separation of ownership and decision control as suggested by Fama and Jensen (1983) and the legal system in which they operate. Ownership is associated with those who are entitled to receive the residual profit stream after all costs and debts have been paid. Decision management refers to those who initiate proposals and implement decisions. Decision control indicates those who ratify and supervise the decisions. In all cases, the government provides regulatory limits, although the legal system presents a vast number of applicable rules which may not all be specified here. "Objectives" refers to how objective functions have been characterized, assumed or stated in the literature for purposes of explication.

Taking the first column, the term non-industrial private forester (NIPF) is defined as private forest owners who does not own or operate wood processing facilities. They include individuals and organizations that for varying reasons own forestland. In the US, this group owns about 60% of all forestland, and harvest occurs mainly through stumpage contracts with outside firms (Klemperer 1996), a profile not too dissimilar from the Mexican case. In the case of individual ownership, the NIPF combines the role of risk bearing, decision control and decision management, thus differing from stumpage communities with their collective decision-making over forests. NIPFs are usually assumed to have multiple objectives (Amacher et al 2003), as do communities, although community objectives may be broader.

While an array of compensation schemes to management and workers exist in conventional firms in a capitalist economy, most separate the tasks of risk bearing, decision management and control into specialized teams. While there are deviations, it has been convenient to assume that most firms are profit maximizing. Unlike a conventional firm with either private or public shareholders, only the official members of the community have a claim to the CFEs profits. Further, CFEs do not have well-defined shares and as such cannot be traded or sold.

A closer institutional analogy may be industrial or agricultural labor-managed firms or cooperatives, although myriad versions exist. In industrial cooperatives, members own capital assets in common (Jones and Svejnar 1982), as do the community members of a CFE. However, industrial cooperatives restrict ownership to worker-members whereas current community members have access to resource stock and benefits regardless of their employment in the CFE. Much of the literature characterizes the objectives of industrial labor-managed firms as maximizing dividends to the worker, in contrast to the profit-maximizing, "twin" capitalist firm (Jones and Svejnar 1982). In communities, one may extend the logic if we think of dividends in a public as well as private sense, where "public dividends" are the share and level of public goods that individuals accrue in addition to private returns. As we shall see, in many cases in Mexico a significant amount of the benefits from a CFE accrue to the community as a whole as public goods rather than to individuals. This is similar to Vanek's idea of "collective consumption" engaged in by labor-managed firms (Vanek 1970). Where the labor force is drawn from the local population, the labor-managed firm has a closer connection to the community, and can demonstrate adaptability and flexibility to local conditions. The perceived responsibility of the firm to a community leads more likely to a multivariate objective function that includes, for example, generation of jobs for the local population and public infrastructure.

Indeed, the broad set of possible goals has made characterizing the objective function of agricultural cooperatives an open question where many of the differences from conventional firms are traceable to ownership structure (Lerman and Parliament 1992). Agricultural cooperatives are usually based on individual production from private property, with a focus on marketing, purchasing, services or bargaining but they often seek to provide other benefits, e.g. community development, lobbying and member education. Objective functions have been characterized as maximizing the price of the unit sold and maximizing the sum of producer and consumer surplus (Lerman and Parliament 1992). Generally, profitability, as in agricultural cooperatives, may not reflect the total performance of the CFE. Because of the restrictions on common stock, cooperatives are more likely to need funding from debt or other means than equity capital. Unions of CFEs (an example is provided below) offer distinct services and resemble Sexton's version of the cooperative as a "horizontal club organized to accomplish vertical integration" (Sexton 1986). In these unions, CFEs from different communities band together for the collective provision of technical assistance, political support or milling capacity

or the fewer instances where individuals harvest but market collectively. For these forms, financing and the setting of appropriate allocation rules are problems directly in common with agricultural cooperatives.

For individual CFEs, perhaps Israeli agricultural cooperatives, particularly the *moshavim,* are one of the closest analogies to CFEs, where the governance structure is specified in national law (the *takanon*) as a result of a political movement and includes local governing councils elected by a General Assembly and executive and advisory committees (Zusman 1988). Most activities operate as agricultural cooperatives where individual farmers or producers sell their product through the *moshav* as a unit but some have community-level operations which generate revenues for all members. Their system of democratic control, collective provision of public goods and normative basis of formation has similarities to the CFE and makes public choice theory applicable to its functioning (Zusman 1988), thus differentiating CFEs from other production institutions. The most direct institutional analogy may be with U.S. Native American logging operations, but these have also been little studied or analyzed, particularly from the kinds of perspectives suggested here (Davis 1993; Jorgensen & Taylor 2000; Nesper 1993).

To summarize, we venture a definition of a CFE as a form of enterprise based on collective ownership or secured access to a forest resource by a community, with forms of enterprise governance derived from local community traditions, where tensions between direct "democratic" community control and hierarchical management structure are present, and which typically have multivariate objective functions with profits as only one of several goals. A CFE may be distinguished from a conventional capitalist firm by the unusual features of collective ownership, usually birth, and a common property natural resource but can exhibit similar tensions of cooperative firms where workers and local residents hold a claim to tangible and intangible benefits generated therein. As an economic development strategy, CFEs may be regarded as either a variant of corporate private property (e.g. "the community as entrepreneurial firm" (Antinori et al. 2000) or a "third way" between private and public sector production (Boyce & Shelley 2003).

CFE organization

The broad range of different organizational forms and rules enacted by forest communities may be conceived as different ways to address these tensions, with distinct impacts on the allocation of stocks and flows of the common property resource (McKean & Ostrom 1995). These range from arrangements whereby there is extensive individual appropriation of timber to situations where the appropriation remains entirely communal. Examples from specific Mexican communities follow:

a) El Balcón (Guerrero). In El Balcon the forest common property is undivided in any way, and a CFE has been formed to administer the flow of timber from the resource. Both the stock and the flow are considered as communal property, and the flow is divided among community members only after the sale in a monetary form (Bray & Merino Perez 2003).

b) San Juan Nuevo Parangaricutiro (Michoacan). Here, a CFE has been erected on the basis of individually appropriated parcels in the forest. In the 1940s, before community logging appeared, forests were divided for pine resin extraction, effectively privatizing the forest. However, in the early 1980s, leaders convinced landholders to follow a community management plan and allow logging on their lands in exchange for being treated as private property holders, through the payment of a stumpage fee. Thus, the stock is privatized for resin appropriation, but forest management is communalized (Bray & Merino Perez 2003).

c) Petcacab (Quintana Roo). In Petcacab, a previously existing CFE has been dissolved, and in its place approximately 10 "work groups" or subcommunal enterprises have been formed. These work group enterprises divide up the annual authorized logging volume from the management plan on a proportional basis. Thus, the forest stock remains as common property held by the community, but the flow is divided up into the work groups, and finally individually which has led to a "futures market" in timber (Wilshusen Forthcoming).

d) Unión de Ejidos Forestales de Tamaulipas (Tamaulipas). In at least four ejidos of this organization, the forest remains a common property, but the flow of timber is divided up in two different forms. Approximately half members of the communities divide the annually authorized volume into proportional amounts, which is then individually logged, while several "work groups" manage the remainder of the volume. Thus, the stock as a whole remains communal, but the flow is both individually- and work-group-appropriated. (Bray & Merino-Pérez 2002).

e) Cuauhtémoc (Quintana Roo). In this community, the forest has been internally and informally parceled out among the *ejidatarios*. Each ejidatario can now individually appropriate the timber on his or her land. However, they still operate under a management plan so the authorized flow represented in the management plan is still proportionally divided. Thus, both the stock and the flow have been individually appropriated.

From research on industrial organization, institutions and contractual arrangements, it is known that these variations have both equity and efficiency consequences. They are most likely to have an effect on the creation and conservation of forest stock and the distribution of benefits it generates. This variety of institutional regimes indicates there is no one right way to manage a common property forest resource, assuming the observed governance choices represent a local social optimum. Each variant emerges as a creative response to local problems.

Stocks, flows and the economic performance of CFEs

There has been a tendency to regard Mexican CFEs as constantly teetering on the brink of collapse because of mismanagement, high costs, inefficient industries, and exploitation by outside forces. It has been argued that the allocation of capital and labor can shift in the private sector to equalize the value of marginal product to each factor while peasant industries do not have that choice (Aguilar et al. 1990). However, the peasant industry can simply sit on its natural asset, exploiting other means of subsistence, until prices or technology change in favor of using it again. Forest capital, in contrast to other physical capital which typically depreciates, maintains its value or appreciates (Klemperer 1996). The traditional governance practices of CFE administration can also bring about cost savings. A comparison of communal and private enterprises in the Sierra Juárez of Oaxaca showed that all else equal communities had lower administrative costs because of the *cargo* system, as well as proximity of sawmills to timber production areas which lowered transportation costs (Aguilar et al. 1990).[3]

Survey data on revenue and cost levels collected by Antinori (2000) suggests that CFEs at all levels of integration are economically feasible in the sense that cash inflows more than cover cash outflows. In a first order approximation, it was calculated that in four categories of CFE vertical integration -- stumpage, roundwood, sawnwood and secondary products -- gross

[3] It is not specified in the study if the lower costs were reflected in the market price or the marketability of the CFE's product.

margin (sales less labor and materials) range from 32% in secondary products communities to 54% in stumpage communities (Antinori In press). This data indicates a reason why few CFEs go out of business entirely, despite the odds against so many small companies in any sector surviving. For example, in 1995 in the United States, 43% of new businesses failed (Stuart, 2000). There are few reports of CFEs failing entirely.

A major management task facing communities with CFEs is to "distribute the surplus and achieve a certain equilibrium between communal interest, consumption, (and) family and individual interests" (Alatorre Frenk 2000). CFE benefit flows for the community can be distributed to 1) employment, wages, and benefits 2) capital investments in the enterprise, 3) public goods investments in community infrastructure and social welfare programs, 4) profit-sharing and 5) economic diversification.

a) Employment, wages, and benefits. CFEs can generate jobs for very high percentages of the community labor force. At one extreme, there are "full employment" CFEs where nearly everyone in the community who wants a job can get one, ranging from San Juan Nuevo Parangaricutiro, with some 900 full-time jobs, to Rosario del Xico in Veracruz with 24 jobs. At the other extreme, there are stumpage communities where almost no one is employed in forest extraction (Robinson 2000). In a study of 42 CFE communities in Oaxaca, the percentage of community members receiving income from the CFE on a regular basis was 15% in stumpage communities, 19% in roundwood and sawnwood communities, and 26% in secondary product communities (Antinori et al. 2000). This suggests that most CFEs can only generate employment for a quarter or less of the community labor force, although without CFEs there would be few opportunities outside of agricultural labor. The stumpage group has the largest percentage of outside workers, perhaps due to lack of skill or interest in the community or less bargaining power with contractors. However, the 26% employment level in secondary products communities may exhaust the community labor supply interested in working in the CFE, since 63% of the secondary products communities hire outside workers compared to 11% of the sawmill communities (Antinori 2000). Most of the more integrated and prosperous CFEs also support various fringe benefits. For example, when a worker is sick, the CFE may pay the lost salary. If a worker is killed on the job, the CFE may pay funeral costs and an indemnity equivalent to about two years salary to the worker's family (Bray & Merino-Pérez 2002).

In the next several sections we will be making reference to figures in Table II, which shows how CFE profits were distributed between public goods investments, profit sharing, and reinvestment in the CFE.

b) Public Goods Investments. Many communities invest significant funds into public goods as 1) public infrastructure and 2) retirement pensions. In both cases, CFE are investing in public goods that would normally be the responsibility of government. Communities may construct or restore churches, municipal buildings, public lighting, potable water systems, clinics, and schools. Almost all 42 communities in the Oaxaca study channeled CFE revenues to social services in the year of the survey (Antinori 2000). Some communities also support retirement pensions for elderly members or widows and one community with one million dollars annually in profits invests 60% of it in community public goods (Bray & Merino-Pérez 2002). As Table II shows, over 80% of communities at all levels of integration invest in public goods.

c) Profit-sharing. Communities may also decide to distribute all or part of the profits on a proportional basis to all legal members, usually retaining a small percentage for the *Comisariado* administrative expenses. Distribution of most profits may be more common in communities with smaller volumes of timber, where poverty is greater, where community authorities are not trusted, and where proceeds are small. Amounts of profit distribution may range from less than one months average income to full average annual incomes. A study of forest incomes from five forest communities in Quintana Roo showed an average of 13.5% and a high of 30.3% of household income came from profit sharing exclusively (Armijo Canto 1997). Table II shows that less than half (15 of 42) of the communities distribute profits in that year.

d) Reinvestment and vertical integration. Profits may also go to asset maintenance such as constructing or maintaining new logging roads and for buying new equipment that permits vertical integration. Most communities made such investments, with a higher percentage in the more integrated types. Successive steps in vertical integration typically go from using extraction equipment such as cranes, to trucks for transporting the logs, and then to sawmills and other processing facilities. Logging can be such a profitable activity that the proceeds are frequently used to acquire more productive assets for the CFEs. This is quite common in the Oaxacan CFE Study. Table III shows the degree of asset ownership in CFEs at the four levels of integration, who owns the equipment, and when and how it was acquired. Of particular note here is that in

the great majority of cases assets were purchased with community funds that came from CFE profits.

e) Diversification. Communities with more vertically integrated CFEs more frequently seek to diversify into other forest or non-timber forest activities. Diversification allows timber-producing communities to maximize the value from the forest and reduce pressure on timber resources. In the Oaxaca study, it was also found that communities diversify their activities to create a broader employment base in the community. For example, a water bottling plant in one community employs solely women, who tend not to be employed in timber extraction and transportation. Communities can allocate timber resources to promote community-level production activities, work group-level activities and individual-level activities. Table IV shows the frequency of community-level diversification into nontimber production activities is the largest for secondary products communities, followed by the roundwood group, and the stumpage and sawnwood groups. Among the five categories of ecotourism, retail nurseries, water purification, mining and an "other" category, there is a distinct pattern where investments in diversification track CFE vertical integration. The sawnwood and secondary products communities almost always have their own nurseries to reforest the timber harvesting areas and eroded areas. In at least one case, women were predominantly employed at the nursery.

Conclusions

Mexico has been historical vanguard in developing a large and relatively mature sector of communities managing their forests for the commercial production of timber (Stone & D'Andrea 2001). As such, it provides key elements for both a conceptual model of CFEs and empirical lessons about their institutional evolution and economic benefits. Mexico, due to its agrarian revolution early in the 20th century, advanced in its devolution of control over forest resources to local communities, and thus provides a laboratory test of the costs and benefits of such a policy.

We have argued that CFEs, and common property community enterprises in general, may present a new enterprise model. This model shares similarities with those of Israeli agricultural cooperatives and worker-owned firms, but also differs in important ways, particularly in ownership of a common property natural resource and the need to create market enterprises out of a pre-existing matrix of traditional community governance. Mexico's *cargo* system is different in kind but not degree from indigenous governance systems elsewhere in the world, and

the issues of institutional emergence sketched above are likely to be similar. The analytical treatment of organizational issues and problems in other institutional environments apply to CFEs but with important adaptations needed to account for distinctive features of Mexico's agrarian community system. A non-mutually exclusive, illustrative list of these features is: a) the norms and character of the membership base, b) ownership and control rights, c) the political component of civic governance, d) limits, either real or perceived, to associations with other communities, e) limits on power and f) potential providers of development needs in economically marginal areas, where most CFEs are located.

It has also been pointed out that CFEs can generate an array of benefits for forest communities, including wages and benefits associated with employment, investment in public goods and welfare programs, direct profit-sharing dividends, capital investments in the CFE, and enterprise diversification. Exact quantification of these benefits is still underway in several different studies, but they appear to be significant when the timber resource is substantial. As well, the Mexican case demonstrates that the mastery of demanding industrial skills and processes is not beyond the capacity of local communities with appropriate levels of training and technical assistance and contractual arrangements.

CFEs, when they are run with a degree of transparency and accountability, appear to be able to better achieve equity in the distribution of profits from forest enterprises than either private sector or public sector models. A final key area that must be noted is the ecological impact of community logging. There may be no inherent reason why community-based logging should be any less ecologically damaging than industrial logging. However, it has been argued that the communities managing forests under secure tenure arrangements bring other values to bear than profit maximization (Bray, in press), particularly the value placed on the multiple roles of communal forests which may lead to greater emphasis on conservation and biodiversity. As Snook (1998) has argued for community forests in Quintana Roo, Mexico "…the many communities that own, utilize, and benefit from this forest also provide a context within which forest management can be practiced in a more holistic fashion than that defined by the limited demands of the timber industry…a diversified, peasant economy may provide the best framework for a kind of silviculture that works with the complexity of …species-diverse tropical forests". Research is also suggesting that community logging areas may preserve forest cover at

rates similar to protected areas (Durán et al. In press In press) and that silvicultural practices in community logging are not harming plant or avian biodiversity (Vester & Martínez In press).

CFEs are not a panacea for biodiversity protection or the sustainable management of both temperate and tropical forests, but the evidence is suggesting that the expanding policy option of promoting community logging has an empirical foundation for the hopes that it can deliver both a significant degree of biodiversity protection and economic equity. We hope this article will help stimulate further research on the economic institutional challenges and ecological advantages and disadvantages of community-based logging.

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Table I. Ownership and Control in Production Organizations

Institutional Component	NIPFs	Conventional Firm	Worker-Owned Cooperatives		Mexican CFEs
			Industrial	*Agricultural*	
Owner(s)	Individual or organization	Shareholders	Labor	Land held by public, community or individual with sales to farmer-owned enterprise	Official members of the community
Decision management	Owner	Managers	Management committee elected by workers	Management committee elected by producers	CBC/CBE elected by members
Decision control	Owner	Executive officers, shareholders, auditors	General Assembly of workers, auditors	General Assembly of producers, auditors	General Assembly of local community members, auditors?
Legal system	Land use and tax laws	Land use, corporate and tax law	Land use, corporate and tax law	National and state cooperative laws	Agrarian, forestry and environmental law
Objectives, assumed or stated	Profit, amenities, NTFPs, bequest	Profit, return on invesment	Dividends per worker	Unit price, producer and consumer surplus, services to members	Profit, amenities, NTFPs, bequest, jobs, public goods and services

Table II. Distribution of CFE Profits By Level of Integration to Public Goods, Profit-Sharing and Reinvestments in CFE (in 1998 pesos) (N=42 CFEs, Antinori, 2000)

Public Goods Investments	*Percent contributing*	*S.E.*	*Number of observations reporting*
Stumpage	88%	.0837068	16
Roundwood	82%	.117736	11
Sawnwood	88%	.1183794	8
Secondary Products	100%	0	6
Profits distributed to members >0	*Average, in pesos*	*S.E.*	
Stumpage	10194	9390	4
Roundwood	814	548	5
Sawnwood	2333	1155	3
Secondary Products	2250	2411	3
Reinvestment in ongoing operations	*Percent contributing*		
Stumpage	38%	.50	16
Roundwood	83%	.39	12
Sawnwood	88%	.35	8
Secondary Products	100%	0	7

Table III. Capital Asset Ownership in Oaxacan CFEs (n=42)

	Trucks				Cranes				Sawmills	
	Stumpage	***Roundwood***	***Sawnwood***	***Secondary Products***	***Stumpage***	***Roundwood***	***Sawnwood***	***Secondary Products***	***Sawnwood***	***Secondary Products***
	n=15	***n=13***	***n=8***	***n=7***	***n=15***	***n=11***	***n=7***	***n=7***	***n=8***	***n=7***
Average number used for harvest	10	10	13	14	1.75	1.7	1.5	2.9		
Average owned by community									1	1.3
Distribution of ownership										
Community-owned	1	8	6	7	0	6	7	7		
Total Individually-owned, comuneros	4	7	7	4	1	3	0	0		
Total Individually-owned, non-comuneros	11	9	2	4	0	0	0	1		
Buyer-owned	7	1	1	0	14	4	1	0		
Average year first bought, if community owns	1993	1991	1989	1980	1994	1995	1991	1986	1993	1986
How bought first, if community or *comunero*-owned*										
Community funds	1	7	5	4	1**	4	5	6	6	6
Government assistance	0	0	0	1	0	0	0	2	1	0
Bank credit	0	1	1	0	0	0	0	1	1	1
Agreement with private company	0	0	0	2	1**	4	1	1	1	4

* Numbers do not always add to sample totals due to multiple responses per community.
**Refers to acquisition by community members

Table IV. Diversification in Oaxacan CFEs (n=42)

	Stumpage n=15	*Roundwood n=13*	*Sawnwood n=8*	*Secondary Products n=7*
Community-level activities				
Nurseries	0	0	0	3
Ecotourism	0	1	1	3
Water bottling plant	1	1	0	1
Mines	0	0	1	1
Other	1	2	0	3
Total number	**2**	**4**	**2**	**11**
Assistance given to work groups or cooperatives at sub-community level for entrepreneurial activities	1	0	1	2
Assistance given to individual community members for entrepreneurial activities	5	1	1	5