

# Cross-Scale Linkages in Common-Pool Resource Management: The Evolution of Forest Associations in the Mexican Forest Commons

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## ABSTRACT

Inter-community forest associations play an important role in the community forestry sector in many countries, providing benefits such as political representation, technical forestry services, and production cooperation. They face challenges related to collective action, representation and legitimacy among their heterogeneous memberships. In Mexico, despite the vast research on common-property forest systems, no systematic study has been done on forest associations. This paper analyzes the role and evolution of forest associations among Mexican forest communities within the context of changing national policies in the last 50 years. First, we trace the changes in a historical perspective, complemented with field survey data from communities in the states of Durango and Michoacan. The historical overview supported by the empirical data illustrate how forest associations emerge and evolve to meet changing community objectives and challenges, often shifting from political organizations to self-production or service-oriented organizations. In addition, we discuss an apparent reversal from 'bottoms-up' to 'top-down' origins of recent associations. Second, using the data, we characterize associations in terms of the different services provided, and evaluate the impact that these services have on related measures of effectiveness, comparing members versus non-member communities in the sample. Measures include community-level indicators of market access and power, investment patterns, effectiveness in production, social capital, and forest conservation. We also look at how the services within a similar category of associations may vary according to an association's characteristics, such as its origins and its size, and how perceptions of services differ among members of the same association. The analysis provides insights into the cross-scale linkages between community institutions and higher-level institutions at the regional level, in this case, forest associations, and the impacts that policy changes have in these linkages. We conclude by discussing the challenges with which associations currently grapple and possible policy implications.

*KEYWORDS: forest commons, Mexico, community forestry, forest associations, cross-scale linkages*

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## I. INTRODUCTION

Forestry associations exist around the world to pursue economic, political and social goals for their membership. In Mexico, they a cross-scale linkage both between communities involved in forestry management and production as well as between the communities and higher levels of state, national and international organizations. In an ideal sense, the forestry associations capitalize on synergistic effects of group action. The vast literature on common property has just begun to explore the importance of cross-scale linkages for local level common pool resource management (e.g. Young, Berkes, 2004). Their possible benefits include management oversight, access to technical and management expertise, political voice and coordinated management. Accordingly, a much broader set of literature can be applied in understanding how they have shaped and been shaped by local level common pool management efforts. In this paper, we systematically bring together these perspectives in an analysis of the role of Mexican forestry associations in creating the current organizational and political landscape of the Mexican forestry industry, with implications for both community and private sector actors, as well as policymakers.

Mexican *ejidos* and *comunidades*, it may be argued (e.g., Gordillo 1998), are in the state of an institutional crisis. Economic and political liberalization reforms since the eighties, especially the 1992 Agrarian Reform, have highlighted a historical pattern of contradictory political philosophies which have undermined economic development and political representation of the agrarian sector (Gordillo 1998; Cornelius and Myhre 1998). The agrarian communities are the core of the agrarian sector in terms of they population and agricultural and forested area they represent. Yet their organization from their original creation has been a result of competing political and economic goals. On the one hand, one force has to phase out gradually the agrarian community as a step towards modernization, while another force sees the community as a permanent institution. Along the way, the community structure has been a focus of state political control and a relatively low cost source of labor (Gordillo 1998).

The continued viability of these communities places vast natural resources at stake. Eighty-three percent of all agricultural land and 80% of all forest land are estimated to be under community ownership. Deforestation in Mexico is estimated at 1.7% on average between 1993 and 2000 (Fernandez and Munoz, 2006; Masera). Yet, efforts to privatize the “social sector” with the 1992 reform has resulted in only about 15% of the over 30,000 *ejidos* or *comunidades* transitioning to full individual level titling (IBRD 2008). Furthermore, research has shown that Mexican communities with management plans have less deforestation (Duran and Velasquez, Deininger and Minten, World Bank, Bray et al., 2007)<sup>2</sup>. Bray et al. (2007) summarizes research to date on the outcomes of community-based forest management and concluded that communities have equal or lower deforestation rates than conservation areas and lower poverty and lower conflict levels. Therefore, policies towards redistributing accessibility to forest resources may profoundly affect natural resource benefits.

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<sup>2</sup> One exception is Alix-Garcia et al., 2005.

Gordillo (2007) argues that the main reasons why the Mexican social sector has not disappeared are the advantages it offers for different interest groups. For the state sector, it is a vehicle for control following a pattern of clientilism since its inception after the revolution. For the private sector, it has been a source of cheap labor as community members leave to seek employment outside the community; and a source of cheap raw materials as private companies were given access to resources through leases. For individuals within the communities themselves, it is a peasant economy that provides mutual insurance, livelihood (even if at subsistence levels) and political representation despite the contradictions of the system. Lastly, it assures access to common property resources that would not be available to community members if communities were fully titled and dissolved, as permitted under the agrarian reform. In a way, the community is a political apparatus that permits mutual individual insurance and a body of peasant representation, where common property is possibly a competitive advantage. The concern exists that dissolution of the ejidos under current conditions could impoverish people through reducing access to natural capital and redistributing such assets in a biased manner.

A practical role for forestry associations (FAs) is to pursue strategies to reduce deforestation and improve economic development opportunities, as is recognized by international development policymakers with respect to productive organizations (FAO; WBWD Report p. 154). A large percentage of the rural poor depend on forest resources, but deforestation continues at high rates (Chomitz et al., 2007 foreword). Chomitz et al. (2007, p. 176) claims that limited access to markets, management and marketing skills and poor internal organization hinder the potential for community forest ownership to provide both income to stakeholders and conservation benefits. Forestry associations have often formed to reduce transaction costs left by gaps in the market and government policies. The Mexican social forestry sector has weathered the changing political environment partly through social mobilization at critical points in time. Mexican FAs achievements include gaining greater community control over their own resources and direct access to forestry services. Other associations further connect to the market and the policymakers. Many associations identify and channel funds from government programs for targeted forestry projects or public infrastructure. Thus, associations have assisted communities in benefiting directly from their natural asset wealth.

The FAs role is all the more important in light of studies which point to the weak role of state and private sectors in poverty alleviation and wealth accumulation in rural sector organizations. Bebbington (1996) argues that the private sector, nongovernmental organizations (NGOs) and local government have done little for market opportunities and wealth accumulation among rural poor. The role of rural people's organizations which often link traditional and modern practices and therefore potentially have a long-term advantage are virtually ignored (p. 1163). In fact, despite scholars recognizing the increasing importance of cross-scale perspectives in studying problems of common-pool resources (e.g. Berkes, 2008), most of the research on common-property regimes and community-based natural resource management has focused on the individual community or local organization, without much emphasis on federated or regional forms

of association or the challenge of “scaling up” through networks (Shrestha & Britt, 1998; Wilshusen & Murguía, 2003). While effective organization for conservation and development is crucial it is also challenging, especially in contexts of state authoritarianism, as has been the historical case in Mexico, where there is a strong institutional legacy of state control, local and regional bosses (*caciques*), and community dependence on state aid (Wilshusen & Murguía, 2003).

This paper examines the role of forestry associations in Mexico’s changing political climate of modernization and globalization. For purposes of this paper, we define a forestry association broadly. We are interested in the institutional relationships among communities which connect them to the market and policy sphere and which would theoretically contribute to alleviating poverty. This follows from the observation that associations often form to overcome government and market failures (see, e.g., Cooperative Research Inventory Project 2003). The associations we include in the analysis are political associations, technical services associations, production cooperatives and government-prescribed ecological management zones.

The objective is to shed light on how FAs in Mexico have allowed the agrarian communities to integrate as market participants in the forestry industry and manage common property forests. As part of that research agenda, we examine how the associations emerged among communities; the purpose of each FA as perceived by its members, whether membership leads to observable economic, social and environmental benefits consistent with the association’s activities; if “top-down” versus “bottoms-up” type of association matter in delivering benefits; and constraints on the long-term viability of existing associations or formation of new associations. The basis of the research is a unique dataset from forty-one community-level surveys in Durango and Michoacan during 2005 to 2007. We analyze what factors influenced the creation of associations, including social solidarity against a weakening state enterprise and the lack of direct technical assistance; life-cycle of associations in terms of changing member needs and costs of membership and rules for membership; and impact on member communities, including whether the motivation for formation affects the ability to deliver services. At the core of the analysis is a public policy concern with forestry organizations’ contribution in developing the rural sector and alleviating poverty. The results also speak to how cross-scale linkages may be incorporated into common pool (and property) research.

## **II. HISTORICAL OVERVIEW**

Most inter-community associations formed out of struggles for land in the 1960s. These associations have undergone significant changes, which can be understood, through the lens of a historical perspective, in the context of changes in both national-level and community-level institutions. As Taylor (2001) points out, “restructuring is peopled by social actors; the organizations’ trajectories are shaped by complex interactions between structural pressures and social agency. Community forestry organizations, therefore, are best understood as historical processes rather than as static arrangements of incentives and procedures, and as being embedded in levels of context ranging from local to global.” Likewise, Mexican forest communities exist within

the broader social sector, and, as such, their histories sometimes parallel that of the sector as a whole. However, they can also be distinct, given the specific characteristics of their economies (e.g. more economically dependent on the timber trade) and their institutional history (e.g. the forest concessions and capacity to participate in the market). In this historical review, we discuss the interrelationships between these changes at different scales. We identify four distinct periods broadly related to shifts in national forest policies, in which different types of forest associations have predominated. One important caveat is warranted: given the large diversity across regions within Mexico, any generalization about patterns of forest association formation are necessarily fraught with errors of omission and commission about the histories of regions and particular associations within them. We recognize these errors, while at the same time noting the value of tracing general patterns that can provide insights into the effects of national-level policies on forest associations.

*First phase (up to 1986): Shifting control from state to local*

The main driving force for the formation of the first forest associations was the need for greater economic and political control over their governance, including natural resources. As with Andean federations studied by Bebbington (1996), initial struggles did not revolve directly around forest management, but rather around issues of control over land and autonomy. The activism centered on access and control over forest resources should be seen in the context with three political characteristics of the time: first, the state's political control of the rural agrarian sector in general; second, the confluence of bureaucratic state support for community rights and community activism; and third, state efforts to co-opt emerging inter-community organizations/ associations (Gordillo et al. 1997; Gordillo, 2007).

In the forest sector, a significant aspect of the government in the sixties and seventies was the control over community-owned forests. In the 1940s, the Mexican government, as part of its import substitution policy, imposed monopsony power in timber production by leasing community forests first to private companies (1940s – 1960s) and then to state companies (1960s – 1980s) (Merino, 2004, p. 213-214; Klooster, 2000; 2003). From 1959 to 1980, about 50% of the Mexican forests were under concessions to private and public companies, and the other 50% was subject to either bans (*vedas*) or short-term contracts with private companies (Bray & Merino, 2004). While the parastatal, as the private-public companies were called, had their own team of foresters, the government provided technical forestry services to other areas where forestry occurred. A presidential decree gave parastatals the exclusive right to acquire raw material from communities in their leasehold (Abardia & Moros; *Diario Oficial*). Under the parastatal system, communities had the right to refuse the contract offered to them but generally had little control over the terms of trade. Community members' access to timber forest products was highly discouraged or outright forbidden (Vidal; survey interview data – Antinori, 2000; Merino). Communities were required to deposit 10% of their earnings from timber sales into a 'community development' trust fund (FIFONAFE). Thus, while community ownership of the land was recognized, the community's ability to control its flow of benefits was severely limited.

These were not the only mechanisms of political control. In all communities, the government placed representatives from the Agriculture Department in each General Assembly meeting to approve community member decisions, including the selection of the community councils. The department also automatically included all community members into the ruling political party (PRI) and provided strong support for local 'political bosses' (*caciques*) representing the PRI. In many instances associations were expressly prohibited or at least discouraged by the government and by concessionaires, since they were seen as a barrier to full government-private control over forest production (Gordillo, personal communication). Government supports, particularly agricultural subsidies, simultaneously built clientelist ties rather than increasing productivity or promoting self-governance (Gordillo, 2007). Overall, the nature of this system constricted the institutional spaces in which organizations could self-organize or in which they could remain autonomous. The community sector had become "a repressed peasant economy in the grips of a Leviathan" (*ibid*).

The nature of this system and the persistent existence of a landless class of peasants led to the emergence of various struggles and organizations during the 1960s and 1970s. In the forest sector, a series of grassroots associations emerged, mostly centered on "*la lucha*" (the struggle) to reform or end the parastatal concession system and reclaim their full rights over their forest lands (Vidal). Two well-known examples are the *Organización para la Defensa de los Recursos Naturales y el Desarrollo Social de la Sierra Juárez (ORDRENASIJ)* in Oaxaca and *Unión de Ejidos y Comunidades Forestales y Agropecuarias Emiliano Zapata (UNECOFAEZ)* in Durango. In Oaxaca, local activists were key in unifying communities. FAs in this era organized the political action necessary to regain control and thereby economic maneuverability from the state to the local for forestry resources. In this way, FAs, understood as organizations in the new institutional sense, shifted levels of collective action to bring about change (North, 1990: 5). They bridged to the "constitutional level" where they could influence the rules being made about forest management and thus change the undesirable patterns and outcomes of the institutional regime in place (Ostrom, 2005: 63). These associations established the foundations for a new form of nested governance in the forest sector in which the associations served to "build bridges" between scales, i.e. establish cross-scale linkages across communities as horizontal linkages. In addition, the associations created vertical linkages between communities and other levels of governance, including the state but also federations of associations. Such vertical linkages are now recognized as crucial to develop or maintain governance capacity (see Hahn et al. 2006; Cash and Moser 2000).

However, this movement happened simultaneously with state-directed efforts to control inter-community actions, mainly by allowing their formation but incorporating some into the national peasant union, *Confederación Nacional Campesina (CNC)* (Gordillo, 1988). In some cases, the government-created unions sought to incorporate forestry issues into their agenda. The distinction in forces motivated an association to form characterizes whether the origins of an association are "bottoms-up" or "top-down". The distinction is not always clear as associations resulting from different forces often use the same vocabulary to identify themselves. These government-co-opted organizations typically used the term "union". Grassroots forestry associations seeking political and

economic change also used the term “union” in their title. The use of “unions” to self-define, these grassroots associations could indicate their political and combative nature. By defining forest associations as unions, peasants in forest communities became workers who struggled against their patrons for ownership of their production decisions.

Towards the end of the 1970s, the concession system began to break down, suffering from poor economic performance and a policy agenda moving towards liberalism. The actual end date for concessions varied across states. In most cases, concessions ended when the then-president did not renew the leases when they came up for renewal in 1982. This breakdown was coupled with a crisis in the *ejido* system generated by scarcity of agricultural products and government budget deficit which limited its ability to maintain patronage politics – a crisis which may have signaled the beginning of the breakdown of the clientelist system (Gordillo, 1988, 2007). Community struggles materialized under the 1986 Forest Law, which officially ended timber production concessions, and with a series of federal and state government programs supporting community forestry and confirming the community’s right to form internal production units to commercialize their forest resources (Merino, 2004).

In those years, the government also sought to fill the gap in technical forestry services (STFs) left by the timber concessionaires by creating a series of Forest Administration Units (UAFs) across the country. An example is the *Unidad Industrial de Explotación Forestal de Triplay y Maderas de Durango* company, in the region of La Victoria-Miravalles, Durango. The timber concession began in 1958 and ended in 1978, at which point the government created the UAF La Victoria-Miravalles. UAFs corresponded to intra-state regions, based on the concept of “development poles”, or regionally-based development plans. Under UAFs, the communities were given slightly more powers to self-organize, manage the forest and plan regional development. As a director of an ex-UAF regional forestry office recalls, at this point people started to “get together” and to realize that they could do more and gain more from the government if they were united, eventually forming an inter-community union.

### *Second phase (1986-1992): Liberalization of forestry services*

The economic and political aperture begun in 1980s generated new opportunities for actors “operating outside the state’s domain to pursue initiatives focused on community development, environmental protection, and, in some cases, political opposition” (Wilshusen and Murguía, p. 195, citing Fox and Hernández, 1992), including the emergence of a community forestry sector where communities integrated into the market for forestry products (Antinori, 2000). Therefore, this period included a focus by associations on the economic issues associated with ‘self-production’ of forest resources. This transition was embedded in a broader process occurring within rural/peasant organizations (and rural struggles) in general, which shifted their main objectives from accessing land to creating economic benefits through gaining autonomy over their territory and socio-political life, and appropriating the productive process and supporting strategies of “self-management and democratic production” of agricultural, forestry resources, operating in bottoms-up, decentralized network movements (de

Janvry, Gordillo, & Sadoulet, 1997; Gustavo Gordillo, 1988; Otero, 1989, in Otero, 2000).

Throughout the entire historical period covered in this paper, the state maintains some control over forestry services. All forestry professionals must be state-qualified, and all timber harvesting must be specified by a professionally developed management plan and subject to approval from the state permit office. The 1986 Law did not end concessions on technical forestry services. The government transferred all forestry services from the UAFs into what it termed Conservation and Forest Development Units (UCODEFOs) (Merino, 2004, p. 192). To varying degrees, the UCODEFOs were responsive to community needs. During this period, many associations (old and new) focused on obtaining community rights to hire their own forestry services. The *Union Zapoteco-Chinanteco* and the *Union of Forest Ejidos and Communities of Oaxaca* (UCEFO) in Oaxaca were grassroots organizations that sought to provide both forestry services and broader community management planning and technical assistance (Lopez Arzola). They directly lobbied the government and eventually won the right to provide technical forestry services. The *Society of Ejido Forest Producers of Quintana Roo* (SPFEQR), obtained the concession through support from NGOs and the German government, and eventually the state government (Taylor, 2001). Some associations struggled to maintain key foresters within the new UCODEFOs rather than to obtain full control over the STFs, such as *UNECOFAEZ*, which won the right to name 2 of the 5 positions to the government STF concession (UCODEFO) in 1990 after a struggle with the governor, who wanted to appoint all new PRI people and remove the pro-community forester (ibid). In the spirit of continuing liberalization, the central government officially ended technical forestry service concessions by privatizing them under the 1992 Forestry Law.<sup>3</sup>

During this period, cross-scale linkages were formed with national-level confederations (i.e. federations of federations) through which communities and their associations could have a representation in national policy-making. A crucial actor in this process was National Union of Regional Autonomous Peasant Organizations (UNORCA) which formed in 1985 in an attempt to break the monopoly over peasant organization held by the clientelist *Confederation Nacional de Campesinos* (CNC) ( Gordillo, 1988; <http://www.unorca.org.mx/>). Similar forestry associations emerged at the national level in the same period, such as the Mocaf Network (1991), a non-partisan, pluralist coalition of NGOs, production-oriented organizations, communities, and small landowners offering technical assistance, training, design and evaluation of productive projects, environmental studies, participation in related policy-making, and channeling resources (see <http://www.redmocaf.org.mx/index.html>). Another was the National Union of Communal Forestry Organizations (UNOFOC), formed in 1993 by organizations focused on forest resource conservation and community development as an alternative

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<sup>3</sup> Some of the technical forestry associations formed in this period keep the term UAF or UCODEFO in their title, as the term had familiar usage in the profession and continues to be associated with the same set of communities under its region of responsibility, though they are free to seek services from other private foresters.



to the centralized national peasant organizations and as a medium for consolidating forest-related work (Arguelles & Gonzalez, 1994).

In addition to liberalizing the forestry profession, previous efforts at supporting community rights fell in direct contradiction of modernization and economic liberalization efforts, starting with the 1986 GATT. The regulatory provisions implemented based on the GATT stood in contradiction to the 1986 Forest Law supporting community forestry (Silva, 1997, p. 483, citing Chapela, 1992). To some, these and later reforms reversed the gains for grassroots organization (Silva, 1997; P. L. Taylor, 2001), and echoed the structural adjustment reforms of the 1980s that swept across Latin America and other developing regions (World Bank, 2008) <sup>4</sup>.

### *Third phase (1992 to 2000): Capacity-building*

The community forest sector's role in production represents a significant challenge to established practices in the timber sector. While communities are vertically integrating forward, the percentage of those selling stumpage remains high (Antinori et al., 2008). The development of community forest management requires the crafting of new institutions and organizations and the modification of existing ones. Antinori and Rausser (2008) show that among the factors increasing the propensity of a community with forest resources to integrate downstream into the forestry industry include not only size of the forest but also social capital related to forestry issues, often garnered from social activism against the parastatal system. FAs are one result of efforts in this direction. Vertical integration was a way to control difficult-to-describe uncertainties and risks of contracting for production services when in other political and economic contexts, the economic benefits would leave the community indifferent between selling stumpage or investing in downstream extraction and processing capabilities. Key problem areas remain the communities' ability to participate and compete effectively in the market (Molnar), where FAs may continue to address. To gain this capacity, suggestions include the need to increase production efficiency, receive full market value for timber, and increase mechanisms to ensure transparent and easily accountable contracting between the social and private sectors. Diversification of forest activities from timber into ecotourism, fish farms, and payment for environmental services are also seen as avenues to maximize the community forest benefits.

Associations emerging out of the experiences of the collective struggles against the timber and forestry service concessions have a decidedly more autonomous and self-emergent character than previous government-created production cooperatives from the 1920s and 1940s (Merino, 2004). A new role is to gather market power through to physical capital, information, and government program funds while maintaining legal

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<sup>4</sup> "The structural adjustment in the eighties dismantled an elaborate system of public agencies that provided access to and, credit, insurance, productive inputs, and cooperative forms of organization. The expectation that by removing the presence of the State those functions would be retaken by private agents did not occur in many cases....Incomplete markets and institutional vacuums imposed enormous costs...", hindering growth and leading to loss of well-being for small producers, "threatening their competitiveness and, in many cases, their survival." (WB, 2008)

and political representation. For instance, *UNECOFAEZ* began providing price lists of different wood products and wages and offering *compra-venta* services, that is, serving as witnesses to timber contracts between communities and firms, all of which give communities more bargaining power.

The government also addressed the need for technical and production capacity-building by creating two important programs to support community forestry - PRODEFOR and PROCYMAF. PROCYMAF, a World Bank-sponsored project, has been hailed as a success in promoting vertical integration and product diversification in forest communities, although it is not without its critics (Delgado Ramos, 2004; Bray and Merino, 2004). The type of service given is determined by an assessment of the community's potential and advancement along the production chain, a categorization adopted by several government agencies, including PRODEFOR which funds mainly conservation and silvicultural activities with smaller amounts dedicated to industrial modernization (National Community Forestry Survey Data, 2004; Antinori, 2006 – CATIE presentation)<sup>5</sup>. PROCYMAF was renewed as PROCYMAF II to run from 2004-2007, and may not be renewed again.

In policy terms, the reforms begun in 1986 created a window of opportunity for the transformation of forest associations. The 1991/92 constitutional reform, the 1992 Forest Law and NAFTA in 1994 were significantly shaped by the previous experiences with the grassroots peasant and forest organizations,<sup>6</sup> and presented new opportunities and challenges. The 1992 Forest Law ended the technical forest service concessions while further deregulating the forest sector (Klooster, 2003; Merino, 2004; Silva, 1997). The constitutional reform of 1991/92 ended land redistribution, facilitated privatization of community land and intra-community division of forest activities, removed many of the government's political controls, and liberalized the land market, facilitating entrepreneurship amongst communities (Gordillo et al., 1997). This new policy setting deepened the contradictions characteristic of the 1986 policies. On one hand, a more autonomous community governance system (Gordillo et al., 1997) and an “unprecedented combination of communally-organized forestry and smaller local associations” emerged while, on the other hand, the legal reforms of the 1990s directly and indirectly undermined the system and related organizations (Taylor, 2001, p. 61; Wilshusen and Murguía, 2003). As a result, “the agrarian communities obtained more

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<sup>5</sup> The program provides supports under different categories to strengthen: (a) *social capital* - community planning and social organization, including Participatory Rural Appraisals (ERPs), development of communal statutes (rulebooks), and workshops between communities for sharing experiences; (b) *technical capacity*, including studies to develop/strengthen community land use plans (OTCs), community forest enterprises (EFCs), and inter-community production associations, training workshops and courses to improve forest management, and feasibility studies to define future community projects and diversification strategies; and (c) *diversification and investments in community silviculture*, including feasibility studies and the execution of such investment projects. The program also includes training of community foresters, strengthening the STF services hired by the communities, and other strategic actions. PROCYMAF is widely regarded as one of the most successful community programs worldwide promoting development and sustainable use of resources. See <http://www.conafor.gob.mx/portal/index.php?s1=2&s2=7>

<sup>6</sup> This was partly expected given that one of the architects behind the 1991-92 reforms was Gustavo Gordillo, who had been one of the founding leaders of UNORCA.

autonomy, but their abandonment was also increased” (Merino, 2004, p. 195), particularly through a marked reduction in government support.<sup>7</sup> In this context, non-state actors such as international agencies and donors became important sources of financing in some cases. For instance, in 1997, 12 small to medium-sized NGOs in Yucatan formed the Sustainable Development Network (ROSDESAC), with the help of a Small Grants program set up by the United Nations Development Program (UNDP) and the Global Environmental Fund (GEF) (Wilshusen & Murguía, 2003). The network sought to “scale-up” activities to strengthen community-level organizations. In addition to the reforms, the 1994 economic crisis was a significant structural challenge to the new economic-oriented associations formed in the 1980s and 1990s. Some associations, particularly those focused on providing credit, did not have financial insurance against price devaluations or inflationary processes, and as a result many of them lost their patrimonial capital after the crisis and eventually dissolved (Gordillo, personal communication).

For existing associations, the changes demanded modification in services offered, and, thereby, membership rules and forms of organization. In general, one can talk about a transition from an open membership of initial associations typical of social movements to a closed membership of economically-oriented organizations which require membership fees or other forms of entry restrictions to fund services requiring expertise or physical capital (Bebbington, 1996). A case in point is SEZARIC, created in 1990 by *UNECOFAEZ* as a production cooperative to buy raw material from communities at premium prices and process and sell wood products. *UNECOFAEZ* had been instrumental in obtaining retired equipment from PROFORMEX after it ceased operations as a parastatal. In this sense, *UNECOFAEZ* decidedly engaged the issue of developing self-productive capacity and promoting vertical integration among its members. Membership was originally about 40 members who, as a condition of membership, contributed either raw material or capital as stock for the cooperative. In return, members receive a share of the SEZARIC’s profits. SEZARIC owns a fleet of trucks and extraction equipment which it lends or utilizes for communities in harvesting. Membership is now closed though SEZARIC buys from any community (PST in Santiago Papasquiario, personal communication as part of Survey interviews, 2007). In his case study of *UNECOFAEZ*, Taylor (2001) argues that the introduction of economic objectives under SEZARIC competes with its social and political objectives, and as a consequence, *UNECOFAEZ* has shifted from a primarily-grassroots movement to a more centralized and less participative organizational structure characteristic of a business enterprise. He claims that while the economic model has strained *UNECOFAEZ*’s legitimacy among the membership, the organization increasingly depends on this economic model to produce benefits which maintain legitimacy.<sup>8</sup>

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<sup>7</sup> It must be noted however, that in comparison to other Latin American, Mexico has a very high percentage of the national public budget dedicated to rural development, and a very low percentage of rural development comes from NGOs.

<sup>8</sup> At the same time, new or renewed associations faced continued pressure to maintain their autonomy and self-management capacity *vis a vis* the national peasant organizations, which saw them as units of potential political influence (Arguelles & Gonzalez, 1994).

Similar challenges have arisen for forest associations mainly providing technical forest services. In a case study in Quintana Roo, Taylor and Zabin (2000) note how one such association struggles with maintaining cohesion with the emergence of intra-community work groups which challenges representation within the inter-community body and the ability to design regional forest management plans. Secondly, with the liberalization of forestry services, some communities have left to hire their own forester, reducing the FAs main source of income, a pattern also noted in Guerrero (*UEFA*) and Oaxaca (*UCEFO*). This trend places more demands on STF FAs to provide the benefits promised to their member communities at a low cost.

*Fourth phase (2000 to the present): Recentralization of control over forest resources?*

In the context of the political and scholarly debates about the impacts the 1990s reforms have had on local self-governance, in 2000 the government expressed its worries about what it perceived as a 'lack of organization' at the local level, a continued deforestation problem, and lackluster timber production (CONAFOR, 2001).<sup>9</sup> The government's strategic plan proposed increased investment in local organization, promotion of the private sector, and increased productivity, efficiency and sustainability in forest management. The 2003 forest law (LGDFS, 2003) reflected this concern. In it, the government mandated the National Forest Commission (CONAFOR) to "*generate the structures of forest users at a local level with a self-managing character*" so that they are receptors of CONAFOR programs and to "strengthen the organization and participation of forest users in decision-making regarding their uses [of the forest], and in the definition and instrumentation of national policy on forest matters...".<sup>10</sup> These regional organizations were defined as Regional Forest Management Units (*Unidades de Manejo Forestal Regional* (UMAFORs)) tend to focus on environmental services as a public policy goal. The assistance given to communities seeks to build community capacity as stewards of important forest lands which are indeed vulnerable to high rates of deforestation. UMAFORs are defined as "representing" 30% of the forest owners within particular region, usually delineated along ecological zones, and thus can coordinate cross-community interdependence in a biological sense. In the pyramidal structure being implemented, the basic units of "forest producers" are organized and planned around UMAFORs, further grouped into state organizations, in turn grouped into national (inter-state) organizations (Martínez Tenorio, Garza Bueno, & Ramírez Moreno, 2005). This approach raises the question of which associations will continue to survive to also meet the needs of communities for integrating and maintaining a market presence should they seek to combine their conservation efforts with commercial harvesting.

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<sup>9</sup> As stated in the *Strategic Forest Plan for Mexico, 2025* (CONAFOR, 2001): "the investment in social organization has been halted and has been insignificant since 1992. This has propelled a deterioration of silviculture organizations. Many of the organizations that remain have serious difficulties to respond to the new challenges of silviculture. In order for the process of capture of the forestry potential in Mexico to continue, it will be necessary to make an important economic and political investment during the coming years to recover the organizational infrastructure which the country's silviculture requires." (p. 44)

<sup>10</sup> Taken from the website of the CONAFOR (<http://www.conafor.gob.mx/portal/index.php?s1=3&s2=10>); translation by Garcia Lopez; emphasis added.

Following these statutory provisions, CONAFOR started the *PROFAS* program in 2004 to provide support for forest associations at the regional, state and national levels.<sup>11</sup> Associations that join this program must perform an extensive list of legally-sanctioned activities.<sup>12</sup> The design of this policy gained the participation and support of important third level forestry associations (e.g., Red Mocaf, UNECOF, UNOFOC), and was initially heralded as a victory for the existing grassroots movement. However, data from a recent CONAFOR-commissioned evaluation showed that the vast majority of the policy's funding has gone to the establishment of new, state-mandated FAs rather than existing ones (Martínez Tenorio et al., 2005). In addition, CONAFOR has pushed for recognizing only one association to receive funds and act as exclusive representative of each level of governance (UMAFOR, state, national). In this context, the third level associations that initially supported the policy now decry it as an attempt to establish clientelist "paper associations" which appear as representative of regional interests but which are only responsive to the central government (Red Mocaf et al., 2005). Given the recent establishment of this policy, it is still unclear what its effects on forest associations will be in the long-run. Yet the emphasis on a pyramidal structure is not generally compatible with many existing associations formed through a bottom-up, autonomous, decentralized/network-based process. These centralization efforts parallel the 1970s when the PRI grouped peasant unions under the *CNC*, and they open the door for the re-establishment of clientelist-paternalist structures. Some political commentators believe this is a strategy of the new ruling party (PAN) to take control of the still-dominated rural areas of Mexico (Gordillo, personal communication). At the same time, this proposal may be thought of as a way for government to reduce transaction costs in their channeling of funds to local actors, but perhaps most importantly, in the monitoring and enforcement of forest regulations, in which the associations are now expected to participate, to implement quality control and efficiency in activities deemed important for sustainable forestry.

Finally, we must also consider that the current phase also represents the solidification of broader neoliberal policies. First, NAFTA will enter into full effect next year, which means agricultural support policies will end. Second, the central government may not seek PROCYMAF renewal, thus removing what has been an important support for communities in developing their forestry activities.

### III. RELEVANT LITERATURE

The basis of our research for this paper is by nature interdisciplinary. First, we integrate concepts from the "commons" literature on cross-scale linkages (Ostrom, 1990, 1999; Berkes 2002; Young, 2002). The Mexican FAs exist between the community-level

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<sup>11</sup> These supports focus on the organization, training, and legal constitution of associations (mostly at UMAFOR level); "capacity development" for existing associations through workshops, seminars, etc.; technical advice, operational costs, and acquisition of basic equipment (e.g. computers); and regional or national studies for integration of regional chains of production (mostly at national level).

<sup>12</sup> These include adoption of silviculture; conducting conservation and restoration practices; prevention, control and combat of fires, plagues/diseases, and illegal logging; production of plants; presenting periodic reports; etc. See Art. 112 of the LGDFS. Taken from <http://www.conafor.gob.mx/portal/index.php?s1=3&s2=10>; translation by Garcia-Lopez.

institutions and state-level agencies and operations. Their motivation to form, especially for the grassroots associations, has often been precisely to scale up operations to affect change in operational, collective choice, and constitutional rules and policies. Common property forestry in Mexico exists within a constellation of nested enterprises whose actions, however, are not always coordinated. The previous historical section described the interplay of conflicting interests since the forties regarding control of forest resources. At times, the different institutional levels have been more disjointed than nested though they nevertheless affect behavior across scales.

Second, the extensive literature on associations and cooperatives allows us to evaluate the challenges experienced by a broad range of networks. One definition of an association is any type of organization with a formal structure in which people with a common interest join for collective action (Anderson, 2003). Cooperatives are one type of association and usually refer to those associations organized as a type of business. Forestry cooperatives, also called landowner cooperatives in the US context, conceive of landowners as producers of timber and other valuable forest resources and services. In the present case, landowners are defined as community members who own a forest as a group. In this sense, inter-community forest associations face a double collective action problem: first, at the community level where members must jointly agree to join the association, approve associational activities, etc., and second, at the inter-community level where community representatives must function collectively to maintain the association. A “secondary” association can be defined as an organization of forest communities working together to accomplish joint activities and/or objectives with rules, policies, and/or guidelines (see IFRI, 2005). Some also think of associations as networks (Shrestha & Britt, 1998), but this is a more limiting definition since the FAs in our study have more formal organizations.

The long literature on cooperatives assesses why cooperative organizations emerge and the challenges they face. Cooperatives have usually been understood as a response to market failures such as imperfect competition, excessive concentration of power, and unmet demand for goods and services (Fulton, 1999)<sup>13</sup>. The formation of forestry coops in the US, for instance, is seen as the result of landowners’ dissatisfaction with the current forestry assistance programs provided by both private companies and the government (Tiles et al., 2004). Commonly shared experiences and pressures from town governments and churches have also stimulated cooperatives (Barten et al., 2001). We use this literature to guide analysis of Mexican FAs services and how the governance structure within the associations themselves affects their ability to meet needs of their stated constituency.

Most writings on cooperatives focus on their economic benefits (Sexton, 1986; Schrader 1989, in Anderson, 2003; Ashton, 2006; Tiles et al., 2004): addressing market failure (reducing monopoly and monopsony); generating economies of scale and lower

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<sup>13</sup> One such example might be the agricultural coops developed by the *Movimiento de los Sin Tierra* (MST) in Brazil (see Ying, 2003), where the national government –captured by the special interests of the *hacendados*, has failed to establish equitable land ownership.

transaction costs; promoting vertical integration; facilitating access to better-priced supplies and more secure markets, and to additional resources such as grants and loans at below-market rates, and free and subsidized assistance from government, academia, and NGO; gains from coordinating aspects of production; reducing risks (by pooling resources and stabilizing returns); and increasing groups' market power and/or profits (related to economies of scale and vertical integration). These benefits stem mostly from the coordination of production aspects, the pooling resources and information and the sharing costs, the collective marketing and processing of timber and non-timber products, and the provision of services previously unavailable or unaffordable, such as forest management services underprovided by government and markets.

In the ecological dimension, associations and cooperatives themselves can coordinate land management across boundaries (Richenbach; Ashton, 2006). Larger contiguous areas offer opportunity for long-term and ecosystem or landscape based-management and allow forestry decisions to be based on stand boundaries rather than political considerations (Richenbach; Anderson, 2003).

In social terms, a body of literature has focused on the positive effects of associations and cooperatives on community economic development (CED) (Zeulil & Radel, 2005; Trechter & King, 2001; World Bank 2008; Cooperative Research Inventory Project, 2003). Coops can promote individual 'self-help' and build human capital through training, education, and leadership development, and they can also strengthen local institutions, cultural identities and economies in the face of rapid macro-scale changes such as market liberalization (Anderson, 2003; Ashton, 2006).

Challenges facing forestry associations and production cooperatives have been duly noted. Factors identified as causes for failure have affected Mexican FAs, such as the diversity of small and non-industrial private forest lands (Staatz 1983; Anderson, 2003); a decline in the benefits of cooperation as markets improve and some members are able to 'go on their own' (Miyazaki, 1984; Tiles, Rickenbach, Sturgess, & Zeuli, 2004). Economic and financial limitations emerge: lack of start-up capital, capital formation problems, and limited production and markets. Production cooperatives are known in general for their tendency to self-finance less and underinvest as compared to private corporations (Furbotn and Pejovich; Estrin and Jones). Problems of ownership and control within the organization commonly arise, such as lack of experience and conflicts over management and leadership (Vitaliano 1983; Anderson, 2003; Ashton, 2006; Tiles et al., 2004; Trechter & King, 2001), insufficient communication between user groups, and issues of representation and negotiation (Zusman 1982; Shrestha & Britt, 1998). A case study of an NGO network in Mexico's Yucatan Peninsula focused on sustainable development gives examples of the myriad paths to organizational failure (Wilshusen & Murguía, 2003). In one case, an NGO with high levels of project implementation efficiency, community representation, and goal commitment failed because of organizational instability, due mainly to insufficient resources. In another case, an NGO with highly stable and efficient organization failed because of low goal commitment and low community representation, mainly because of low levels of professional training and competition from another service provider. The study underscores the importance of

rules for membership, collective decision-making, and compliance, which served to stabilize participant expectations around a set of common objectives, creating 'boundaries of legitimate governance' (Young, 1989). Ashton (2006) describes the general failure of forestry cooperatives in the US relative to farmer cooperatives, due to inadequate capital, insufficient interest, lack of business and poor management even though stated goals of formation are access to technical services and better prices for timber (pp 13-14).

Thirdly, we explore the effectiveness of top-down versus bottoms up organizations based on the widespread dissatisfaction with decentralization policies and general observation that bottoms-up organizations tend to function more effectively in this regard. Devolution has met with serious obstacles in delivering promised benefits to stated beneficiaries (including economic improvements, democratization, resource ownership). We seek to shed light on the question of whether current trends in Mexican forestry associations are in the direction of greater "centralization through decentralization", that is, a tendency for central government actors to use decentralization policies as mechanisms for recentralization through the devolution of insufficient powers (Ribot et al., 2006) and the reconstitution of local representation (Garcia-Lopez and Kashwan, 2008). Merino (2004) and others have emphasized that strengthening a community's access to their own resources has been paralleled by a closing of options through restriction of funding, change in policy focus and policy changes elsewhere which limit community development efforts to benefit from those natural resources. Bebbington's analysis (1996) reflects a similar trend in the Andes and Amazon by documenting the capacity of rural organizations to represent communities, their changing character over time in response to marketing and production needs, and ability to offer services neglected by the state, private and NGO sectors. Evidence shows that bottoms-up style associations consistently deliver services more effectively. In the context of decentralization policies, Faguet (2002) found strong evidence from Bolivia that local governments improved well-being in their jurisdictions after drastic decentralization policies were implemented. Top down efforts may be motivated by goals other than CED or miss key local information that allow programs to be effective. Rickenbach et al.'s (2006) distinguishes voluntary and non-voluntary associations and their program goals.

Associations in Mexico can be understood in light of these interdisciplinary theoretical and practical observations. They initially responded to government failure to secure their property rights under the concession system and market failures from monopsony power of concessionaires and the continuing transaction costs of highly incomplete information and unequal bargaining powers. The evolution of these associations and emergence of new ones in the 1980s could be interpreted as an attempt to increase information-sharing (e.g. price lists), reduce transaction costs of timber sales, increase bargaining power (get better prices for timber), improve productive capabilities (e.g. vertical integration, product diversification), coordinate activities such as road building and maintenance (crucial not only for access to the community but for the timber economy), and seek more resources for communities from government and other sources. A concern is that recent program activities turn back into clientelist



arrangements where the government finances the top-down creation of new forest associations to serve as representatives of all forest users in the region and therefore gloss over heterogeneous needs.

#### IV. EMPIRICAL ANALYSIS

The data comes from the National Survey of Community Forests of Mexico project funded by the Ford Foundation. Forty-one surveys were conducted in randomly selected forest communities, with and without timber production activities, in Durango and Michoacan between November 2005 and April 2007.<sup>14</sup> Informal interviews were also conducted with key informants in government agencies, forest service providers, and NGOs. Most surveys were carried out with at least the community authorities, although the size of the group present varied substantially, in some cases being more like participating in a general assembly. Survey interviews lasted three to four hours and covered a broad range of topics related to community forestry, amongst which was a section on inter-community associations. The majority of surveys were administered in the community.

All of these associations are *secondary-level* associations. We do not include here higher-level associations such as networks of secondary associations or federations (associations of associations), although some of the associations in our sample are integrated into such organizations. For instance, both *UNECOFAEZ* and the *Union de Ejidos y Comunidades Forestales (UNECOF)* are part of the national-level *UNOFOC*, and *UNECOFAEZ* also received help from both *UNORCA* and the *Mocaf Network* (also national-level organizations described in the history section) in their struggle against the concessionaires. Also, both the *Asociación de Silvicultores del Huehuento* and the *Asociación de Silvicultores y Productores del Norte de Durango (ASOPRONOR)*, recently created, are part of the National Confederation of Organizations of Silviculturists (*CONASIL* in Spanish). As discussed in the history section, there is ongoing debate about the role that these new associations and their national entity are playing in the organizational space of forest communities. We return to this issue below.

We divide results into three parts. The first combines information on the full list of forestry associations and looks at the different types of services they offer. The second analyzes the systematic differences between bottoms-up and top-down associations. The third uses regression analysis to evaluate the impacts that associations have on their member communities in terms of different 1) membership in a FA, 2) whether the FA is BU or TD, and 3) the FAs focus of services to the community.

##### *Basic characteristics*

Community representatives identified which services the association offered and which they considered the most important from their point of view. Table 1 presents the full list

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<sup>14</sup> See Antinori et al. (2008) for full description of project and data summary statistics.

of associations mentioned in our survey along with the service that communities identified as most important and the association's asset base. Since communities in our survey sometimes belonged to the same association, more than one "main" service may be listed. The list illustrates not only the wide variety of services offered, even among the same association but also the ranking of needs among the communities. Services which communities identified as most important include commercialization of wood products, technical forest services (STF), political and policy representation, accessing financial resources, market search, legal advice, purchase of timber, road building and maintenance, and forest management activities (conservation, reforestation, restoration).

We also see that a limited number of associations have capital reflecting that few associations are production cooperatives involved in upstream or downstream markets. Assets include ownership of: land or office space, forest inventory equipment, extraction and secondary processing equipment, and "other" assets.<sup>15</sup>

The basic characteristics of communities in a forestry association are depicted in Table 2. Almost all the communities reported being a member of an association, and about half of this number reported membership in at least one other forestry association. The number may represent a lower limit, as we later learned that some communities were not aware as yet that they were members of the pyramidal state associations.

Durango has significantly more communities as members in a FA, given its predominant history of political movement. This effort was replicated in other states but seems to have persisted in Durango through longer lasting membership in original forestry associations. In fact, many communities were long-time members of the original FAs which formed to change the concession-era policies, as is seen in the significant correlation between association membership and past "anti-parastatal" association. Vertical integration evolved with membership in a forestry association, as most became members first and then later acquired the capital to integrate downstream. Now, more integrated communities are more likely to be members of FAs. This result may also be related to the finding that those with larger forests are significantly more likely to be members in a FA.

FA membership is positively and significantly associated with both greater degrees of trust within the community and a broader network of local groups within the community (not shown).<sup>16</sup> While the result is consistent with the much of the literature on networks and on social capital, analysis awaits a clearer statement on the direction of causality.

Continuing with the historical perspective, Table 3 shows the associations in our sample, organized by state, membership size, year formed and origins. The origins of the association are coded as either bottoms-up (BU) or top-down (TD). The BU-type is assigned to associations which the communities said were formed by solely grassroots,

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<sup>15</sup> Later analysis will collate the "other" responses and test for any historical patterns.

<sup>16</sup> Social capital measures were constructed from a series of questions ranking views on situations of trust and social coherence among community members and a series of questions on networks within the local community. A higher overall score represents higher degrees of trust and network relationships.

i.e. community-motivated, efforts. We assigned associations to the TD category if communities classified the motivating forces as other than purely community-motivated (e.g. government, forest service providers (PST), “other”). Thirteen out of the 19 associations (68%) in our sample claimed to have formed out of a grassroots process. Certain patterns are significant statistically (Table 4). Older organizations tend to be BU while almost all of the newer organizations since 2000 are TD, which reflects the new government policy and corroborates the previous evaluation in our historical overview that most of PROFAS funds went to new associations rather than existing ones. On average, BUs are larger in membership numbers and meet more frequently.<sup>17</sup> Significant correlations appear between dummy variable indicating if the community received a particular service from the association (not necessarily the “main” service as above). We find that BUs significantly more often provide regional communication services (i.e. roads and radio networks), political representation, legal assistance and marketing information (e.g., contract monitoring and price lists for hired labor and wood product categories) and applying for government program funds.

To test the assumption that a different set of factors explain membership in a forest association broadly defined versus a BU association in particular, we separately estimated the FA membership dummy and the BU dummy on various community characteristics using the generalized linear model of the binomial probit. Independent variables included forest size, various population density measures (i.e., persons per total hectares, ejidatarios per forest hectare, persons per forest hectare, measures of trust and within-community organizations, distance from towns, and past membership in a parastatal-busting association.

Remaining issues such as endogeneity and omitted variable bias will be addressed in future versions of this paper, so the results which follow should be seen as first approximations. However, given our efforts here to avoid endogeneity and multicollinearity, we find that only *size of forest* and within-community *social networks* explain FA membership (results not shown). Size of forest remained particularly robust as we alternately added the various population density measures. This first approximation points to different dynamics driving formation of and membership in BU organizations. BU membership is positively explained in univariate models by size of forest, past membership in a parastatal-busting association and social capital/trust, yet none of these three variables remain significant at conventional statistical levels of 10% level or better in multivariate regressions. Therefore, while FA membership in general is associated with communities with larger forests and greater intra-community social capital, the empirical analysis revealed no other significant pattern of variation. Given the political context of FA formation over time, it is possible that the broader political process may have motivated communities overall to join an FA, in addition to any particular interests of each community given their characteristics.

### *Association Services*

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<sup>17</sup> Meetings are commonly in the form of general assemblies of representatives from the member communities.

Bebbington (1996) distinguishes between four types of peasant federations: those focused on political activism and ‘representation’, those focused entirely economic activities, those focused on economic activities but also linked organizationally to a political organization, and those focused on accessing resources and channeling them to their members. In our surveys, communities were asked to state which services they received from their association. The responses included fourteen types of services.

The list of services raises the question of how to distill the information for meaningful analysis. We turn to principal factor analysis (PFA) to detect relationships among services. Principal factor analysis identifies correlations among a set of variables and groups them according to their directions of variation. Each grouping, called a factor, assigns a weight to the factors according to its relationship to that group. Applied to our dataset, assigns scored coefficients to each service, representing whether the community said they received a service from the association.<sup>18</sup>

Table 5 shows the scored coefficients based on the varimax rotated factor loadings from a principal factor regression. They represent the 46 (since communities could be a member of more than one association) instances in which membership in a distinct forestry association was acknowledged by the community and for which data was collected through additional survey questions. The seven factor scores represent the factors with the highest eigenvalues, i.e. the factors that capture the most variation in the data. The first factor loads most heavily and positively on legal and political services and negatively on PST services, protection, radio communication, and monitoring. We call this the *political-legal representation factor*. The next factor we label *the environmental services factor* as it loads most heavily on protection and nurseries and capacity building that may be oriented towards protection services, while negative scores on legal/political and some of the commercially-oriented scores show the distinction orientation of these associations. The third factor loads most heavily on providing *price information and contract monitoring services*, so it serves to fill the market information gap. The fourth factor groups committees which provide *radio communication or road infrastructure*, to the exclusion of most of the other services except for, surprisingly, nurseries.<sup>19</sup> The fifth factor draws out services for *timber extraction and marketing*, as distinct from PST or environmental services and channeling funds from government programs. The sixth factor may be labeled the *PST factor* as it picks up the services associated with PST organization, i.e. is the silvicultural services and management planning, nurseries and capacity-building which may be oriented to maintaining forest for production. Finally, the seventh factor might be called the *capacity-building and funds factor*. FAs which score high on this factor focus on channeling funds for local projects and offering capacity-building workshops, most commonly for forest management, e.g. silvicultural/stand improvement, soil

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<sup>18</sup> See Mardia et al. (1979) for a full description of the model and technique. In our ongoing research, results from the principal factor model will be compared with the principal component model.

<sup>19</sup> We attribute nurseries’ positive coefficient score to the mandatory nature of reforestation as well as the practical production phase of replanting in ongoing production activities. The government requires a set amount of reforestation to occur in each community with numbers of plants specified depending on the management plan. Sources of seedlings include professional foresters, production associations, conservation-oriented associations and, apparently, with radio and road FAs.

conservation and restoration, and fire prevention and control. Budgeting and accounting training or services shows up rarely overall.

As a number of communities are members of the same association, we can also use the information on services provided to each community to assess whether services vary across communities in the same association. As an example, Table 6 illustrates factor scorings for *SEZARIC*, *UNECOFAEZ*, *UPSE El Salto*, and the *Union de Ejidos Carlos Salinas de Gortari*.

*SEZARIC* is most associated with *price information and contract monitoring* (factor 2) and *timber extraction and commercialization* (factor 4). There is also great variation in these services across communities. Not all communities may avail themselves of *SEZARIC*'s full services, despite being members, though all members share in profits.

*UNECOFAEZ* has a broader scope of services as shown by the larger number of positive averages across factors than *SEZARIC*. However standard deviations from the mean tend to be large as well, indicating variation across communities as to whether they perceive that they receive these services. Part of this variation can be explained based on the large area covered by the union, which implies that some communities are very far removed association's headquarters. For instance, at least two of the member communities in our sample very clearly stated that they do not receive any real services from *UNECOFAEZ* due to their distance. For one thing, the price list that *UNECOFAEZ* puts out is not useful for them because they sell in Parral, Chihuahua, and the prices in Chihuahua are overall higher than anywhere in Durango. For the same reason they do not sell to *SEZARIC* since even after taking into account the premium by *SEZARIC*, it is more profitable for them to sell in Parral.

The factor scorings for the *UPSE El Salto* in Durango reflect their main services as professional forestry, with relatively little variation across communities. They have a surprisingly high score on political/legal representation, though variability is high across communities. To a lesser, and also variable degree, they provide some extraction/marketing services and training/fund-raising. The variation is to be expected for STFs. While the main role of STFs is to design management plans for timber and non-timber activities in the forest -usually including action plans for conservation, reforestation, and restoration- the role of the forest management associations is to actually carry out these activities. At the same time, STFs are diverse in their capacity (size, resources, experience) and objectives. While some service providers focus only on designing the plan, others are more active in informing about or channeling resources, providing training for fire prevention and combat, soil restoration, and enhanced silvicultural practices.

The FA, *Union de Ejidos Forestales Carlos Salinas de Gortari*, in which three sample communities are members, focuses mainly on the factor related to training and channeling government program funds, as seen by the positive sign only on factor 7 and negative scores on all other factors. The greatest degree of variation across communities is whether they provide legal and political representation. This appears to

be a more politically guided organization with an eye towards linkages with state and federal programs.

Finally, Table 7 below shows the correlations between the bottoms-up types of associations and each of the characteristic services offered by the association organized by factor analysis. The BU dummy correlates positively with all factors except environmental services (f2), STF services (f6) and capacity building/channeling project funds (f7).

### *Impacts*

To test the impacts of association membership, type of association and services received by communities, we regress a set of community-level performance indicators on dummies for association membership, whether the association is TD or BU, services received by the community according to the scorings for the associations in which the community is a member, and a set of exogenous community characteristics. Should a community be a member of more than one association (15 in our sample), the factor scores take the maximum score recorded between the two associations. The vector of community characteristics include size of forested hectares (logarithmic scale), distance from closest populated center of 500 people or more, and person/hectare ratios for total and forested hectares. The population data is taken from the 1990 INEGI Census to reduce endogeneity of population size and changes with our performance measures from the 2005 surveys. Generally, the linear model estimated, either by OLS for continuous variables or binomial probit for dummy impact variables takes the form:

$$Impact \sim X'B_1 + Z'B_2 + e$$

where *Impact* is a vector of the observed economic, social and environmental performance variables for each community observation. *X* is a vector of association characteristics to be alternately used as independent variables to explain performance. These variables in *X* are a dummy for membership in an association, a dummy as to whether the FA is TD or BU, and the seven service factors described above. Estimations using the association membership TD/BU dummies make use of the full set of 41 survey observations while estimations using services delivered make use of only the 32 communities in associations where we may observe these services.<sup>20</sup> The vector *Z* includes community characteristics as described in estimating FA membership above. *B*<sub>1</sub> and *B*<sub>2</sub> are the estimated coefficients and *e* is the vector of error terms.

*(Full results available from authors)*

*Access to credit.* As only seven of the communities in the sample of 41 received credit from commercial banks (including BANRURAL) for forestry operations, there is little explanatory power among the set of association and variation in the data, even though six of the seven are in an association.

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<sup>20</sup> Our ongoing analysis will develop more precise econometric models, such as two-stage estimation, to allow fuller use of the dataset.

*Government funding:* Testing a simple correlation between association membership and receiving government funding from any of PROCYMAF, PSAH or PRODEFOR, we found a (surprising) negative relationship significant at the 10% level. The relationship with BU FAs is nonsignificant. The results may reflect that associations reduce the need for government funds by diversifying their funding sources. For example, the ROSDESAC sustainable development network in Yucatan, to maintain a stronger political and financial autonomy, purposefully sought multiple funding partners in addition to the government (Wilshusen and Murguía (2003). Nevertheless, the statistical relationship does not hold in the probit regression of government funding on the FA dummy and other community (Z) characteristics. Nor did any of the service factors explain receipt of government funding. We also tested the hypothesis for receipt of non-forestry government funds, such as temporary employment, but the model is insignificant. Factors other than FA or Z (including distance to towns, population density and size of forest) characteristics determine receipt of government funding.

*Prices for wood products:* To examine whether association membership or services received translates into better prices for goods sold, we measure the deviation from the mean price in the wood product category for the product sold by that community. As noted above, averages are positive (i.e. above the mean) for association membership and negative for non-membership, but the large degree of variation dilutes any significant difference. This result carries through to the regression analysis where only size of forest and a higher person/forest hectare ratio positively and significantly explain higher prices. One interpretation is that the historical evolution of forestry and the role of FAs have been successful in making market information generally available and allowing communities to negotiate freely in the market. Most actors interviewed, including community and association leaders, foresters, NGO actors, and one timber merchant, emphasized the historical (and for some also current) role that associations played in improving timber prices, with, for instance the price list and overall negotiating conditions for communities, like requiring that local workers be hired from the community for stumpage contracts.<sup>21</sup> Deviations could be better explained by idiosyncratic differences across communities not captured in the data or the specifics of contract clauses that differentiate further the goods and services traded.

*Reinvestment in forest operations:* Association membership is positive and significant while the person/forest hectares ratio is negative and significant for reinvestment in forestry operations. This confirms the information gathered in field interviews with association leaders and foresters whom have spent much effort in trying to convince member communities to refrain from the common practice of distributing all profits equally among members as in cash payments. Reinvestment is seen as a strategy for long-term economic performance and possible vertical integration.

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<sup>21</sup> This information is often transmitted through word-of-mouth among neighboring communities, and it is crucial when such communities are selling to the same buyer. Before, the buyer could cheat communities to sell at a much lower price than the quality of their wood merited because they had no way of knowing at what price the company had bought wood with similar quality from previous sellers. Now communities use the price list and previous sales as indicators of the 'going price'.

*Public goods – schools:* Association membership is positive and significant at the 5% level while a higher ratio of persons to forest hectares is negative and significant. This again confirms our interviews, where we learned that schools are often supported by the community through an annual payment administered by the executive committee.

*Conformance to forest management practices:* We created a principal components factor that captures rule conformance across characteristics of: readiness to response to fires, contraband harvesting and severity of forest clearing. A higher score represents more adherence as a community to better management practices. While the association and BU dummies were insignificant, an OLS regression showed that if the community receives political/legal services (factor 1), conservation assistance (factor 2) or radio/road service (factor 4), they have a higher “rule conformance” score. An interpretation for the result for political legal services is that it is correlated with greater connection to oversight and consciousness of best practices. Meanwhile, the radio and road committees often have as their purpose quicker and more efficient response to fires, but also may facilitate better communication for forest monitoring.

*Biodiversity:* From the literature reviewed in Section III, we expect that associations will improve ecological conditions in their membership by promoting regional planning, sharing training and best practices. To measure this impact, we used a graduated dependent variable of biodiversity which takes discrete values from 0 to 5, where 5 is the reduction in animal abundance observed over the last 10 years, estimated with OLS. Association membership provides negative explanatory power, meaning that membership is correlated with more biodiversity. The BU dummy (in separate regression) is insignificant. In another separate regression, the services which contribute to greater abundance are: political / legal (factor 1) and conservation services (factor 2) as is consistent with the rule conformance result above. However, the training and channeling funds services (factor 7) is related to less biodiversity, as measured. In future work, we will explore possible endogeneity issues as some programs may be targeted to “problem” areas.

## **V. DISCUSSION AND CONCLUSIONS**

Can the cross-scale linkages help the special forestry sector survive economically in Mexico while simultaneously improving environmental management? This paper examines the factors behind both inclusion and exclusion in forestry associations from the parastatal timber leasing program through the transition to greater local control over forest resources. The history of forest associations in Mexico shows an evolution influenced by grassroots organizational processes and national-level changes in policies and in political and economic conditions. From original struggles for land and autonomy, these associations played a role in the sustainable management of common-pool resources in Mexican forest communities – including not only the technical aspects of forestry but also the political and the economic components. Therefore, the form of the cross-scale linkages evolved into a type of social community movement and to national-level policy domains and a more diversified set of linkages to other



communities, other associations, forestry services, and market actors. Understanding the role of these associations is essential, given that extent of agricultural and forest resources these communities represent. Continuing questions for policy makers and actors in the FAs are whether the government can fill in market and legal lacunae and/or work more effectively with existing FAs to deliver services, what political constraints can be lessened and what alternative institutional FA models can better address member concerns.

The preliminary results above show that forest associations have important positive impacts on their member communities. First, membership influenced investment in both forest operations and public goods (schools), conformance to forest rules, and fauna biodiversity. FAs are positively related to (possibly) higher wood product prices and greater social capital within the community in terms of trust and intra-community associational life. These results conform to previous ones from literatures on cooperatives, networks, and rural associations.

We also see that these impacts are conditioned by the type of association and type of service provided. Regarding the type of service, rule conformance and biodiversity were shown to be higher for communities in associations that provide services associated with legal-political lobbying and conservation, and rule conformance was positively affected by the provision of road and radio infrastructure services. Whether the association is BU or TD does not affect rule conformance or biodiversity, but relate to governance (e.g. more frequent meetings), and more frequent provision of regional communication services (i.e. roads and radio networks), political representation, legal assistance and marketing information (e.g. contract monitoring and price lists for hired labor and wood product categories).

As emphasized, these results are preliminary as we are at the early stages of our analysis. Yet we illustrate services which associations provide and the possible impacts their activities can have on community-based forest management in Mexico. Some questions remain. First, if bottoms-up organizations possibly struggle with maintaining legitimacy in the long run yet can deliver services across a broader set of needs and the TD organizations serve an important but narrower set of needs aimed at environmental public policy goals, where does this leave efforts aimed at poverty alleviation? Are the TD associations a form of clientilistic re-centralization or focus which neglects the needs of agrarian communities as economic units and do they continue the appropriation of resources through restriction of access by lack of support?

The overall story cautions against the current trend towards top-down arrangements that substitute existing associations with new ones which are expected to carry out a homogenous set of activities without necessarily addressing needs or objectives of the communities they purport to represent. Looking back at the history of community forestry and forest associations in Mexico may help us understand the current policy in the context of a legacy of paternalism in which the state established strong controls on associational life. In this context, it is important not only for associations to have spaces for autonomy and self-governance, but also for associations themselves to be pro-active in the creation of these spaces. One way pointed out by Wilshusen and Murguía (2003)

when associations are seeking financial support is to obtain as large a pool of donors possible and then to establish contracts with different actors in which the roles and expectations of each of the parties are clearly delineated. Our future research will also explore the governance structures of the FAs themselves to examine the link between incentives and services offered, as FA models continue to struggle with the challenges of collective action. Forming part of a decentralized network of diverse actors which may include not only communities but also NGOs and other rural associations at the national level can be highly productive for obtaining representation in important national policy-making processes. Such was the case with the 1997 Forest Law and the associated creation of PROCYMAF and PRODEFOR, both the product of strong lobbying by several national-level associations representing community interests (Bray and Merino, 2004) and the PROFAS program. History shows the importance of political struggles and mobilization by social actors in the defense of these spaces. At the same time, it raises the question of how the business end of forestry will be supported through FAs, and if BU associations can continue to be up to the task.

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**Table 1. Associations noted by Survey Communities**

<b>NAME</b>	<b>State</b>	<b>Main service</b>	<b>Main assets</b>
UNION DE EJIDOS "JOSE MARIA MORELOS Y PAVON"	MICH	Commericalizing tool handles; agroforestry	NC
UNION DE PERMISIONARIOS DE LA UCODEFO NO.4 "LA VICTORIA-MIRAVALLS"	DUR	STF	Other
UNION DE EJIDOS Y COMUNIDADES FORESTALES (UNECOF) "EL SALTO"	DUR	Politics; Resource Channeling	Other
UNIDAD DE PRESTACION DE SERVICIOS EJIDALES (UPSE) "EL SALTO" (FORMERLY UCODEFO NO.6)	DUR	STF	Forestry inventory equip. + offices/land
UNION DE EJIDOS Y COMUNIDADES FORESTALES Y AGROPECUARIAS "GENERAL EMILIANO ZAPATA" (UNECOF-AEZ)	DUR	Market search; Legal advice; Nursery/Greenhouse	Offices, nursery, water purifying company, restaurant, industrial machinery (repair and manufacturing), restaurant.
UNIDAD DE PERMISIONARIOS FORESTALES NO.6 URUAPAN	MICH	STF	NC
UNION DE PERMISIONARIOS FORESTALES DE LA MESETA PUREPECHA	MICH	STF	NC
UNION DE EJIDOS FORESTALES "CARLOS SALINAS DE GORTARI"	DUR	Resource channeling	None
SEZARIC	DUR	Wood purchase (w/premium); Profits share	Extraction and processing equipment; offices/land; forestry inventory equipment;
UNION DE MANEJO Y ADMINISTRACION FORESTAL CD. HIDALGO	MICH	STF	NC
UNION DE EJIDOS RACIANO SANCHEZ	DUR	Resource channeling	None
ASOCIACION REGIONAL DE SILVICULTORES MESETA TARASCA	MICH		Forest inventory equipment; other
UNION DE EJIDOS Y COMUNIDADES SILVICOLAS DE DURANGO "GENERAL GUADALUPE VICTORIA"	DUR	STF	Forest inventory equipment; Other
ASOCIACION DE SILVICULTORES DEL HUEHUENTO	DUR	Road repairs/maintenance	Other
UNION DE MANEJO Y ADMINISTRACION FORESTAL	MICH	STF	NC
UNIDAD DE MANEJO FORESTAL (UMAFOR) REGION NORTE DE DURANGO	DUR	Conservation/restoration/reforestation	Other
CONSEJO REGIONAL FORESTAL 3 CUITZEO	MICH	Conservation/restoration/reforestation	NC
ASOCIACION REGIONAL DE SILVICULTORES TEHUIM	DUR	STF	None
ASOCIACION DE SILVICULTORES Y PRODUCTORES DEL NORTE DE DURANGO	DUR	Resource channeling	Other
ASOCIACION DE SILVICULTORES SAN MIGUEL DE CRUCES	DUR	Resource channeling	0/8 (Com. 37/38) (none/office/land)

**Table 2. Basic Association and Community Member Characteristics**

	Association Membership		
	No Col. %	Yes Col. %	Total Col. %
<i>State</i>			
Durango	22.2	81.2	68.3
Michoacan	77.8	18.8	31.7
Total	100.00	100.00	100.00
Pearson chi2(1) = 11.3028 Pr = 0.001			
<i>End Product</i>			
No commercial	44.4	9.4	17.1
Stumpage	33.3	40.6	39.0
Roundwood	22.2	31.2	29.3
Lumber	0.0	18.8	14.6
Total	100.00	100.00	100.00
Pearson chi2(3) = 7.0388 Pr = 0.071			
<i>Parastatal-era Assoc. membership</i>			
No	100.0	58.1	67.5
Yes	0.0	41.9	32.5
Total	100.00	100.00	100.00
Pearson chi2(1) = 5.5914 Pr = 0.018			
<i>Bottoms up</i>			
No	100.0	59.4	68.3
Yes	0.0	40.6	31.7
Total	100.00	100.00	100.00
Pearson chi2(1) = 5.3538 Pr = 0.021			
N	9	32	41
<i>Forested hectares</i>			
Mean (SE)	1123 (262)	6946 (1358)	5636 (1124)
<i>Distance from town</i>			
Mean (SE)	0.29 (0.08)	0.77 (0.20)	0.67 (0.16)

**Table 3. Forest Associations: State, Size, Year Formed and Motivation to Form**

NAME	State	Size	Year formed	Origins (BU/TD)
UNION DE EJIDOS "JOSE MARIA MORELOS Y PAVON"	MICH	9	1965	BU
UNION DE PERMISIONARIOS DE LA UCDEFNO.4 "LA VICTORIA-MIRAVALLS"	DUR	181 (private +comms.)	1966	BU
UNION DE EJIDOS Y COMUNIDADES FORESTALES (UNECOF) "EL SALTO"	DUR	24	1968	BU

UNIDAD DE PRESTACION DE SERVICIOS EJIDALES (UPSE) "EL SALTO" (FORMERLY UCODEFO NO.6)	DUR	28	1970	TD
UNION DE EJIDOS Y COMUNIDADES FORESTALES Y AGROPECUARIAS "GENERAL EMILIANO ZAPATA" (UNECOFAEZ)	DUR	72	1977	BU
UNIDAD DE PERMISIONARIOS FORESTALES NO.6 URUAPAN	MICH	12	1978	TD
UNION DE PERMISIONARIOS FORESTALES DE LA MESETA PUREPECHA	MICH	13	1986	BU
UNION DE EJIDOS FORESTALES "CARLOS SALINAS DE GORTARI"	DUR	12	1989	BU
SEZARIC	DUR	40	1990	BU
UNION DE MANEJO Y ADMINISTRACION FORESTAL CD. HIDALGO	MICH	30	1990	TD
UNION DE EJIDOS RACIANO SANCHEZ	DUR	8	1993	BU
ASOCIACION REGIONAL DE SILVICULTORES MESETA TARASCA	MICH	95	1994	TD
UNION DE EJIDOS Y COMUNIDADES SILVICOLAS DE DURANGO "GENERAL GUADALUPE VICTORIA"	DUR	12	1994	BU
ASOCIACION DE SILVICULTORES DEL HUEHUENTO	DUR	7	1995	BU
UNION DE MANEJO Y ADMINISTRACION FORESTAL	MICH	9	2003	TD
UNIDAD DE MANEJO FORESTAL (UMAFOR) REGION NORTE DE DURANGO	DUR	18	2003	TD (PST)
CONSEJO REGIONAL FORESTAL 3 CUITZEO	MICH	13	2005	TD
ASOCIACION REGIONAL DE SILVICULTORES TEHUIM	DUR	4	2005	TD
ASOCIACION DE SILVICULTORES Y PRODUCTORES DEL NORTE DE DURANGO	DUR	59	2005	TD
ASOCIACION DE SILVICULTORES SAN MIGUEL DE CRUCES	DUR	29	2006	TD



**Table 4. Characteristics of Bottoms-Up Associations**

	Bottoms-up		
	No Col. %	Yes Col. %	Total Col. %
<i>PST services</i>			
No	71.4	76.9	73.2
Yes	28.6	23.1	26.8
Total	100.00	100.00	100.00
Pearson chi2(1) = 0.1365 Pr = 0.712			
<i>Conservation</i>			
No	67.9	76.9	70.7
Yes	32.1	23.129.3	26.8
Total	100.00	100.00	100.00
Pearson chi2(1) = 0.3525 Pr = 0.553			
<i>Roads</i>			
No	100.0	76.9	92.7
Yes	0.0	23.1	7.3
Total	100.00	100.00	100.00
Pearson chi2(1) = 6.9717 Pr = 0.008			
<i>Radio</i>			
No	92.9	61.5	82.9
Yes	7.1	38.5	17.1
Total	100.00	100.00	100.00
Pearson chi2(1) = 6.1506 Pr = 0.013			
<i>Political representation</i>			
No	78.6	30.8	63.4
Yes	21.4	69.0	36.6
Total	100.0	100.00	100.00
Pearson chi2(1) = 8.7441 Pr = 0.003			
<i>Legal representation</i>			
No	89.3	53.8	78.0
Yes	10.7	46.2	22.0
Total	100.0	100.00	100.00
Pearson chi2(1) = 6.5083 Pr = 0.011			
<i>Contract monitoring</i>			
No	100.0	61.5	87.8
Yes	0.0	38.5	12.2
Total	100.0	100.00	100.00
Pearson chi2(1) = 12.2650 Pr = 0.000			
<i>Marketing</i>			
No	89.3	61.5	80.5
Yes	10.7	38.5	19.5
Total	100.0	100.00	100.00
Pearson chi2(1) = 4.3523 Pr = 0.037			

<i>Accessing government funds</i>			
No	50.0	15.4	39.0
Yes	50.0	84.6	61.0
Total	100.0	100.00	100.00
Pearson chi2(1) = 4.4706 Pr = 0.034			
<i>Parastatal-era assoc. membership</i>			
No	81.5	38.5	67.5
Yes	18.5	61.5	38.5
Total	100.0	100.00	100.00
Pearson chi2(1) = 7.4029 Pr = 0.007			
N	27	13	40

**Table 5. Scoring coefficients based principal factors (varimax rotation)**

<b>Services</b>	<b>Factor1</b>	<b>Factor2</b>	<b>Factor3</b>	<b>Factor4</b>	<b>Factor5</b>	<b>Factor6</b>	<b>Factor7</b>
PST	-0.01746	0.02020	-0.01562	-0.05106	-0.06146	0.44321	-0.17573
Budgeting	0.01661	0.03027	0.06312	-0.07855	0.18916	0.04094	-0.20927
Legal	0.49173	-0.00429	-0.10131	-0.00951	0.00663	-0.19061	-0.41576
Extraction	0.04480	0.00216	-0.07956	-0.04888	0.36108	-0.00472	-0.02422
Commercial	-0.07225	0.00138	0.11750	0.03046	0.42397	-0.08081	0.00664
Capacitating	0.09384	0.17804	0.13891	-0.19053	0.10864	0.40438	0.56690
Funds	0.09969	0.05071	-0.08833	-0.00944	-0.01246	-0.20904	0.34079
Political	0.38772	-0.03825	-0.02438	0.00827	-0.16698	-0.02879	0.01918
Nurseries	-0.02171	0.22309	-0.10765	0.38322	0.15741	0.31650	-0.14537
Monitor	-0.06831	-0.06707	0.47581	-0.02756	-0.04318	0.04825	0.12316
Price info	0.02265	0.01350	0.37489	0.01824	-0.16869	-0.00386	-0.18240
Protection	-0.02820	0.66651	-0.05608	-0.19691	-0.15632	-0.40453	-0.30605
Radio	-0.03804	-0.02257	0.00111	0.43203	-0.00464	-0.00858	0.05090
Roads	0.00106	-0.03015	-0.01267	0.27178	0.00399	-0.07898	0.04987

**Table 6. Factor scores for selected FAs**

	SEZARIC (n=7)		UNECOFAEZ (n=8)		UPSE El Salto (n=4)		Union de Ejidos Forestales Carlos Salinas de Gortari (n=3)	
	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>
<b>Factor*</b>								
Political/legal	-.723	.122	.528	1.166	.997	.734	-.266	.453
Environmental	-.752	.123	.255	.932	.043	.002	-.750	.044
price and monitoring	.282	.952	.903	1.156	-.635	.270	-.396	.028
radio and roads	-.304	.248	.498	1.267	-.010	.095	-.198	.009
Commercial services	.545	1.072	-.044	.635	.205	.621	-.495	.195
STF	-.325	.285	-.231	.340	1.462	.263	-.738	.033
Training and funding	-.371	.845	-.318	.914	.1602	.597	.209	.022

**Table 7. Pairwise correlations among factor scorings, n=46\***

	BU	f1	f2	f3	f4	f5	f6	f7
BU	1.0000							
f1	0.2725	1.0000						
f2	-0.3283	-0.0092	1.0000					
f3	0.4644	0.0842	0.0628	1.0000				
f4	0.1572	0.0423	0.0282	0.1084	1.0000			
f5	0.2840	0.0760	-0.0287	0.1954	-0.1154	1.0000		
f6	-0.1829	0.1001	0.0288	-0.1573	0.0144	0.0323	1.0000	
f7	-0.0476	0.1201	0.1006	-0.0256	-0.0292	-0.0543	0.1023	1.0000

\*f1=political/legal, f2=environmental, f3=price and monitoring, f4=radio and roads, f5=extraction and commercialization, f6=STF, f7=capacity building and resource channeling.