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Scaling up from the grassroots and the top down: the impacts of multi-level governance on community forestry in Durango, Mexico

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Abstract: This paper analyzes the local-level impacts of cross-scale linkages in Mexican community forestry by evaluating the operation of four inter-community forest associations (FAs). Based on 1 year of fieldwork in Durango, Mexico, the paper focuses on two inter-related issues: (1) the services that each association provides to their member communities and how they impact forest management and the development of communities' forestry enterprises, and (2) the differences in services and impacts between top-down and bottom-up FAs. The findings show that FAs, as a form of cross-scale linkage, can be crucial for the provision of services, goods and infrastructure related to the protection and enhancement of community forests, the economic development of community enterprises, and the political representation of these communities. At the same time, the study finds important differences between top-down and bottom-up FAs, while pointing to some of the disadvantages of each type of linkage.

Keywords: Common pool resources, community forestry, cross-scale linkages, forests, inter-community forest associations, Mexico

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1. Introduction

The collective action tradition has demonstrated that local institutions can strongly influence resource management (Ostrom 1990; Baland and Platteau 1996; Gibson et al. 2000; Ostrom et al. 2002; Agrawal 2007). Recent work, however, has pointed out that sustainable resource management requires looking at "cross-scale" or "multi-level" networks that go beyond local arrangements (Antinori and García-López 2008; Berkes 2008; Carlsson and Sandström 2008; Brondizio et al. 2009; Taylor 2010; Heikkila et al. 2011; Mwangi and Wardell 2012; Nagendra and Ostrom 2012; Young 2012). "Multi-level" refers here to the horizontal and vertical connections between communities and other levels of organization such as government agencies and civil society groups. In this sense, it implies a form of networked governance (Carlsson and Sandström 2008; see also Bodin and Crona 2009; Benjamin et al. 2011). It is also reminiscent of the concept of polycentric governance, in which collective action occurs in multiple interconnected action situations at different levels and scales (McGinnis 1999, 2011; Nagendra and Ostrom 2012).[1]

In this paper I seek to analyze the function and impacts of a unique form of multi-level governance – inter-community forest associations (FAs)[2] – in community forestry through a comparative study of four FAs in the state of Durango, Mexico. I hypothesize that FAs provide benefits to members that improve the sustainability of community forestry. The findings show that Mexican FAs have important roles in the provision of services, goods and infrastructure related to the protection and enhancement of forests, and the economic development and political representation of forest communities. There are also important distinctions in services and impacts between government-initiated (top-down) and self-organized (bottom-up) FAs. In discussing these results, I contend that FA impacts are partly conditioned by origins but also by other internal governance factors, linkages to other actors, and the political and policy context.

The paper is organized as follows. Section 2 presents a review of recent work on multi-level governance. Section 3 summarizes the study's methodology. The fourth section presents the main results, and the fifth analyzes them, followed by the conclusions.

2. The impacts of multi-level arrangements: a review of the evidence

2.1. The potential benefits of multi-level arrangements

There are four types of potential roles for multi-level arrangements (MLAs) in common-pool resource settings: ecological, economic, social and political. MLAs

[1] These concepts are also related the work on collaborative management (e.g. Armitage et al. 2007) which looks at partnerships between communities, government agencies and other organizations; the concept of "nested enterprises" or 'institutions embedded within institutions' (Ostrom 1990; Brondizio et al. 2009); and that of "bridging organizations" (Brown 1991; Bebbington 1996).

[2] FAs are associations that group collective action organizations of several communities.

often form to tackle complex, cross-scale environmental problems (Benjamin et al. 2011; Heikkila et al. 2011). By sharing information and resources and generating coordination, MLAs can help social actors and institutions respond to social-ecological changes more effectively (Janssen et al. 2006; Olsson et al. 2006; Armitage 2008; Berkes 2008; Ros-Tonen et al. 2008). MLAs also foster negotiation and the integration of different management objectives and 'knowledge systems' (Berkes 2008). As Olsson et al. (2006, 29) conclude, networks show "a willingness to experiment and generate alternative solutions to emerging problems". Similarly, Heikkila et al. (2011) demonstrate how inter-state water agreements lead to new cross-scale institutions that promote better water governance.

MLAs can also have economic impacts, helping to scale up and diversify production activities by pooling resources, helping members deal with imperfect competition, promoting vertical integration, reducing monopoly and monopsony, coordinating aspects of production, reducing risks (by pooling resources and stabilizing returns), and lowering transaction costs in community-based economic projects such as community-owned timber enterprises (Bebbington 1996; Flores and Rello 2002; Kazoora et al. 2006; Antinori and García-López 2008). These organizations can also provide services and goods previously offered by government agencies (Flores and Rello 2002).

Finally, MLAs can have social and political effects. Organizations that bridge scales – such as FAs – can amplify members' voice in the political arena and increase their bargaining power as part of struggles to gain or defend rights to forests, or to influence public policies (e.g. Britt 2002; Cronkleton et al. 2008; Paudel et al. 2010; Durán et al. 2011), especially in contexts of high tenure insecurity, conflict with other users and a politicized or weak rule of law (Andersson 2013). Network scholars refer to this as "interest aggregation" (Benjamin et al. 2011). Ostrom (2005, 59–63) points to the mechanism of shifting scales as one of the strategies for changing higher-level institutions. Scaled-up or networked forms of organization can connect communities with governmental and legislative policy-making bodies. They can also strengthen local social capital and institutions through small-scale projects that build trust, participation, conflict-resolution, and technical capacities (Brown 1991; Bebbington 1996; Paudel et al. 2010; Durán et al. 2011; Bray et al. 2012; Andersson 2013). Moreover, they can increase communities' ability to adapt to external political-economic disturbances (Hahn et al. 2006; Smith and Wandel 2006; Fabricius et al. 2007; Berkes 2008).

2.2. Different linkages, different benefits: top-down and bottom-up

Research on MLAs has recently begun to pay attention to how different types of linkages influence their operation and impact. Some studies have shown that top-down co-management projects have worse management outcomes than bottom-up community governance (Agrawal and Chhatre 2007; Behera 2009). Top-down linkages can reduce local collective action and communities' external linkages, and politicize local resource governance (Nayak and Berkes 2008). Self-

organized processes/institutions are not necessarily exempt from these problems, but more likely to be (Ostrom 1990; Agrawal and Chhatre 2007).

Nevertheless, recent research shows that top-down linkages can also have positive outcomes. For instance, Schoon (2012), in an analysis of park conservation in Africa, finds that while bottom-up arrangements do increase cooperation and coordination at the operational (day-to-day) level, top-down arrangements can generate successful cooperation at higher levels of governance. At the same time, it is important to recognize that the distinctions between bottom-up and top-down processes is often blurry, since MLAs usually form and evolve with initiatives from both sides. This paper differentiates BU and TD associations based on their origins and then evaluates whether there are any ongoing differences between them in services and impacts.

2.3. Multi-level arrangements in the Mexican forest commons

A substantial body of literature has highlighted the notable successes of Mexico's community forestry experiment, which some consider a "global model for sustainable landscapes" (Bray et al. 2003; see also Antinori and Bray 2005; Bray et al. 2005; Barsimantov and Navia-Antezana 2012). Approximately 60% of the country's forests – over one fourth of its territory – are estimated to be under community ownership (Madrid et al. 2009). This property rights regime was an outcome of the Mexican Revolution and the subsequent land redistribution which gave land in common property to groups of landless peasants or indigenous communities.

Notwithstanding this large-scale devolutionary process, recent research shows that less than 25% of forest communities are harvesting timber, and the majority of these have little participation in the extraction process, instead renting out their lands to private timber companies or intermediaries (Antinori and Rausser 2010; Merino and Martínez 2011). In addition, communities face substantial challenges related to weak organization, insufficient management skills, and limited access to markets (Merino and Martínez 2011). These problems, which threaten the protection of large forest areas and the livelihoods of millions of rural households, suggest that community institutions alone are not enough for successful forest management.

Mexican FAs are a somewhat unique example of arrangements that go beyond local institutions to create multi-level linkages connecting communities to each other and to higher levels of governance. In practice, few countries have established broad land reform policies and programs aimed at supporting community forestry and inter-community associations. Some relatively similar experiences can be found in other countries such as Guatemala, which has eight regional inter-community networks, the best known being ACOFOP in the Petén region (see Taylor 2010). Mexican FAs thus have a particular form, origin and coverage. Surprisingly, they have hardly been studied. Most studies of multi-level have looked at communities' connections to other external actors, or networks between individuals; few have looked at horizontal connections between multiple communities, even less outside of Mexico.

FAs have a long history in Mexico, emerging in top-down and bottom-up forms since the 1960s with a diversity of objectives and activities. Their formation has

been strongly driven by government policies (see García-López 2012, Chapter 2). In the 1960s and 1970s, many FAs originated as part of a broader struggle against government concessions of community forest lands to large corporations. From 1986 to 1992, which community forestry and FAs received strong official support and, aided by the 1986 forest law, some FAs took control of the technical forestry services for the emerging community forestry enterprises. In the 1990s, neoliberal policies dismantled much of the government supports, and FAs struggled to reconfigure themselves. Finally, in the 2000s the government created a new federal program to support FAs (PROFAS) which led to the emergence of many new FAs, most of them in top-down fashion.

Recent scholarship has analyzed the role of these associations in Mexico (e.g. Taylor and Zabin 2000; Taylor 2001; Bray and Merino 2004, Chapter 11; Merino et al. 2008; Wilshusen 2010; Durán et al. 2011; Bray et al. 2012), as well as other multi-level arrangements (Wilshusen and Murguía 2003; Barsimantov 2010; Orozco-Quintero and Berkes 2010). These studies have pointed to FAs' positive impacts on member communities, as well as the challenges they face. Using a survey database of 41 communities from Michoacán and Durango, Antinori and García-López (2008) found that 78% of communities belonged to an FA and identified seven types of services provided by these associations: legal and political representation; environmental protection; price information and contract monitoring; radio communication and road infrastructure; timber extraction and commercialization; forestry services; and capacity-building and resource channeling. There was also a significant correlation between the type of FA (bottom-up or top-down) and their services: top-down FAs focused more on capacity-building, environmental protection, tree nurseries, and professional forestry services, while bottom-up FAs focused more on improving timber extraction and commercialization. Antinori and Rausser (2010), using the same database, showed that while associations do not always have the expected impacts, association membership is positively correlated to community investments in secondary processing, diversification of forestry activities, investment in local public goods (e.g. roads, schools), reduced incidence of illegal harvesting, and self-reported improvements in both forest cover and wildlife abundance. Merino et al. (2008) argued that Mexican FAs are necessary for taking advantage of scale economies, financing quality forestry services, professionalized commercialization of forest products, and political representation. Using a national-level survey, they found that top-down FAs have had some positive impacts related to coordination with the government, particularly participation in activities related to the promotion of government programs that support forestry activities, and their implementation.

Important gaps, however, remain in this research agenda. First, there is still insufficient information about the types of impacts across settings and different types of MLAs, such as second-level organizations. This is very important given the particularities of Mexican FAs highlighted above. Second, we know little about how impacts vary across bottom-up and top-down linkages. Finally, except for a few comparative analyses, research in Mexico and elsewhere has focused

on case studies of individual FAs; comparing FAs that cover a large number of communities can shed light on differences in impacts.

3. Methods and research design

3.1. Comparative case study

This research is based on the comparative case study method, which allows for close examination of complex empirical processes by collecting information across carefully selected units, based on theoretically-guided questions (George and Bennett 2005). I purposefully selected four FAs following the "diverse-case" approach, in which cases are selected to achieve maximum variation in the variable of interest (Gerring 2007). In this case, the variable was whether the FA was created by communities (bottom-up/BU) or by external actors (top-down/TD). Basic information about the form of origins (TD or BU), year of formation, and membership size was obtained from a 2007 survey of forest communities in Durango (see Antinori and Rausser 2010). I selected two grassroots FAs (FA-1 and FA-2) and two top-down ones (FA-3 and FA-4). The sample also includes FAs from different periods representing different phases of Mexican forest policy and the types of associations that emerged in each. The study found that this additional variable (age/experience) was not significant. However, a relevant distinction is between the types of services provided: two of the FAs provide technical forestry services (FA-2 and FA-3) and two do not (FA-1 and FA-4).[3]

I sampled all of the communities in FA-2, FA-3, and FA-4, and selected a sub-sample of communities from the larger FA-1 (14) that was similar in size to those of the other associations. A total of 49 communities from the four FAs participated in the study.

In-depth information was obtained through one year of fieldwork in Durango focused on archival research and semi-structured interviews of key actors within each FA, participant observation of FA meetings, interviews with other key stakeholders (e.g. government agencies, foresters), community-level focus group discussions, and semi-structured interviews with members and elected leaders of the communities.

I identified the benefits of FAs by asking leaders and other community members what services and perceived benefits they received from the FAs.[4] The focus group discussions tended to confirm the community leadership's perceptions, though in some cases they differed. Given the limitations of perception-based measures such as this one, I also documented community-level characteristics that could be influenced by FAs. I included two socio-economic characteristics: vertical integration, which is a proxy for the level of community collective action and development; and whether communities are internally united or divided into so-called work groups.[5] I also

[3] "Forestry services" refers to the elaboration of the forest management programs required by Mexican law for landowners doing timber extraction.

[4] The questions asked were: What are the services provided by your association? What are the main benefits you receive from this association?

[5] On work groups, see Wilshusen (2005).

included three measures related to forest-management: self-reported incidents of forest fires and of changes in timber stocks, and the adoption of Forest Stewardship Council's (FSC) sustainable forestry certification. These indicators could be directly related to FA membership if the FA helps the community channel resources for industrial timber processing equipment or business-related training, or indirectly if it channels resources for activities like courses that strengthen community organization or promotes vertical integration or FSC certification.

3.2. The setting: Durango

Located in the north of Mexico's central region, Durango is the fourth largest state in the country (see Figure 1). It has its largest timber stock (approx. 20% of the country's total) and, together with Chihuahua, the highest level of timber production, averaging 2 million m^3 of timber per year (SRNyMA 2006). Moreover, contrary to other areas of Mexico, the state shows low levels of deforestation, with a rate of only 1% between 1993 and 2002, 5% points lower than the national average (Perez-Verdin et al. 2009).

Durango also has historically been a pioneer in Mexico's community forestry, and currently has 395 forest communities, and over 90% is estimated to have timber extraction. It has the highest proportion of vertically-integrated communities (Antinori and Rausser 2010; Merino and Martínez 2011), and the highest number of communities and largest area certified as sustainably managed under the FSC certification system (interview 01-22-2010).

In stark contrast to states like Oaxaca, Durango has practically no community forestry NGOs, with the exception of the Rainforest Alliance. NGOs' role is mainly filled by private foresters who contract individually with communities, and by FAs. Lastly, despite the importance as a forest state, little research has been conducted (exceptions are Taylor and Zabin 2000; Taylor 2001; Antinori and García-López 2008; Antinori and Rausser 2010; García López 2012).

3.3. The four FAs

The four FAs in the study are located in four of the five main forestry municipalities in Durango; these municipalities represented about 60% of the timber extraction in the state in 2003 (SRNyMA 2006). The four regions have similar socio-economic conditions, with high levels of unemployment and migration, drug-related insecurity, limited transportation infrastructure and lack of basic services like electricity, potable water, health, and education. Lack of employment was mentioned by all the communities interviewed as one of the main problems they face,[6] together with weak community organization and poor vertical integration into timber markets. Recurrent ecological problems include soil degradation, over-

[6] The main source of employment in forest communities is usually temporary work in forest-related activities (e.g. timber cutting and extraction, transport, reforestation) which lasts about 3–4 months each year. This is often combined with subsistence-based agricultural activities.

Figure 1: Durango.
Source: SRNyMA (2006).

grazing, deforestation, and forest fires (SRNyMA 2006). Table 1 summarizes the characteristics of the four FAs.

FA-1 was constituted in 1968 as part of its communities' struggles against the government concession of forest lands to a foreign timber corporation. As with other similar associations, FA-1's original objectives included supporting land titling and promoting the communities' organization and unity, and the development of their nascent forestry sector; later, it also promoted the industrialization and commercialization of community timber enterprises (FA-1 constituting meeting minutes 1976). This process was described by communities as an attempt to "protect" each other and gather collective strength (interview 04-27-2010). Pursuant to these objectives, one of FA-1's key services during its initial years was setting prices for logs and sawn products. In the 1970s, FA-1 acquired its own sawmill with government support and served as intermediary between communities and timber buyers, but these projects failed after a decade mainly due to corruption and lack of technical capacities. In the 1990s, the association built a tree nursery, but it never became operational and was transferred to the region's largest forestry services. In 2005 FA-1 underwent a restructuring promoted by the National Forest Commission (CONAFOR) and changed its bylaws. Currently, the association does not regulate prices nor helps with commercialization; rather it is focused on "obtaining a sustainable forest planning, an ordered planning of the forestry activities and the efficient management of forest resources" (FA-1 meeting minutes 2007).

Table 1: Basic characteristics of 4 FAs in sample

Name	Year	Origins	Forestry services	Members	Total forest area (ha)	Timber volume (m^3)
FA-1	1968	BU	No	*40 coms**, 33 pp** (77 tot)	474,543	Pine: 385,521 Oak: 102,739 TOT: 504,914
FA-2	1994	BU	Yes	*12 coms* (12 tot)	52,833	Pine: 39,477 Oak: 16,900 TOT: 56,377
FA-3	1986	TD	Yes	*10 coms*, 178 pp (188 tot)	186,000 (approx.)	Pine: 167,825 Oak: 39,901 TOT: 216,933
FA-4	2003	TD	No	*13 coms*, 8 pp (21 tot)	56,638	Pine: NA Oak: NA TOT: 73,831

*coms, communities.
**pp, private (smallholder) properties.

FA-2 formed in 1994 after the dissolution of a previous association in the region fueled by discontent with the association's forester and leaders, perceived to be excessively controlling decision-making and corruptly benefitting from projects. Most communities left and formed FA-2 to continue having their own forestry services but with more control over them and over the associated project funds (interview 04-01-2010; 07-14-2010). As the current president expressed, they formed FA-2 so they could manage the forest themselves and "be the ones ordering the forester, and not the other way around" (interview 10-27-2010). Another motivating factor was communities' belief that, united, they would be taken into account by the government. According to its Bylaws, the FA's main objectives are related to commercialization of agricultural and forest resources and provision of technical forestry services and other services such as resource channeling, commercialization, access to credits education, and legal and financial advice. FA-2's motto is: "For the rational management of the forest and the development of its inhabitants."

FA-3 formed in 1986 as a result of a change in the national forest law that was perceived by communities (and promoted by the government) as a mandate to create community-owned forestry services. Eleven communities and 204 private landowners which had been previously organized in a government-run forest administration unit (UAF) joined the new association. A forester in the region, who had been the right-hand man of the previous government-appointed director of the region's UAF, had a strong role in its creation. In 1989, FA-3 obtained the concession to provide the forestry services in the region. Through these services, the association sought to "contribute to the social, economic and ecological development of the forest areas" by promoting "the sustainable use of forest resources" in the region (FA-3 Bylaws 1989). More specifically, FA-3's objectives are to design management plans and other technical studies for

members, represent their interests, provide capacity-building, channel resources, and help mediate in and resolve conflicts.

FA-4 was created in 2003 by the region's main forester, who had been the director of the government-run forestry services and later of an FA. The main motivation was the 2003 Forest Law's perceived mandate to create new regional associations within each Regional Forest Management Region (UMAFOR) in the state. FA-4 was the first of its type in the country. However, community leaders also participated, especially some who had previously formed an FA in the 1990s. The overall objective of FA-4 is to "achieve a sustainable management of forests ecosystems that guarantees its productive capacity in the short, medium and long-terms, through the promotion and diversification of integral forest production, seeking out the social improvement of producers." Specific objectives include generating regional analyses to plan forest actions; identifying forest products markets to improve investment; developing commercialization and timber production; integrating region-wide information to improve the quality and efficiency of forestry services; organizing regional 'production chains'; and developing regional strategic planning (FA-4 Bylaws 2003).

4. Results

4.1. Types of services

The research identified five types of services provided by the four FAs: resource channeling, resource pooling, political representation and information exchange, regional analysis and strategic planning (except FA-2), and forestry services (FA-2 and FA-3). This categorization is somewhat different than that in Antinori and García-López (2008), but has substantial overlaps. These services were associated with eight categories of perceived benefits: (1) resources for forestry programs, (2) resources for agriculture, (3) resources for basic infrastructure, (4) information, (5) political representation, (6) unity, (7) forestry services, and (8) investments in public goods.[7]

4.2. Perceived benefits

A high percentage of member communities in each FA (from 83% in FA-4 to 100% in FA-3) perceived some benefits in at least one of the categories. Figure 2 presents the averages for all categories. The categories are ordered from left to right according to the average percentage of member communities across the four FAs (n=49 member communities) mentioning the category as a benefit. The most important perceived benefits were those directly related to resources in different areas: forestry (63%), basic infrastructure (42%), and agriculture (40%). Investments in public and collective goods (39%), forestry services (35%), and

[7] Note that these categories some overlap. For instance, some of the associations invested in public goods, but these investments were coupled with resources channeled from government programs.

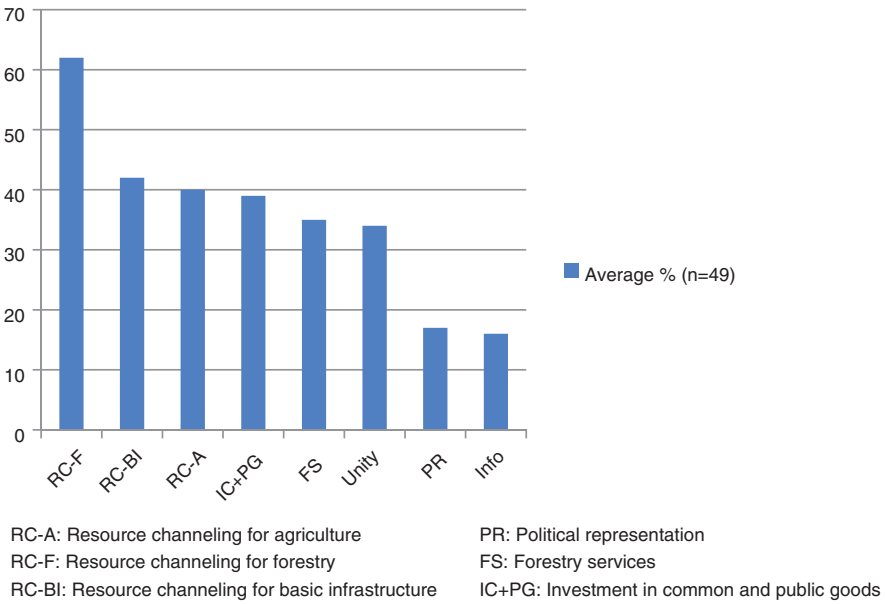

Figure 2: Average percentage of member communities perceiving benefits across the four FAs, by category.

unity (34%) emerged as moderately important; and political representation (17%) and information (16%) as the least important.

Table 2 presents the results regarding the perceived benefits from member communities in each FA across different categories. The highest values for each category (each column) are in bold.

Table 2: Perceived benefits from member communities in the four FAs in the study, by category

FA	Benefits (% of member communities perceiving benefits)							
	RC-F	RC-BI	RC-A	IC+PG	FS	Unity	PR	Info
FA-1 (n=14)	57.1%	21.4%	**78.6%**	0%	0%	14.3%	**35.7%**	14.3%
FA-2 (n=12)	**75%**	**66.7%**	25%	8.3%	50%*	**58.3%**	25%	33.3%
FA-3 (n=10)	70%	50%	50%	70%	**90%**	40%	0%	0%
FA-4 (n=13)	46%	30.8%	7.7%	**76.9%**	0%	23.1%	7.7%	15.4%

*n=8, The number of member communities that actually contract with the FAs' forestry services.
RC-A, Resource channeling for agriculture; RC-F, Resource channeling for forestry; RC-BI, Resource channeling for basic infrastructure; PR, Political representation; FS, Forestry services; IC+PG, Investment in common and public goods.

Resource channeling – called "*gestoría*" (lobbying) – to secure funds from different government programs in forestry, housing, agricultural subsidies, and basic infrastructure like roads and electricity, for a community or the region, was constantly referred to by interviewees as FAs' main role. An ex-leader of a community from FA-1 expressed that the objective was "to make sure that communities are obtaining their resources" (interview 08-26-2010). A forester from the same region further described the associations as a "bridge" between communities and government agencies where "needs flow from here to there [to the government] and support programs flow from there to here" (interview 03-04-2010).

Forestry-related resources were the most important benefits perceived on average across the whole sample. FA-2 and FA-3 had the highest percentages of member communities reporting these resources as a benefit, as expected given that they provide forestry services. However, the percentages were also high in FA-1 and FA-4. The most-mentioned supports were those directly related to forest management (e.g. reforestation). Some communities also mentioned resources for fire brigades. Only in very few cases did communities mention diversification programs such as payment for environmental services or eco-tourism.

Resources for basic infrastructure were mostly related to regional road improvements and electrification. FA-2 and (to a lesser extent) FA-3 stood out for their roles in creating inter-community road committees to improve roads and have them paved by the government, and for their efforts to bring electricity to their regions. Basic services like potable water and housing improvements were also mentioned in some communities. Resources for agricultural programs were mostly subsidized oat seeds and fertilizer channeled through the state's agriculture ministry. FA-1 and FA-3 stood out in this category.

Investments in public and collective goods ranked fourth, closely behind agricultural resources. These refer to members' grouped contributions for specific projects, i.e. resource pooling. This is a crucial benefit because federal programs in Mexico require communities to match funds for forestry grants. By pooling resources from their membership, FAs reduce the financial contributions that a given community would have to make on its own. This benefit was very relevant in FA-3[8] and FA-4, but scarcely mentioned in FA-1 and FA-2. FA-3 and FA-4 have used member fees to invest in fire watchtowers and to support fire combat brigades. FA-2, FA-3 and FA-4 collect member contributions for road improvements, while FA-2 and FA-4 have also invested in road improvement machinery and FA-2 and FA-3 in building tree nurseries; they sell the trees to member communities at subsidized prices, and to CONAFOR, for the annual reforestation projects. FA-3 communities also mentioned the radio communication system as an important collective investment.

[8] FA-3 in particular has a longstanding tradition of pairing a fixed percentage of all government program funds even when not required (interview 06-26-2010).

Forestry services ranked fifth across the four FAs (35%), though only FA-2 and FA-3 provide them. In Durango, these services entail not only designing and implementing forest management plans, but also channeling funds from the multiple grant programs CONAFOR operates; they are also a form of resource pooling, where members' service fees are used to invest in infrastructure that enhances these services (and ultimately forest management), such as tree nurseries and fire combat infrastructure. Forestry services were particularly relevant in FA-3 (90%), in which many emphasized the high quality of services (described as 'more than just markup of trees'), and the good forest management practices implemented. Several communities expressly connected these services to the observed reduction in forest fires and the overall improvement of their forest, especially regarding timber volumes.

Another benefit mentioned in many communities of all four associations (32%) was unity, which relates to political power. FA-2 had the highest percentage of communities (58.3%) in this category, followed by FA-3 (40%). FA-1 had the lowest (14.3%), highlighting the organization's current internal divisions. The underlying idea was that 'unity provides strength', and makes it easier to access government resources and solve problems. An FA-1 community leader highlighted this political role saying that "one speaking for oneself is not the same as one speaking for twenty" (interview 05-22-2010). In other cases, being united was perceived as a benefit because the government gave preference to communities organized within FAs: "united it is much easier to obtain attention, because they [the government] rarely pay attention to a community on its own anymore" (interview 08-25-2010). This perception coincides with government statements to the effect that 'well-organized' communities are a priority. A few others emphasized how being united allowed them to 'work together' and pool resources to invest in projects or equipment.

Political representation was one of the least important benefits overall, but was relatively important in FA-1 (35.7%) and FA-2 (25%). Moreover, this benefit was tightly linked to FAs' lobbying and unity roles and particularly to problem-solving. As a FA community leader expressed, the objective is to "represent all the communities in government agencies…to go united towards a common goal" (interview 05-22-2010). In FA-1, respondents mentioned the association's help in dealing with "large problems" with government agencies like the Mexican Social Security Institute when it does not provide the needed health service;[9] to convince the federal Treasury to condone or reduce communities' tax debts; or to receive fair compensation for Federal Electricity Commission right of ways.

A second important dimension of political representation is associations' participation in governmental decision-making bodies at municipal, regional, and state levels, such as CONAFOR's State Evaluation Committee. Most of

[9] In Mexico, social security refers to medical coverage provided to employees of a company.

these committees are in charge of evaluating and approving proposals for funding submitted by communities. A third dimension of representation is FAs' connections to other associations at higher levels, such as the confederation of FAs, national forest associations such as the National Union of Community Forestry Organizations (UNOFOC)[10] and the National Council of Silviculturalist Organizations (CONOSIL), and other peasant organizations such as the National Peasant Confederation (CNC). Through these associations, FAs try to influence state and national policies and programs and can better coordinate with agencies at those levels. FAs also bridge with political parties. Leaders in FA-2 and FA-3, for instance, stated that they are taken into account in the process to select candidates for office for one of the parties.

Finally, communities perceived as benefits the information and advice about available government programs provided by FAs. FA-2 showed the highest percentage in this category (33%).

4.3. Community-level indicators

These results show that communities perceive benefits from being in FAs, especially regarding channeling resources, collective investments, and other services. In this section, I evaluate how these resources and other FA benefits translate into community-level outcomes. Currently none of the associations provide any specific services directly focused on communities' vertical integration or internal organization. Moreover, leaders of all four associations stated that they tended not to intervene in internal community affairs. In terms of forest management, the FAs providing forestry services would be expected to have a stronger impact because they are owned by communities – and therefore can incorporate local knowledge – and apply forest management at the regional level. It would also be expected that FA-3 and FA-4 have a strong impact on forest fires because of their investments in this area. Table 3 summarizes these results. For each category, a shade identifies the FA with the highest value.

The analysis shows a weak relationship between vertical integration and FA membership. For instance, in the region in which FA-3 operates, only one of eight communities with sawmills belongs to the FA, and three of them are not members of any association. There are higher proportions of communities with sawmills in FA-1 (50%) and FA-4 (23%). However, the causal linkage between their establishment and FA actions is not always clear, since in many cases the sawmills preceded the association's formation. In addition, all four associations show a marked trend towards vertical disintegration: six member communities in FA-1, five in FA-2, three in FA-4 and one in FA-3 have sold their sawmills and gone back to selling roundwood.

This does not mean that FAs do not help communities in their vertical integration. The sawmills in the two FA-2 and FA-3 communities were established

[10] On UNOFOC, see Chapela (1998).

Table 3: Measurable community-level characteristics

Community characteristics	Impact by FA[11]			
	FA-1	FA-2	FA-3	FA-4
Vertical integration (% w/sawmills)	50% (n=14)	0% (n=12)	9% (n=10)	23% (n=13)
Community organization (% members w/out sub-groups)	34% (n=14)	25% (n=8)	67% (n=6)	54% (n=13)
Timber stock (% members w/stable or increased stocks)	58% (n=7)	60% (n=5)	100% (n=9)	0% (n=7)
FSC Certification (% of members)	40% (n=14)	0% (n=12)	10% (n=10)	0% (n=13)
Forest fires (% members w/reduced fires)	NA	NA	100% (n=6)	31% (n=4)

with the support of their associations. And, historically, FA-1 was crucial in helping communities obtain loans and other support for their emerging timber enterprises, as well as better prices for their timber.

Regarding community organization, there is a notable trend towards formation of intra-community 'work groups' in FA-1, FA-2 and FA-4, generally interpreted by interviewees as a sign of community divisions. FA-3 has been the most successful FA in this respect, with only two member communities (33% of sample) forming work groups; interviewees attributed this to efforts by the association's forester.

In terms of forest management, communities in all FAs except FA-3 reported declining timber volumes. All FA-4 communities reported decreasing volumes; in FA-1 and FA-2, the trend was less marked but still negative overall. The FA-2 president claimed that the forest volumes in the region had remained stable but that the composition had changed towards smaller-diameter trees. In contrast, 78% of FA-3 communities reported increased timber volume and the remaining two reported no change.

Reductions in community forest fires showed a strong association with perceived benefits in FA-3 and FA-4, coinciding with the substantial investments in fire prevention and combat that they have made. In the case of FA-3, according to its forestry services director, fires have been reduced from 12,000 ha per year 15 years ago to 50–100 ha per year currently (interview 06-26-2010). Five member communities (50%) mentioned this trend. The FA-3 Secretary claimed that the region's forests had been "totally transformed" (interview 07-29-2010). In the case of FA-4, the forester and four communities (31%) also mentioned a substantial decrease in the frequency and magnitude of fires. In both cases, these statements were confirmed by the analyses in regional forest studies. The FA-4 regional study concluded that the investments in constructing fire towers

[11] Sample sizes vary in each FA because of non-responses.

and increasing the number of combat brigades, as well as increased coordination with CONAFOR, were the main reasons for the decline.[12] FA-2 and FA-3 members also reported a reduced incidence of illegal logging as a result of inter-community efforts in monitoring and enforcement.

Finally, the impact of FAs on member communities' investments in forest diversification projects is also weak. FA-3 and FA-4 have not developed eco-tourism at all, except in one FA-3 community. FA-2 has promoted eco-tourism and payment for environmental services programs, but these are still incipient projects and some communities complained about the unequal distribution of the benefits, mostly captured by private properties associated to the region's main timber entrepreneur. In the establishment of FSC certification, FA-1 has the highest number of certified communities of all the state's regions (8, 20%). FA-2 was very active in this regard in the 2000s and at one point had almost half of its membership certified, but to date all have abandoned certification. In contrast, in FA-3 there is only one member community certified, and in FA-4 there are none.

4.4. Differences between top-down and bottom-up linkages

There are some observable differences between the activities of top-down (FA-3 and FA-4) and bottom-up associations (FA-1 and FA-2). The first strongly emphasize issues directly related to forestry, and their members perceive them as being dedicated to it. Combating fires has been one of their main goals, and they have invested substantially in this as well as in road improvements. At the same time, there is an evident lack of attention to other issues such as industrialization, commercialization, and price regulation, despite the fact that these constantly come up as some of the main problems in member communities of all four FAs.

There are also important contrasts in two categories of perceived benefits: political representation and investments in public goods. Figure 2 summarizes these distinctions. Only one of the communities in the top-down FAs mentioned political representation as a benefit (4%), while an average of 30% of the two bottom-up FAs did. In investments in public goods, the relationship is inverted: an average of 75% in the top-down associations mentioned this as a benefit, but in the bottom-up FAs only 4% (one community) did. There are also differences in channeling of agricultural resources, but there is large variation across the FAs in each category (TD/BU).

In terms of measurable impacts, both top-down FAs have been more successful at investing in fire-detection towers and other regional fire combat projects, and as a result show more success in reducing forest fires. FA-3 also serves as an example

[12] The results are not definite, as the causes of forest fires are manifold (e.g. climate variability, agricultural expansion) and perceptions of fires may be incorrect. In fact, in FA-3 and FA-4, the associations' own data shows that the patterns of perceived fire reduction are less clear, with some recent years showing increases.

of how a top-down FA with strong emphasis on good forest management practices can lead to sustainable timber harvesting. There are also important differences in terms of internal governance, particularly regarding sense of ownership and participation (see García López 2012, Chapter 4) (see Figure 3).

5. Discussion

5.1. FA impacts

These results show that FAs, as a type of cross-scale linkage, are carrying out activities that strengthen local common-pool resource management, particularly in providing connections to government agencies to channel resources for forestry-related programs, sharing information about them, investing in public goods to improve forest management, offering technical forestry services, and, to a lesser extent, promoting diversification of forest activities. They help deal with some ecological problems that cross geographic scales, particularly forest fires and illegal logging. Moreover, these activities have important perceived and (some) measurable benefits at the local level. For instance, the two associations which made substantial collective investments in fire prevention and combat (FA-3 and FA-4) had a positive impact on reducing forest fires in their regions. And those focused on improving forest management at the regional scale through education and capacity-building have seen improved conditions in timber stocks. In the process, new institutions such as norms about collaboration in cases of fires or about collective bargaining for better timber prices have been developed to deal with cross-scale problems.

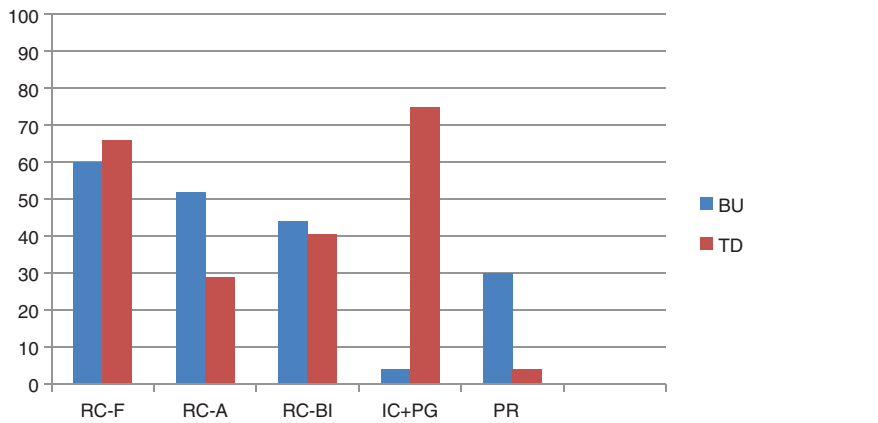

Figure 3: Differences in perceived benefits between the TD and BU FAs.

However, FAs are not merely, or even mainly, about forest management. Political representation appears as a central component of almost everything the associations do – participating in decision-making bodies at different levels, providing political muscle, interceding on behalf of communities to solve problems with agencies, lobbying to address needs in basic infrastructure and services, or channeling resources from existing government programs. Theoretically, these findings suggest connections between concepts in CPR management and those in social movements literature (Britt 2002; García-López and Villamayor-Tomás 2012). Empirically, they highlight the influence of both historical and current contextual factors on the operation of these associations. On one hand, FAs in Mexico were often created with the objective of being the 'representatives' of regional forest communities, be it in struggles such as the anti-concession movements, to deal with governmental inefficiencies and lack of service-provision, or for the communities' integration into the corporatist political structure. From this vantage point, these associations can be seen as a way of reducing transaction costs for both the government and peasant communities. For communities, FAs can help share information about government programs and fill out the applications for which they often have limited information and expertise. With the increasing competition over ever-scarcer resources of government programs, this role becomes even more important, as several community leaders interviewed stressed. For government agencies, individual visits to communities or meeting with them in their offices are no longer necessary.

Another relevant finding is that one of the most important functions of the forestry programs that FAs help to channel is, at least from the communities' perspective, not really ecological but economic – helping to channel resources for projects such as reforestation and soil conservation activities which lead to local employment. Their activities related to agriculture may also be surprising if one thinks of them as forestry organizations, but it makes sense when one considers that forest communities in Mexico, as in many other developing countries, are also peasant/agricultural communities.

5.2. Top-down and bottom-up linkages

The distinctions between the top-down and bottom-up associations studied coincide with Antinori and Rausser's (2010) findings. The fact that foresters were key actors in the formation of both top-down FAs explains their strong focus on forestry issues, while BU associations' emphasis on the political dimension – unity and representation – points to their origins as grassroots political movements. These differences recall the work on polycentric governance and the theory of co-production, where different types of production processes are understood to require different forms of polycentric arrangements (McGinnis 1999). In other words, different types of FAs and different types of linkages between communities, FAs, and other actors are needed for different activities. In this case, top-down linkages

may be better at improving forest conditions, but at the expense of economic development, internal democracy and equity.

However, the categorization between TD and BU is blurry because their origins are often the result of hybrid processes. While the foresters in the top-down FAs seemed to have more control of the organizations, in different periods foresters also have had much internal influence in the bottom-up organizations. Moreover, associations may shift from more bottom-up to more top-down models of governance, as highlighted by all four cases.

Aside from the TD/BU distinction, there was one significant difference between the associations that provide forestry services (FA-2 and FA-3) and the ones that do not. In the first, resources channeled were perceived as a direct benefit of services, and communities made the link to specific programs. In contrast, in FA-1 and FA-4, communities mostly perceived them as indirect benefits related to membership and referred to resource channeling in general terms.[13]

5.3. Qualifying the linkages

While multi-level arrangements can provide some important benefits, they can also be very turbulent (Bray et al. 2012) and can have many 'dysfunctionalities' (Benjamin et al. 2011). The results suggest that some of the FAs may not be providing the benefits community members expect, at least to some of their members. An average of 50% of member communities in FAs 1, 2 and 4 had at least one interviewee perceiving no benefits. Most often, they blamed politicking and/or bad leadership for this. In FA-1, for instance, members lamented the organization's decay and the fact that it did not regulate timber prices or help in timber commercialization or industrialization anymore, despite this having being one of the primary reasons to create the organization. In addition, in the four FAs the perceived benefits and their magnitude varied across communities and, in some cases, within each community, suggesting unequal distribution of certain benefits. In FA-1 and FA-2, some explicitly mentioned this, perceiving a preference towards the larger, wealthier communities.

In some instances, interviewees also argued that the FAs were not addressing issues crucial to their communities. None of the FAs currently has its own timber business; nor do they contribute to regulating timber prices, commercializing members' timber products, or generating sustained employment opportunities. There were also criticisms that the associations were not doing enough to support agricultural issues and diversification of forest uses; a majority considered that they do not help ensure the provision of basic services like health and education. None of the four FAs has had much impact on strengthening community organization, partly because they have not been actively involved in this aspect. One community leader in FA-1 complained that "there have been studies but no palpable benefits" (interview 10-12-2011).

[13] In FA-1, only two communities mentioned specific programs, and in FA-4, three communities did.

In ecological terms, aside from continuing problems with fires, pests and soil degradation, the main limitation is the lack of integration of management strategies at the eco-regional level. While the four FAs cover broad areas, none has been able to incorporate all of the communities in their watersheds as defined by CONAFOR's forest management units. The closest to achieving this is FA-1, but they do not provide forestry services directly.

The four FAs also seemed to have little direct influence on federal and state forestry policies. A clear example is the failure to influence the delineation "priority areas", a concept CONAFOR developed to determine which areas in a given state have priority for different programs. In the first meeting I attended during my fieldwork, foresters and FA representatives complained about the exclusion of many areas from the priority areas of reforestation and soil conservation programs. CONAFOR officials responded that the areas could not be modified but promised they would take the concerns into account in 2011. However, the same problem was repeated in 2011. The failure is also reflected in the inability of FAs to alter market conditions even as member communities suffer from increased dumping of cheaper timber from the US, Canada and Chile.

The weak influence on federal policy can be explained by several factors. One is the high level of centralization of Mexican forest policy; many key issues such as the definition of priorities and the budget are decided at federal levels, with little or no local or state consultation. Another is the loss of political power of the community sector over the last decades, a point emphasized by many interviewees. As one interviewee noted: "its not like before where the [community] unions would say 'we want these sawmills, these dry kilns, these trucks', and they would get the loans, they would go to Mexico City to meet with the Secretary of the agency they wanted" (interview 11-30-2010). A third aspect is that, as proposed by Chapela (1998), Mexican FAs have been unable to develop a strong, united national coalition to influence federal policy-making; instead, as a result of heavy political intervention, they have developed multiple national FAs (Red Mocaf, UNOFOC, CONOSIL, etc.) which compete between them.

We also need to recognize the conflicts inherent in these linkages and their capture by internal and external actors (see García-López 2012, Chapter 4). In sum, besides benefits, it is also important to underscore what FAs are failing to do or doing wrong.

5.4. Beyond FAs and towards multiple linkages

While FAs are a crucial component of cross-scale governance in Durango, communities also have additional linkages – foresters, other associations, local and regional leaders, politicians, entrepreneurs – that supplement or substitute the services FAs provide and create a more complex network. A community leader in FA-2 made this clear when he explained that the FA's role in providing benefits was intermixed with those of community leaders and the region's main timber entrepreneur, who had been key in achieving the paving of the region's main

road and the development of eco-tourism (interview 09-10-2010). Similarly, a community leader from FA-1 expressed: "[The resources] all come from the [forestry services], the Union, and the government…between all of them together" (interview 06-02-2010).

Nevertheless, in Durango these other linkages are reduced in comparison to other states. There is a practical inexistence of non-governmental organizations (NGOs), – a common linkage in other Mexican forest communities (e.g. Orozco-Quintero and Berkes 2010). As a consequence, foresters have taken over many NGO functions, especially channeling resources from federal forestry programs and sometimes also from social and agricultural ones. Communities without a good forestry service, even when they are within an FA, can become isolated from government funds. There are also contrasting examples from communities where good foresters, combined with local leaders and timber entrepreneurs, can obtain the same or more benefits than FAs.

Linkages in Durango also show relative isolation, with few connections to national-level organizations. For instance, when a new national FA was created to group FSC-certified communities, only one community from Durango participated, despite the state having the most communities of this type in the country. To a certain extent, this can explain the failure of these linkages in promoting substantial policy changes in forestry.

6. Conclusions

This study has analyzed the operation and local-level impacts of two types of multi-level arrangements – top-down and bottom-up – in a sample of 49 communities within four inter-community associations (FAs). The results show that inter-community associations can be an important form of MLAs, but that their role is not only ecological, but also political and economic. Second, there is evidence of important distinctions, but also similarities, between the benefits that TD and BU arrangements provide. Third, we observed that there are limitations in the operation of these linkages, partly tied to internal governance factors but also public policies and political processes. Finally, we pointed to other linkages that also have impacts on community forestry which need to be taken into account.

These findings can help further refine our understanding of MLAs as a crucial component of CPR governance. Still, it is important to recognize that there are multiple other factors that affect both FAs and member communities and complicate the analysis of the 'benefits' that these linkages provide. Relevant factors include leadership at the community and FA levels, socio-economic and ecological characteristics of communities, and the macro-level political-economic context. For instance, the participation of one FA-4 community was hindered partly by its high levels of internal conflict and division as well as the poor quality of their forestry services. As was constantly emphasized by interviewees and observations in all four cases, the ability of FAs to provide benefits is also partly dependent on whether local leaders actively seek help from the FAs and from other

linkages. As an assembly member in FA-2 expressed, "He who doesn't speak, God doesn't hear" (10-31-2010). Member heterogeneity has also been an issue commonly affecting the internal governance of FAs and their ability to provide benefits; moreover, communities' need of associations and their decision to join or exit one is partly associated to this heterogeneity (e.g. Bray and Merino 2004).

More research is needed to better understand MLAs in forest governance, including the factors influencing the success or failure of different linkages, since the design principles of scaled-up forms of collective action may be different from those of local-level governance. A separate paper analyzes this issue in the four FAs discussed here (García-López 2012, Chapter 5). We also need to better understand the distinctions between communities inside the linkages and similar communities outside them. Finally, following the lead of recent work analyzing and comparing different types of linkages (Barsimantov 2010; Andersson 2013; Barnes and van Laerhoven 2013) we need to determine which connections – e.g. forester, NGOs, FAs – are more effective and under which circumstances.

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