

# An Analytical Agenda for the Study of Decentralized Resource Regimes

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## Authors:

**Krister Andersson**, Department of Political Science, Environmental  
Studies Program, University of Colorado-Boulder

**Elinor Ostrom**, Workshop in Political Theory and Policy Analysis,  
Indiana University-Bloomington

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## Prepared by:

Sustainable Agriculture and Natural Resource Management Collaborative  
Research Support Program (SANREM CRSP)

Office of International Research, Education, and Development (OIRE),  
Virginia Tech

E-mail: [oired@vt.edu](mailto:oired@vt.edu)

On the Web: [www.oired.vt.edu](http://www.oired.vt.edu)



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## **Abstract**

This paper seeks to shed new light on the study of decentralized natural resource governance by applying institutional theories of polycentricity—the relationships among multiple authorities with overlapping jurisdictions. The emphasis on multi-level dynamics has not penetrated empirical studies of environmental policy reforms in nonindustrial countries. On the contrary, many of today’s decentralization proponents seem to be infatuated with the local sphere, expecting that local actors are always able and willing to govern their natural resources effectively. Existing studies in this area often focus exclusively on characteristics and performance of local institutions. While we certainly do not deny the importance of local institutions, we argue that institutional arrangements operating at other governance scales—such as national government agencies, international organizations, NGOs at multiple scales, and private associations—also often have critical roles to play in natural resource governance regimes, including self-organized regimes.

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## **Introduction**

Forestry has always been important in the Bolivian municipality of San Rafael. For many years, however, most forest extractions were unchecked and often illegal.<sup>1</sup>

Landowners relentlessly expanded their agricultural fields by clearing forest. Groups without permits logged the area extensively. Illegal loggers sometimes exchanged gunfire to gain access to valuable timber. The central government in charge of enforcing the rules was virtually absent. In 1996, the Bolivian decentralized forest policy changed most of that. Mayor Romelio Ortiz used his new powers to create a 220,000-hectare municipal forest reserve and established forest management plans incorporating the concerns of landowners. He also developed a forest monitoring system. One leader of a previously illegal logging group now runs a legitimate forestry operation and sells sawed wood to buyers around the country.

Mayor Ortiz's efforts and success fulfill the hope of a new decentralized approach to natural resource governance that has spread around the world. Until the 1970s, central governments tended to view natural resource governance as a top-down affair—as a means towards industrialized development. Given the perceived failure of these top-down policies, decentralization policy is now a highly touted response to the difficulties of forest governance. Local governments, it is thought, can design more appropriate policies because they are more familiar with both the local environment and needs of local users. Dozens of countries implemented decentralized natural resource management programs in the 1990s. By 2003, the World Resources Institute identified

60 countries where decentralization was an important component of their natural resource policies (WRI, 2003).

In spite of the euphoria of the 1990s, the actual outcomes of decentralized policies adopted around the world have been mixed. In fact, just 200 miles down the road from San Rafael, a darker side of decentralization appears. In the municipality of Samaipata, the substantial increases in the municipal government's power and resources have not produced any noticeable improvements for the majority of its inhabitants. If anything, the decentralization reform in that municipality seems to have further strengthened the dominant group of political and economic elites. The ruling elite has invested in urban infrastructure improvements rather than worrying about rural people's access to and management of natural resources. One observer notes that "The municipal work plan includes infrastructure for the town and for the tourism industry, but ignores the needs of the majority of the municipality's population: the rural poor. The municipal officials, who are tightly linked to the tourism industry, either forgot about the demands from the farmer organizations or they simply ignored them" (Flores, 1998: p. 418).

Recent studies support the anecdotal evidence presented above. Decentralization does not uniformly lead to better or worse local governance (see Blair, 2000; Gibson and Lehoucq, 2003; Larson, 2002; Nygren, 2005; E. Ostrom, 2001; Pacheco and Kaimowitz, 1998; Smoke, 2003). Even in Bolivia—hailed as a decentralization success story by two United Nations organizations (FAO, 1999; UNDP, 1998)—the outcomes are extremely mixed (Andersson, 2003; Pacheco, 2000). The diverse outcomes in countries that have decentralized their natural resource governance regimes raise two important questions for public policy analysts:

- Why do local governments in decentralized regimes respond differently to their new roles?
- Why are some local governments in decentralized regimes so much more effective than others in governing their resources?

In this paper, we draw on institutional theories of *polycentricity*—the relationships among multiple authorities with overlapping jurisdictions—to address these questions. Since V. Ostrom, Tiebout, and Warren introduced the term in 1961, a growing body of theoretical literature has developed on polycentric governance (McGinnis, 1999a, 1999b, 2000; Oakerson, 1999; E., Ostrom 2005). This literature has made the case that the study of political systems needs to consider the degree of *nestedness* of political actors within larger political systems and that a particular political order depends on the relationships among governance actors at different levels and the problems they are addressing.

No perfect governance arrangement exists. All governance institutions are imperfect responses to the challenge of collective-action problems. Because these imperfections may exist at any level of governance, we argue that analysts should consider the extent to which complementary back-up institutions exist at higher or lower levels of governance that can help offset some of the imperfections. Polycentric scholars engage in a multilevel analysis of how actors at different levels of governance interact and influence each others' decision making (Bickers and Williams, 2001; Hooghe and Marks, 2003; Sproule-Jones, 1993). This emphasis on multilevel dynamics has not yet, however, penetrated empirical studies of decentralized reforms in nonindustrial countries.

The purpose of this paper is to lay out an analytical agenda for the study of decentralized governance of natural resources from a polycentric perspective.

We focus our exploration of the relationships between particular characteristics of multilevel interactions and variations in public service performance among local governments—some of which have received new powers and some of which have not. We assume that a governance system that manages to distribute capabilities and duties in such a way that perverse incentive and information problems at one level are offset by positive incentives and information capabilities for actors at other levels, will achieve better outcomes than either a highly centralized or fully decentralized system.

We start this theoretical exploration by discussing the characteristics of different natural resources that make them so challenging to manage sustainably. We then describe the social dilemmas that are associated with the governance of these resources, and review the existing research on decentralized natural resource governance. We examine how polycentric governance theory applies to recent decentralization reforms in nonindustrialized societies. We end by discussing how a polycentric approach to the study of decentralized natural resource governance helps to identify previously understudied areas of significant importance for both theory and public policy.

### **The Challenge to Governing Natural Resources**

As human populations and their demands on natural resources continue to grow, citizens and officials from around the world search for effective solutions to environmental problems. Four factors conspire to make governing natural resources difficult.

First, since many larger-scale natural resources are common-pool resources, they pose different and arguably more difficult challenges to governance than either private or

public goods. Many analysts now classify goods along two dimensions: (1) the ease with which potential users can be excluded from access to the good (the excludability of the good) and (2) whether using a portion of the good shrinks the supply that remains (the subtractability or rivalness of a good).<sup>2</sup> Public goods (e.g., national defense) are nonexcludable and nonsubtractable. Private goods (i.e., packaged goods in the supermarket) are both excludable and subtractable. Toll goods (e.g., a country club) are easily excludable but nonsubtractable. Common-pool goods (e.g., fish in the ocean) are costly to exclude others from using but one person's harvest leaves less for others.

Because of their excludability properties, the allocation of private and toll goods is thought to be best handled by free-market pricing mechanisms or private associations. Because of their nonsubtractibility, public goods are generally thought to be in the purview of governments to provide. Common-pool resources, on the other hand, combine the most problematic aspects of both dimensions. Since they are subtractable like private goods, common-pool resources can be overused or even destroyed (see E. Ostrom, Gardner, and Walker, 1994). Since it is costly to control access to them (the excludability dimension), it is also difficult to restrict the rate at which they are consumed. Most natural resources that we care about are common-pool resources at multiple scales (e.g., ozone layer, oceans, breathable air, forests). The effective management of these resources remains one of the most difficult tasks facing modern public policy (Dietz, Ostrom, and Stern, 2003).

Second, the use of natural resources can produce significant externalities. Emitting chlorofluorocarbons depletes the ozone layer, which, if unchecked, will cause an increase in harmful ultraviolet radiation on the earth's surface. Converting mangroves

into shrimp farms alters the populations of other fish species that use the areas for reproduction and feeding. It also adversely affects the opportunities for rural populations—which tend to be among the poorest in a country—to harvest a variety of products from the coastal areas. Harvesting trees on a hillside may alter the species composition mix of the local area and, through siltation, that of nearby rivers and lakes. Effective governance of natural resources, then, must take externalities into account in order to avoid negative cascading effects.

Third, the spatial and temporal nature of natural resources and their potential externalities rarely conform to existing political institutions. Jurisdictions rarely exist with the same boundaries as watersheds or airsheds. Environmental problems often take decades or even centuries to emerge; their solutions need policies with equally long time horizons. Unless political institutions are extraordinarily well crafted, however, they enable politicians, users, and officials to embrace short time horizons. Policymakers frequently have strong incentives to ignore some of the most serious threats to the sustainability of natural resources and the related benefits that local as well as larger populations could obtain over time.

Fourth, natural resource systems are complex. Often such systems produce multiple goods and services, sometimes dozens—each of which has its own set of inputs and outputs in its production. And the production of goods is likely nonlinear. Each of the goods may have its own distinct spatial ranges at any point in time. Each may interact with other goods. Some may have more resilience than others when responding to interruptions to their production. Such complexity challenges any attempt to create institutions to manage natural resources, especially those that propose free-market



privatization, top-down centralized control, or bottom-up decentralized control as the “only” way to organize (E. Ostrom, forthcoming).

Many reforms attempt to streamline government organizations—a strategy that makes the resulting governance structure unable to deal with the complexity of the world of resources. Constitutional systems that generate adequate information at multiple scales and provide legitimate decision-making procedures without being too complicated for the different actors involved have a better chance of succeeding in the challenges to govern common-pool resources than simple systems at any one scale.

The effectiveness of human institutions in regulating the competition over and access to a particular common-pool resource depends on how successful human institutions are in dealing with a series of context-specific collective-action problems. These collective-action problems are present in all efforts to govern common-pool resources, regardless of whether a particular system has a centralized or decentralized governance structure. The conditions for addressing these problems effectively, however, may be quite different depending on how decision-making authority is distributed throughout the system’s structure. In the next section, we look at the pros and cons of a fully decentralized structure in addressing some of these fundamental problems.

### **The Pros and Cons of Fully Decentralized Regimes**

Why may a series of relatively autonomous, self-organized, resource governance systems do a better job of managing their natural resources than a single central authority?

Drawing on E. Ostrom (2005), we outline the potential advantages and disadvantages of fully decentralized systems. Decentralization is in many respects a reaction to earlier efforts to centralize the governance of natural resources.

In the 1970s and 1980s, a widely shared presumption was that the single best method for governing natural resources was transferring ownership and responsibility to large-scale, national governments (see, e.g., Grainger, 1993). It was thought that only a strong central government was capable of constraining citizens' demand for resources, which—if unabated by the central powers—would eventually lead to the destruction of the resources. By the end of the 1980s, however, an increasing number of scientific studies challenged the centralist view of natural resource governance, showing that numerous local user groups have successfully self-governed their natural resources (see Feeny, 1988; Higgs, 1996; Lam, 1998; National Research Council, 1986, 2002; E. Ostrom, 1990). Some analysts saw these studies as support for a strategy to turn over all governance responsibilities to local users and consequently pushed for extensive decentralization reforms. Scholars and some policymakers, infatuated with the local sphere, have come to expect that local actors are always able and willing to govern their natural resources effectively. While sufficient evidence exists that local users *can* self-organize in many settings to develop effective governance mechanisms, the capabilities of a governance system that is strictly organized horizontally at a local level are limited.

Among the theoretical advantages of a fully decentralized governance regime for common-pool resources are:

- *Local knowledge.* Users who have lived with and harvested from a resource system over a long period of time will have developed relatively accurate mental models of how their biophysical system operates, since their harvesting success efforts depend on such knowledge.

- *Inclusion of trustworthy participants.* Users can devise rules to increase the probability that others are trustworthy and will use reciprocity. This lowers the cost of relying entirely on formal sanctions and hiring many guards.
- *Reliance on disaggregated knowledge.* Feedback about how the resource system responds to harvesting is provided directly and rapidly. Fishers are aware, for example, of changes in the size and species distribution of their catch over time. Irrigators learn whether a particular rotation system allows most farmers to grow the crops they most prefer.
- *Better-adapted rules.* Local users are more likely to craft better-adapted rules for local common-pool resources than any general system of rules for a larger array of resource systems.
- *Lower enforcement costs.* Since local users have to bear the cost of monitoring, they are apt to craft rules that make infractions highly obvious so that monitoring costs are lower.
- *Redundancy.* The probability of failure throughout a large region is greatly reduced by the establishment of parallel systems of rule making, interpretation, and enforcement. While some groups may fail to govern successfully, others do so. Thus, the more drastic costs of a failure of a centralized unit over a large terrain are offset by other local successes.

Limitations exist, however, to all ways of organizing the governance of resources.

Among the limits of a highly decentralized system are:

- *Some local users do not organize.* While the evidence from the field is that many local users do invest considerable time and energy in their own

regulatory efforts, others do not. Many reasons exist for why some groups do not organize, including the presence of a low-cost alternative resource (and thus a reduced dependency on the resource), considerable conflict among users, lack of leadership, and fear of having their efforts overturned by higher authorities. Some potential organizations never form and some do not survive for long.

- *Some local efforts will fail.* Given the complexity of the design task, some groups will select rules that do not work well together and generate a failure. They may be unable to adapt rapidly enough to avoid the collapse of a resource system.
- *Local tyrannies.* Not all self-organized resource governance systems will be organized democratically or rely on the input of users (Platteau, 2004; Platteau and Gaspart, 2003). Some will be dominated by a local leader or an elite who only change rules for their own advantage. This problem is accentuated in locations where the cost of exit is particularly high and reduced where users can leave.
- *Stagnation.* Where local ecological systems are characterized by considerable variance, experimentation can produce unexpected results leading users to cling to systems that have worked well in the past and stop innovating long before they develop new rules likely to lead to better outcomes.
- *Inappropriate discrimination.* The use of identity tags is frequently an important method for increasing the level of trust and rule conformance (Holland, 1995). Tags based on ascribed characteristics can, however, be the

basis of excluding some individuals from access to sources of productive endeavor that has nothing to do with their trustworthiness.

- *Limited access to scientific information.* While time and place information may be extensively developed and used, local groups may not have access to scientific knowledge concerning the type of resource system involved.
- *Conflict among users.* Without access to external conflict-resolution mechanisms, conflict within and across common-pool resource systems can escalate and provoke physical violence. Two or more groups may claim the same territory and may continue to make raids on one another over a very long period of time.
- *Inability to cope with larger-scale common-pool resources.* Without access to larger-scale jurisdiction, local users may have substantial difficulties regulating part of a larger-scale common-pool resource.

The disadvantages associated with decentralized governance arrangements have been used by some scholars to argue for the centralization of natural resource governance. Yet, others have made similar lists of the advantages and disadvantages of *centralized* governance only to conclude that a decentralized governance structure is the best way of dealing with the perceived failures of centralization. We suggest that both views are right to point out the problems as well as opportunities associated with either centralized and decentralized governance approaches. We disagree, however, with the prescriptions of either entirely centralized or entirely decentralized governance systems. There are difficulties with both prescriptions, because the adequacy of a particular governance structure depends on several context-specific attributes. As analysts, we

argue, it is important to recognize the inherent imperfections in all human governance arrangements, decentralized or centralized, for dealing with complex resource problems.

Public policy scholars working on governance issues related to natural resources would benefit from scholarly contributions of landscape ecologists and those working on hierarchy theory. Many scholars have contributed to a general theory of complex systems composed of subsystems at many vertical levels and quasi nested in a hierarchical set of systems. For example, Herbert Simon (1973, 2000) has made many contributions to this growing field. Hierarchical levels tend to be separated by the rate of processes among units. Higher levels are frequently both larger and contain slower processes while lower levels tend to be smaller and characterized by more rapid change (see Ahl and Allen, 1996; Wu and David, 2002). One can never match every level of an ecological system to a corresponding governance arrangement, but organizing all governance at the level of a full nation *or* at the smallest governmental scale makes it extraordinarily difficult to match problems with solutions.

In decentralized structures, one of the main challenges is how to design institutions and policies so that elected local officials have an incentive to support local resource users to manage resources in a sustainable manner (Gibson and Lehoucq, 2003; Lutz and Caldecott, 1997; Ribot, 2002). In centralized systems, one of the main constraints is to devise rules that are effective in a variety of different local circumstances, including different local peoples' needs, problems, and knowledge, as well as the characteristics of the resources that they use. Given these imperfections, it is more productive for both analysts and decision makers to accept that no single structure is necessarily superior to the other. The feasibility of any given governance structure is

likely to depend on a series of context-specific factors, such as the nature of the resource to be governed; the extent to which local resource users are organized to create, monitor, and enforce the rules for resource use and management; and the degree to which these local organizational arrangements interact and collaborate with other actors who are external to the community.

The challenge, then, is to design institutional systems that simultaneously capitalize on the advantages of a particular governance arrangement while relying on institutional back-up systems that can help offset the imperfections. The task of analysts is to sort out the design of such complex systems through careful empirically-grounded analyses. In the next section, we review some of the existing empirical research on the institutional conditions for effective decentralized governance of natural resources in developing societies.

### **Empirical Findings on Decentralized Natural Resource Governance**

Whether examined in the context of formal federal structures or the informal rules of rural communities, scores of books and articles now laud the positive effects of decentralized governance. Such work is also consonant with the current development thinking of donors and multilateral lending agencies (e.g., IDB, 1994; OECD, 1997; World Bank, 1988, 1997) that now fund scores of projects incorporating decentralization as at least part of their goals. The existing empirical literature on decentralized natural resource governance may be summarized into four core findings.

First, scholars have observed that a major constraint for effective decentralized decision making is that central governments rarely give up enough power or provide sufficient support to local authorities (Adamolekun, 1991; Agrawal and Ribot, 1999;

Bahl, 1999; Bird and Vaillancourt, 1999; Blair, 2000; Crook and Manor, 1998; Gibson, 1999; de Mello, 2000; Parry, 1997; Prud'homme, 1994; Smoke, 2003). Central governments may even use the guise of de jure decentralization policies to extend their de facto centralized authority (e.g., Gibson, 1999; Murombedzi, 2001), or to pass off a costly policy to subunits without the necessary administrative support (Adamolekun, 1991; Agrawal and Ribot, 1999; Bahl, 1999; Bird and Vaillancourt, 1999; Blair, 2000; Crook and Manor, 1998; Gibson, 1999; de Mello, 2000; Parry, 1997; Prud'homme, 1994; Smoke, 1993).

Second, scholars have also found that effective decentralization requires downward accountability. Several recent studies assert that without institutions to tie local politicians' actions to the preferences of the electorate, no decentralized strategy will work (Agrawal and Ribot, 1999; Blair, 2000; Crook and Manor, 1998; Hoffman and Gibson, 2006; Manor, 1999). Local-level elections are the most often-touted form of accountability: regular, fair, and competitive elections are thought to induce politicians to create policies that turn their newly won decentralized powers into more efficient and equitable outcomes (Agrawal and Ribot, 1999; Blair, 2000; Crook and Manor, 1998; Echeverri-Gent, 1992; Fiszbein, 1997). If elected officials are not financially accountable to local taxpayers (and most of their funds are allocated to them from the central government), it is less likely that local officials will listen to the citizens they serve (Hoffman and Gibson, 2006). Unlike the public finance literature, in which local politicians are often assumed to be benign implementers, the accountability literature presumes that officials have their own goals in mind.



Third, several policy analysts assert that effective decentralized governance requires that local governments possess sufficient internal institutional capacity to be able to operate adequately (Ellis and Mdoe, 2003; Fiszbein, 1997; Gow and Morss, 1988; Larson, 2002; Leighton, 1996; Lewis, 2003; de Oliveira, 2002; Smoke and Lewis, 1996; Warren and Issachar, 1983; Wirtshafter and Shih, 1990). To carry out its mandated functions, whatever these might be, local governments need to have a certain level of financial resources, qualified personnel, and the ability to organize their internal affairs. It is precisely this general lack of institutional capacity, these scholars argue, that limits the potential of decentralization as a performance-enhancing strategy in the nonindustrialized world.

Fourth, decentralizing environmental protection may lead to even greater levels of ecological degradation when important ecosystem services are global—or at least large scale. In this view, local governments will underinvest in environmental protection since they cannot capture all the benefits of the public goods the environment creates (Bahl, 1999; Manor, 1999). Decentralizing natural resource governance, they argue, may undermine the pursuit of the public goods of biodiversity, and global and regional climate stability. Shifting responsibility for environmental protection to lower levels of government may, under some circumstances, endanger the flora and fauna that furnish products central to the livelihoods of millions of rural people (Arnold, 1990, 1992; Costanza et al., 1997; Gibson, McKean, and Ostrom, 2000).

These empirical studies have been extremely important in informing the policy community about the particular conditions under which decentralization will have a higher likelihood of succeeding. One of the current limitations of this literature,

however, is the scope of analysis. Most of the existing studies analyze the performance of the local organization to which power and resources have been transferred through decentralization, most commonly the local government. In a more limited set of studies, the relationships with local groups are considered, as illustrated by Figure 1.

[Figure 1 about here]

Although the polycentric approach to the study of governance systems has principally been applied to the study of collective goods in metropolitan areas of the United States (but see E. Ostrom, Schroeder, and Wynne, 1993 for applications to developing countries), we argue that a polycentric perspective on decentralized natural resource management can provide several additional lessons that are useful for policy analysts. A polycentric analyst would not limit his or her analysis of decentralization to the performance of a local government unit, but would consider the relationships among governance actors, problems, and institutional arrangements at different levels of governance, as illustrated by Figure 2.

[Figure 2 about here]

### **The Polycentric Approach for Analyzing Multi-Scale Governance**

The institutional design of a given governance system can be more or less polycentric. In the real world, no perfect polycentric system exists. We refer to polycentric governance as a theoretical construct. As such, it is a broad type of a governance regime that possesses a number of specific institutional attributes capable of providing and producing essential collective goods and services to the citizens in that regime. It is a system that seeks to unleash the ingenuity, and stimulate the creativity, of political entrepreneurs. It

is a system that is structured so that actors within the system are given opportunities for institutional innovation and adaptation through experimentation and learning.

The polycentric governance approach challenges the blueprint governance model of a one-size-fits-all. All human efforts to govern natural resources face the problem of creating rules that makes sense for the particular social, biophysical, and institutional context in which the resources exist. When policymakers create generalized rule systems that may not fit the local context well, the incentives of users to manage resources responsibly are considerably weakened. The polycentric approach studies the conditions for interactive learning between local user groups and between these groups and government officials. This adaptive governance process will help the actors to craft and adjust their own rules over time, thus increasing the likelihood of these rules being effective in regulating resource use.

Highly polycentric systems are themselves complex, adaptive systems without one central authority dominating all of the others in regard to all policy arenas. Thus, there is no guarantee that such systems will find the combination of rules at diverse levels that are optimal for any particular environment. In fact, one should expect that all governance systems will be operating at less-than-optimal levels given the immense difficulty of fine-tuning any complex, multitiered system. A key aspect of all proposals for increased polycentricity (as opposed to just centralization or just decentralization) is the effort to enable institutions of multiple scales to more effectively blend local, indigenous knowledge with scientific knowledge (Berkes and Folke, 1998; McGinnis, 1999b). The key to the successful design of such institutions is their multiple scales and their generation of information that allows participants operating at many different scales

to learn from experience. The complexity of the environments involved is simply more than any single corporate entity can absorb and manage.

What institutional attributes are of special interest to a polycentric scholar? A polycentric analytical approach studies the conditions for developing adaptive systems where each has some degree of autonomy to cope with one set of discrete policy arenas. The approach assumes that governance arrangements are more effective when citizens are able and authorized to self-organize not just one but multiple governing authorities at differing scales (see V. Ostrom, 1991, 1997, forthcoming; V. Ostrom, Tiebout, and Warren, 1961). Another key assumption is that the self-governing capabilities of groups of citizens should form the basis for the design of wider-scale institutional arrangements, such as those making regional public policies and constitutional laws. In a polycentric governance system that is operationalized to a greater or lesser extent in the world of public affairs, each unit exercises considerable independence to make and enforce rules within a circumscribed scope of authority for a specified geographical area. In such a system, some units are general-purpose governments while others may be highly specialized. Self-organized resource governance systems, in such a system, may be special districts, private associations, or parts of a local government. These are nested in several levels of general-purpose governments that also provide civil, equity, as well as criminal courts.

The polycentric approach to the study of natural resource governance compares the characteristics of a given governance system—such as the decentralized rural development programs in Brazil or the highly centralized forestry regime in Peru—with that of either fully centralized or decentralized systems or other existing systems in

practice. Such comparisons yield observations of policy outcome variables as well as specific variables related to the organization of the governance arrangements that are either somewhat similar or different across systems. These observations help the scholar to construct hypothetical explanations for what institutional attributes make a particular system work better or worse than others for dealing with particular problems. As such, one of the strengths of the polycentric approach is the generation of ex-ante hypotheses about the importance of particular attributes of institutional design as related to the specifics of the resources involved.

What aspect, then, does this polycentric perspective capture that the current literature on decentralized natural resource governance has missed? The next section seeks to outline the understudied areas of research.

### **What is Missing in the Decentralization Research Agenda?**

Consistent with the research on polycentric governance, the decentralization literature has found that one of the main barriers to successful decentralization reforms is the frequent lack of opportunities provided by these policies to local resource users when it comes to acquiring and exercising effective control over the resources that they use (see, e.g., Agrawal and Ribot, 1999; Crook and Manor, 1998; Gibson, McKean, and Ostrom, 2000; Smoke, 2003). Another example of findings from the decentralization literature that resonates with polycentric governance theory is related to the importance of institutional mechanisms for citizen participation. Several existing studies describe how inclusive decision making in decentralized local economies increases the quality of public services (Ackerman, 2004; Cohen and Rogers, 1995; Fung and Wright, 2001; Goldfrank, 2002), improves responsiveness and accountability of local government (Blair, 2000; Fiszbein,

1997; Goldfrank, 2002; Ribot, 1999), and even enhances equitable access to services and productive assets (Hardee et al., 2000; UNDP, 2002). Without the possibility of local resource users voicing their preferences and sharing their local expertise in the local decision making over resource policies, the informational advantages of a decentralized governance structure are foregone.

A polycentric approach—and particularly its emphasis on relationships between governance actors who operate at different levels of governance—points to several areas that are still largely unexplored by decentralization scholars. Among these, we particularly note (1) decentralization as treatment, (2) multiscale analysis, (3) underlying incentive structures, and (4) scope, fit, and outcome measures. Next, we outline each of these areas for future studies.

### **Decentralization as Treatment**

First, and perhaps most surprisingly, many existing studies rely on research designs that make it very difficult to isolate the effects of decentralization reforms on resource governance outcomes. Most studies are qualitative, in-depth studies of local government experiences in single countries or subnational regions for a single point in time. While such studies can offer rich and detailed hypotheses about the institutional conditions for effective decentralized governance, they do not capture any variation with respect to decentralization. As a result, the analysis of decentralization effects in such studies is often speculative. We suggest that future studies would benefit from developing research designs that compare regimes with differing levels of decentralization, or acquire longitudinal data on the governance conditions and outcomes before and after a decentralization reform within a single locality. Ideally, analysts would be able to

combine the two approaches and carry out cross-sectional time-series studies on the decentralization of natural resource governance in multiple regimes.

### **Multiscale Analyses**

The realization that the relationships between different governance actors are important influences on a local government's performance has implications for the unit of analysis chosen in a research design. In the search for viable explanations to the variable outcomes of decentralized resource governance, most existing empirical studies consider the local government administration as the appropriate unit of analysis (i.e., Blair, 2000; Fiszbein, 1997; Larson, 2002). We argue that future empirical analyses would benefit from widening the unit of analysis from the local *government administrative unit* to the local *governance system*.

The logic behind this argument is that the individual characteristics of local governments are often insufficient to explain the variation in governance outcomes in decentralized regimes. Bolivia's forestry sector is a case in point, as the mandate to govern this sector is split up between six different organizations. None of these organizations have either the legal mandate or sufficient human and physical resources to govern the sector unilaterally. To be effective, we argue, the mandated actors at different levels of governance would need to build institutions for communication and reciprocal cooperation through which they can combine their resources and efforts (see Andersson, 2004). Hence, the problem of organizing decentralized governance, not only in Bolivia, is the challenge of achieving collective action among a diverse set of actors with varying interests and access to information, power, and resources.

By studying the larger picture of the local governance system—rather than just the internal dynamics of the local government unit—scholars are more likely to observe the influence of several factors that may not be observable in the local administration, but may nevertheless impact governance outcomes in important ways. For example, the broader polycentric approach is more likely to identify the potentials for interorganizational conflicts and may assess the institutional arrangements for conflict management. A system capable of managing conflicts so that they do not escalate into violent confrontations will need both local units that can respond rapidly and courts or larger units to help resolve local conflicts through arbitration and mediation.

### **Underlying Incentive Structures**

The extant literature on decentralized natural resource governance emphasizes the presence of human and physical capital to provide natural resource management-related goods and services in local jurisdictions. In the polycentric approach, technical capacity and financial resources are important but secondary to institutional incentives. If you are motivated by positive incentives, you are predisposed to seek out better options for acquiring the needed human and physical forms of capital. One of the strongest predictors for a local political leadership committed to delivering high-quality collective goods and services related to natural resource use is the incentive structure for local politicians (Hoffman and Gibson, 2006). These incentives emerge through the interactions between local politicians on the one hand, and the resource users, central government representatives, and other nongovernmental organizations on the other.



### **Institutional Scope, Fit, and Outcome Measures**

The polycentric approach emphasizes the possibility of *configural* relationships between variables to explain variation in outcomes. We suggest that future studies in this area would benefit from considering different combinations of three particular variables: (1) variation in the local institutional context, (2) the fit between the decentralization reform and other public policies, and (3) biophysical outcome measures for decentralized resource governance. Most existing decentralization studies consider one or two of these factors. Few incorporate different combinations of all three, and hence they produce a fragmented understanding of decentralized governance. While there is a growing literature on the effect of local institutions on the success of decentralized forestry policy, which we argue is the appropriate scope of these investigations, such work generally fails to include the fit between the decentralized policy and other macroeconomic policies that may affect outcomes on the landscape.

Policy studies rarely include adequate measures of resource conditions as outcome variables. They focus, instead, on policy-related variables such as levels of citizen participation, local capacity, or the implementation of specific activities. Excellent case studies of decentralized forestry policy may discuss the consequences of other macroeconomic policies, on the other hand, but do not have adequate measures of the policy outcomes. We argue that including the appropriate scope, fit, *and* outcome measures is necessary for a better understanding of the environmental performance of a decentralized regime (see Andersson and Gibson, 2007, and Moran and Ostrom, 2005 for efforts to include outcome measures as well as structural measures of institutional arrangements).

## **Constructing and Testing Hypotheses about Institutional Design**

Having identified four limitations in the decentralization literature, we now turn to a discussion of how analysts might apply the polycentric analytical approach to develop and test new hypotheses in the four areas that we flagged as currently being somewhat underdeveloped in this literature. Table 1 summarizes the main distinguishing features between the conventional decentralization literature and the polycentric analytical approach.

[Table 1 about here]

### **Decentralization as Treatment**

The isolation of the effects of decentralization on any policy outcome measure would require a comparative research design that either utilizes a cross-sectional, longitudinal, or a combined comparative approach. Let us consider an example of how such a research design might be utilized to test a variety of institutional hypotheses derived from polycentric governance theory.

Assume that we are interested in the institutional design of “decentralization” policies. One of the central questions in this area is related to the appropriate scope of local government mandates in natural resource governance. In other words, how much authority should be devolved to local governments? To assess whether it is more productive to have a policy design that devolves a restricted mandate than a mandate that gives extensive decision-making authority to local governments, we decide to compare three countries that represent different degrees of decentralization but are otherwise quite similar. We come across evidence that suggests that current forestry regimes in Bolivia, Guatemala, and Peru fit our criteria. In 1996, both Bolivia and Guatemala decided to

decentralize some governance responsibilities in their forestry sectors to their respective municipal governments. Peru, on the other hand, has not implemented any decentralization reforms during the last 20 years and represents our baseline—a pre-decentralization case. There are also differences in the degree of decentralization between Bolivia and Guatemala. The Guatemalan central government opted for handing over vast decision-making authority to the municipal governments, their Bolivian colleagues were much more restrictive in their decentralization—only authorizing Bolivian municipalities to regulate some very specific functional areas.

This research design enables the comparative analysis to assess the potential influence on policy outcomes of three different doses of decentralization treatments: high dose (Guatemala), medium dose (Bolivia), and zero dose (Peru). An alternative design for analyzing this question would be to select a decentralized country and gather overtime observations on the hypothesized causal and outcome variables related to forest governance. The challenge of this approach, of course, is the difficulty in acquiring reliable data on local institutional variables for the pre-decentralization period.

### **Multiscale Analyses**

To construct a hypothesis that specifies the role of interlevel linkages in explaining policy outcomes, we start by considering the appropriate unit of analysis for the inquiry. Policy outcomes, viewed through the lens of polycentricity, are the results of interactions between policies and actors who operate at different levels of governance. For example, even the most competent and highly motivated municipal government executive official may not be able to do much about forest destruction if the municipal mandate to intervene in the forestry sector is limited, or if the mayor's constituents strongly value

other land uses more than forestry. Hence, to explain observable policy outcomes—such as the degree of forest fragmentation, or the extent to which formal management rules are actually enforced by the local governance organization—it would make sense to consider the local governance system as the unit of analysis.

Andersson (2004) is one example of a study that uses multiscale analyses to explain governance outcomes. Comparing a sample of 32 municipal governance systems in Bolivia, the author shows that the degree of vertical and horizontal connectedness between actors at the community, municipal, and national levels is systematically linked with two different policy outcome measures: forest user ratings of public services related to forestry, and the number of formal property rights issued to formerly marginalized forest users. By extending this polycentric approach to a cross-national comparison, the analysts would be in a position to test hypotheses regarding the potential influence of constitutional design on the decision making at local levels, and consequently policy outcomes on the landscape. In a comparison between the three countries described above, one could compare to what extent the more decentralized policy design actually produces more communication between actors at different governance levels and whether this degree of connectedness helps to explain varying levels of governance performance.

For instance, in a polycentric system, the users of each common-pool resource would have the authority to make at least some of the rules related to how that particular resource will be utilized. Thus, they could achieve most of the advantages of utilizing local knowledge, and the redundancy and rapidity of a trial-and-error learning process. Returning to the comparison between Bolivia, Guatemala, and Peru, we would expect, as our first hypothesis for explaining differences in performance between the three regimes,

that the Guatemalan system would outperform the Bolivian and the Peruvian in regard to effective municipal forestry programs because the former seems to enjoy better conditions for self-governance than the other two.

On the other hand, problems associated with local tyrannies and inappropriate discrimination can often be addressed more effectively in larger, general-purpose governmental units that are responsible for protecting the rights of all citizens and for the oversight of appropriate exercises of authority within smaller units of government. This observation leads us to formulate a second hypothesis for a comparison between the three countries. If the Guatemalan decentralization policy makes local governments so autonomous that the central or regional government organizations have difficulties in holding the local executive accountable, we would expect a relative strengthening of local elites and possible increases in socioeconomic inequities—more so in Guatemala than in Bolivia and Peru.

Moreover, in a polycentric system, it is also possible to make a more effective blend of scientific information with local knowledge where major universities and research stations are located in larger units but have a responsibility to relate recent scientific findings to multiple smaller units within their region. Because polycentric systems have overlapping units, information about what has worked well in one setting can be transmitted to others who may try it out in their settings. Associations of local resource governance units can be encouraged to speed up the exchange of information about relevant local conditions and about policy experiments that have proved particularly successful. And, when small systems fail, there are larger systems to call upon and vice versa.

## **Underlying Incentive Structures**

One of the central assumptions of the polycentric approach to the study of environmental governance decentralization is that local actors may or may not be interested in environmental governance. Their interest in protecting the environment will vary with the perceived costs and benefits associated with environmental governance. A central dilemma of environmental governance is precisely that local actors need to bear a substantial part of the costs, but reap only a small part of the benefits. As analysts, we should not take local actors' interest in any form of governance activity for granted, especially when it comes to environmental governance.

The collective-goods dilemma described above raises an important question: Why would local politicians be interested in natural resource governance? Recent studies by Gibson and Lehoucq (2003), Andersson (2003), Larson (2002), and Andersson, Gibson, and Lehoucq (2006) begin to address this question. These studies explore the incentives that affect local government mayors' interest in decentralized forest policy. They find that local governance executives (mayors) are more likely to express an interest in—and actively support—municipal forest governance when they perceive clear political incentives to do so. They also find that mayors in more decentralized regimes are more likely to invest in forest governance programs than their colleagues in more centralized regimes. The reason, the authors argue, is that the mayors in decentralized regimes enjoy more opportunities to reap both political and financial benefits from forest sector investments. What these studies do not test, however, is the extent to which the constitutional design is systematically linked both to mayors' underlying incentive structures *and* observable ecological outcomes. To test such hypotheses would not only

require a cross-sectional, longitudinal research design as outlined above, but also reliable measures of ecological measures. In the next section, we suggest how such hypotheses might be developed and tested.

### **Institutional Scope, Fit, and Outcome Measures**

We view ecological outcomes as a function of complex interactions between natural, socioeconomic, and institutional processes. To study how the institutional structure—in terms of decentralization—might influence the environment, analysts need to control for the influences of natural and socioeconomic processes that also shape ecological outcomes. This is easier said than done because the three processes often interact and influence each other at the same time as impacting the environment. The environment-related rules that people create and agree to follow often depend on people's socioeconomic situation (i.e., to what extent their basic needs rely on resource extraction) as well as the biophysical nature of the resource itself (i.e., the scarcity and salience of the resource). To deal with this complexity, we suggest that explanatory models include variables that capture each of the three intertwined processes, as well as explicit interaction terms and feedback loops that capture the dynamics of these relationships.

To shed light on how the institutional design of decentralization might influence local decision processes and ecological outcomes, scholars would benefit from simultaneously considering the institutional scope and fit of decentralization policies as well as the ecological outcomes, as outlined above. Andersson and Gibson (2007) start to develop such an approach by using remotely sensed images to assess forest condition changes in 30 municipal territories in Bolivia. They find that the influence of biophysical attributes on environmental change depends to a great extent on the performance of the

municipal governance system. They also find that the results are sensitive to the type of ecological outcome variable considered. High-performing local systems tend to slow down rates of unauthorized deforestation, but have no moderating effect on total deforestation. Thanks to remote-sensing technology, it is now possible to create time-series observations of forest cover change for essentially any forest in the world over the past 35 years. This development represents a tremendous opportunity to polycentric scholars interested in testing the environmental effects of decentralization reforms.

Several theoretical debates continue to brew that do not have clear theoretical predictions. The ongoing environmental race-to-the-bottom debate is one area in which polycentric analytics could make a contribution. In this debate, some scholars argue that decentralization is likely to lead to a race to the bottom, in which local governments compete to undercut each other in environmental laxity. Others argue the exact opposite—that decentralization is more likely to generate healthy competition between local governments in providing better public services related to environmental governance. Evidence exists to support both views—even within the same locality (Galasso and Ravallion, 2005; Galiani, Gertler, and Schargrotsky, 2005; Reinikka and Svensson, 2004). The comparative research design described above—in combination with longitudinal data on natural, social, and institutional processes, including the institutional fit, scope, and forest condition measures—could be used to test both hypotheses.

### **Conclusion**

The complexity of many natural resources requires sophisticated governance systems. Actors who try to govern a complex resource face a variety of incentives that often



complicate collective efforts and subsequent outcomes. The more complex the resource is, in terms of the types of goods and services that it provides, the more perverse incentives are likely to exist unless a well-tailored set of institutional arrangements offset these incentives. Some actors may be tempted to shirk from their contributions to the governance arrangements by not attending meetings or not paying the membership fees. Others may actively try to weaken the institutions so that they can use the resource with fewer constraints. A sophisticated governance system recognizes the multiscale aspects of natural resource governance as well as the presence of countervailing incentives, and seeks to correct them. As analysts of such governance institutions, we need approaches that recognize and capture such complexities.

As the physical scale of the resource changes, so do the types of collective goods that the resource offers to users (ranging from private goods of harvested fuelwood at the microscale to global public goods of maintenance of a stable forest gene pool or storing carbon in trees to stabilize the climate). To govern a process that can provide incentives to users to safeguard the long-term delivery of such a variety of goods requires more than financial resources and accountability mechanisms at any one level of governance. Our argument explores the need for multilevel governance arrangements that rely on the explicit recognition that incentives at some scales may be incompatible with goods and services produced at a different scale.

One of the few findings in the decentralization literature with which most scholars agree is that large variation in policy outcomes exists within countries that have decentralized their governance of public goods and services. Little or no consensus exists, however, about which factors explain this variation. Many extant empirical

studies do not go beyond the boundaries of local governments to examine why some local units perform better than others under the decentralized regime. In this paper, we have argued that there are several institutional factors that are likely to determine the effectiveness of a governance system and that these are related to processes that are larger than the internal dynamic of a particular governmental administration. We suggest that the key to effective governance arrangements lies in the relationships among actors who have a stake in the governance of the resource. A polycentric approach to the study of natural resource governance makes these relationships explicit and allows the researcher to consider how a particular relationship might impact outcomes at different scales.

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## Notes

1. The story of San Rafael is described in more detail in Andersson (2002).
2. For an early discussion of types of goods, see V. Ostrom and E. Ostrom (1977). For more recent discussions, see Aggarwal and Dupont (1999), Gibson et al. (2005), E. Ostrom (2005), and Martin (1995).

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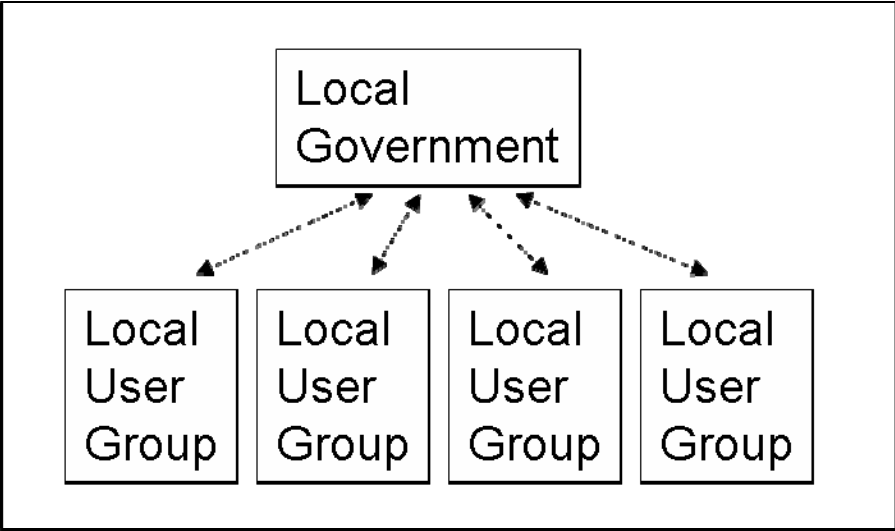
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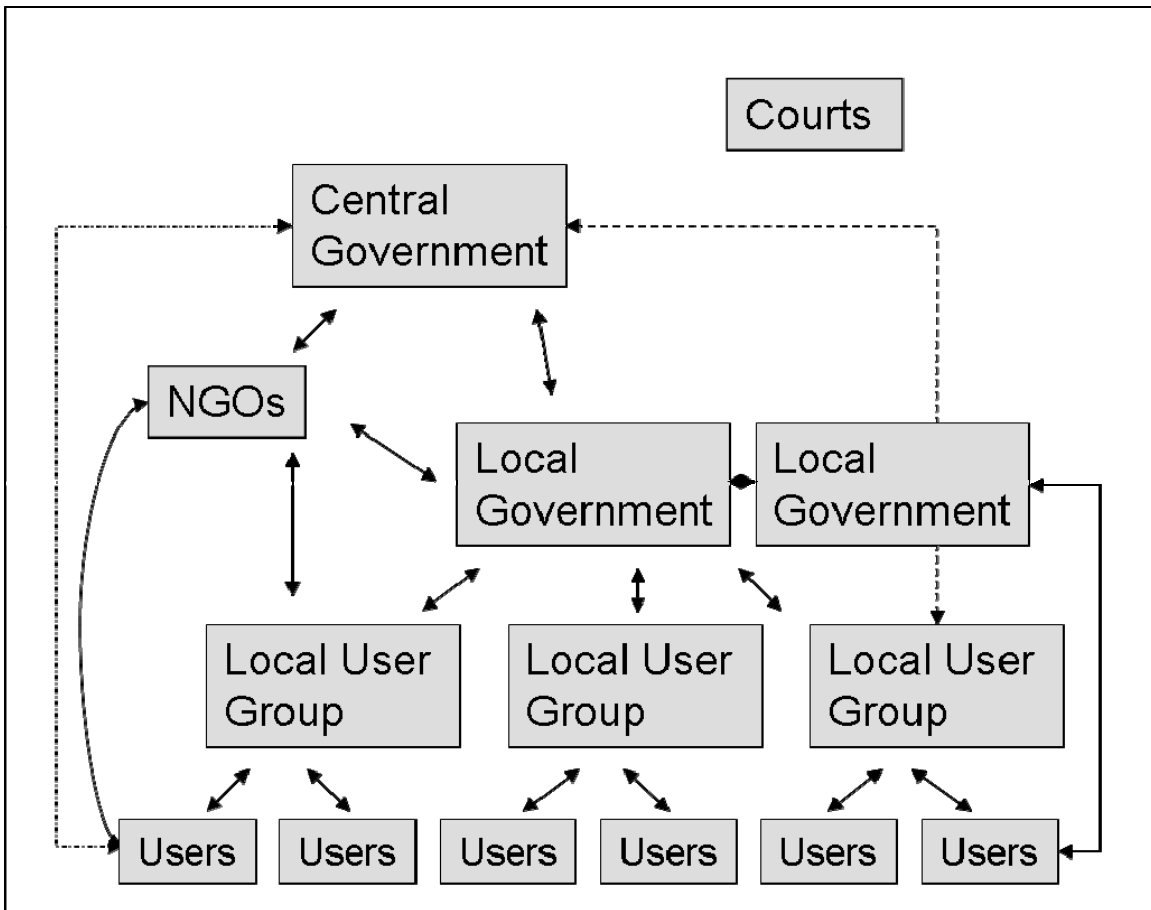
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**Figure 1** Analytical scope of mainstream decentralization studies



**Figure 2** Analytical scope of a polycentric analysis of decentralization



**Table 1** Comparison of the distinguishing features of conventional and polycentric approaches to the study of decentralization

Defining characteristics	Mainstream decentralization literature	Polycentric analytical approach
Unit of analysis	Local <i>government</i>	Territorial focus, local <i>governance</i>
Policy aspect emphasized	Scope, fit, <i>or</i> environmental outcomes	Scope, fit, <i>and</i> environmental outcomes
Key variables	Accountability, financial, and human capacity	Underlying incentive structures