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SUSTAINABLE GOVERNANCE OF COMMON-POOL RESOURCES: Context, Methods, and Politics

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■ **Abstract** This paper presents a critical assessment of the field of common property. After discussing briefly the major findings and accomplishments of the scholarship on the commons, the paper pursues two strategies of critique. The first strategy of friendly critique accepts the basic assumptions of most writings on common property to show that scholars of commons have discovered far more variables that potentially affect resource management than is possible to analyze carefully. The paper identifies some potential means to address the problem of too many variables. The second line of critique proceeds differently. It asks how analyses of common property might change, and what they need to consider, if they loosen assumptions about sovereign selves and apolitical property rights institutions. My examination of these questions concludes this review with an emphasis on the need to (*a*) attend more carefully to processes of subject formation, and (*b*) investigate common property arrangements and associated subject positions with greater historical depth.

INTRODUCTION

The literature on common pool resources and common property has grown swiftly in the last two decades (see reviews in Ostrom et al. 2002). Globally pervasive concerns about environmental degradation and resource depletion have stimulated this growth. Failures attributed to state management and market-oriented policies have made community attractive to many policy makers as an alternative actor to govern forests, pastures, water, and fisheries. Insight from students of common property has found widespread expression as policy innovations, with many governments decentralizing environmental management and promoting community-based conservation (Li 1996). In many instances, these policy shifts are redefining communities, resource management, and local arrangements to govern the commons.

This paper presents a critical assessment of the field of common property. After discussing briefly the major findings and accomplishments of the scholarship on the commons, I follow with two distinct strategies of critique. The first strategy of criticism accepts and uses concepts fundamental to writings on the commons.

These concepts include the idea of a sovereign, self-governing self and systems of property that stand above politics. This friendly critique shows that scholars of commons have discovered far more variables that potentially affect resource management than is possible to analyze carefully. I identify some possible ways to address the problem of too many variables. The second line of critique proceeds differently. It asks how analyses of common property might change, and what they need to consider, if they loosen assumptions about sovereign selves and apolitical property rights institutions. My examination of these questions concludes this review with an emphasis on the need to (*a*) attend more carefully to processes of subject formation, and (*b*) investigate common property arrangements and associated subject positions with greater historical depth.

FINDINGS AND ACCOMPLISHMENTS OF THE COMMONS LITERATURE

The major concern of writings on common property is to show that variations in forms of property rights make a difference in resource management outcomes. Such variations affect outcomes by shaping incentives of users and managers. An allied preoccupation of commons scholars has been to demonstrate that markets or private property arrangements and public ownership or state management do not exhaust the range of plausible institutional mechanisms to govern natural resource use. The alternative that commons theorists have identified—community and common ownership and management—is rooted in the practices of millions of households around the world. At the same time, it resonates with theoretical puzzles that concern scholars of social movements and revolutions, voting and other forms of political participation, collusion and cheating, formation of institutions and their maintenance, cooperation, and conflict. In all these situations, participants attempt to solve collective action problems. By focusing on the conditions under which users of renewable resources cooperate to achieve efficient management (or fail to do so), the literature on common property has created the grounds on which its findings can resonate with broader concerns in the social sciences.

In investigating the impact of different institutional structures on resource management, commons theorists have also shown the importance of both formal and informal institutions as an influence on human behavior. They have drawn and built upon the works of other property rights theorists and institutionalists (Bates 1989, Knight 1992, Libecap 1990, North 1990) but have produced additional evidence on the role of informal norms in influencing human actions. Because they conceptualize institutions deliberately in an abstract manner, as sets of enforceable rules that facilitate and constrain human action, their conclusions about property rights, a subset of institutions, possess significant generalizability. For commons theorists, property rights institutions are best seen as sets of rules that define access, use, exclusion, management, monitoring, sanctioning, and arbitration behavior of users with respect to specific resources (Schlager & Ostrom 1992). At the same

time as such rules are significant in governing patterns of use, they are also the principal mechanisms through which policies regarding resource management work (Alchian & Demsetz 1973, Furubotn & Pejovich 1974). It is not surprising therefore that findings of common property theorists have found direct application in government policy choices.

Many scholars of the commons have also come to emphasize the political nature of institutions. Institutions come into being as consequences of actions of humans and allow specific individuals and groups to reap advantages from altered social circumstances rather than allowing societies as a whole to capture efficiency gains. In this connection, the work of new institutionalists such as Knight (1992) and Bates (1981, 1989) is especially important. Earlier, property rights theorists had used a functionalist evolutionary logic to suggest that inefficient institutions are eliminated over time and efficient institutions survive (Alchian 1950, Demsetz 1967). But now commons theorists have come to emphasize the fact that institutions change mainly as a result of attempts by specific social actors, and therefore institutional change is likely to occur only when relevant political actors perceive gains from institutional change. The emergence of new institutions thus is a highly political affair (Gibson 1999, Peluso 1992). Further, whether new institutions that emerge will also be efficient for a society depends on the extent to which the interests of groups attempting institutional change intersect or overlap with those of the larger collective.

In their empirical research, scholars of commons have focused primarily on producing case studies of successful community management of coastal fisheries, forests, pastures, irrigation, and ground water (Ascher 1995, Bromley 1992, McCay & Acheson 1987, Peters 1994, Tang 1992). Their work, in conjunction with other writings on participation, indigenous knowledge, and political ecology, has encouraged resource comanagement programs by governments. Comanagement programs assign local communities shares in control over and benefits from renewable resources (Agrawal & Ribot 1999, FAO 1999). Many of them delegate only very limited authority and often communities gain only limited shares. But the altered policy environment constitutes a substantial change over the colonial and immediate postcolonial environment when states saw themselves as best suited to resource control and management. The increase in the stakes of communities has meant a resurgence of interest in community and communal management and contributed to the growth of what might be called the New Commons.

The extensive theoretical and empirical research of commons scholars pays due attention to individuals as decision makers and to the circumstances in which decisions are made. A number of writings have undertaken important theoretical development to focus on the commons dilemmas that confront communities of users (Cheung 1970, Dasgupta & Heal 1979, Oakerson 1992, Ostrom 1990, Runge 1984). These writings have helped clarify the nature of resources that are used jointly, how technological or institutional aspects of use can influence resource characteristics, and how the structure of the situations in which resources are utilized affects use and management decisions and use patterns.

Indeed, it is the institutional nature of the analysis conducted by common property theorists that makes their work so valuable in recent discussions of decentralization of environmental management. Around the world, more than 50 countries have now begun to involve local communities and lower-level decision-making units in protecting and managing the environment (FAO 1999). These new policy trends are based on the recognition that the fiscal capacity of the state to undertake coercive conservation is limited and that communities can often manage their resources better than either private actors negotiating through market-based exchanges or state actors regulating through command and control policies. In many cases, communities are seen also to be characterized by high levels of social capital, which permit them to undertake collective tasks far more efficiently in comparison to state bureaucracies, and to do so far more equitably than market-based solutions. Indeed, recent work on common property has begun to draw upon the vast literature on social capital (Putnam 1993). Several scholars have begun to examine the extent to which common property institutions are based upon stocks of social capital and whether and how they enhance the networks through which social capital is generated (Katz 2000, Muldavin 2000, Robbins 2000).

CRITIQUE FROM WITHIN

A Review of Three Studies

Although scholars of commons have demonstrated that variations in property arrangements matter and that community-based and common property institutions can guide sustainable resource use, there is widespread disagreement among them on what accounts for successful and sustainable resource use. One significant reason for divergent conclusions is that most empirical studies of commons follow the case study method. The multiplicity of research designs, sampling techniques, and data collection methods means that there are few compelling analyses that systematically test findings, compare postulated causal connections across contexts, or carefully specify the contextual and historical factors relevant to success.

These rather bold claims can be illustrated by a comparison of three of the most careful studies of the commons to appear since the mid 1980s. The works by Robert Wade (1994), Elinor Ostrom (1990), and Jean-Marie Baland & Jean-Philippe Platteau (1996) are path-breaking book-length analyses of local, community-based efforts to manage and govern common-pool resources. They are carefully comparative, theoretically informed, and, in contrast to single case-oriented research, they use a relatively large sample of cases to analyze the validity of theoretical insight. Each presents a summary set of conditions critical to sustainability of commons institutions. Together, their conclusions form a viable starting point to analyze the findings of the common property literature.

The three authors differ in their methods and research design. Wade (1994) relies primarily on original data from 31 south Indian villages in a single district. His sample is not representative of irrigation institutions in the region, but at least we

can presume that the data collection in each case is consistent. Ostrom (1990) uses detailed case studies that other scholars generated. The independent production of the research she samples means that all her cases may not have consistently collected data. But she examines each case using the same set of independent and dependent variables. Baland & Platteau (1996) motivate their empirical discussion by a wide-ranging review of the economic literature on property rights and the inability of this literature to generate unambiguous conclusions about whether private property is superior to regulated common property. To test the validity of their conclusions, they use information from several different sets of cases. In an important sense, therefore, the model specification is incomplete in each test (King et al. 1994).

Wade's analysis of commonly managed irrigation systems examines when it is that corporate institutions arise in these villages and what accounts for their success in resolving commons dilemmas. He (1994, pp. 215–16) argues for the importance of 14 conditions in facilitating successful management of the commons. According to him, effective rules of restraint on access and use are unlikely to last when there are many users, when the boundaries of the common-pool resource are unclear, when users live in groups scattered over a large area, and when detection of rule-breakers is difficult, and so on (see also Ostrom 1986; Ostrom et al. 1994, p. 319). Wade lists his conclusions in greater detail by classifying different variables under the headings of resources, technology, user group, noticeability, relationship between resources and user group, and relationship between users and the state.

Some of Wade's facilitating conditions parallel findings from other comparative work. Consider Ostrom's (1990) design principles, based on her investigation of 14 cases. A design principle for Ostrom is not part of a blueprint but "an essential element or condition that helps to account for the success of these institutions in sustaining the CPRs and gaining the compliance of generation after generation of appropriators to the rules in use" (1990, p. 90). Like Wade, Ostrom also emphasizes small group size, well-defined boundaries on resources and user groups, and ease of monitoring and enforcement. And in common with Wade, most of the principles are generalizations about local systems and relationships. Nine of her principles are present in a significant manner in all the robust commons institutions she analyzes, and the tenth covers cases that are more complex, such as federated systems.

Baland & Platteau (1996), in their comprehensive and synthesizing review of a large number of studies on the commons, begin with an examination of competing theoretical claims by scholars of property regimes. Carefully comparing features of common property with private property, they suggest that "*regulated common property and private property are equivalent from the standpoint of the efficiency of resource use*" (p. 175, emphasis in original). Note that their result is a formalization of Coase's (1960) insight that property rights are irrelevant in the absence of transactions costs and with full information. Their review of empirical studies of the commons leads them to emphasize small size of a user group, a location close to the resource, homogeneity among group members, effective enforcement

mechanisms, and past experiences of cooperation as some of the factors significant to achieve cooperation to manage resources (Baland & Platteau 1996, pp. 343–45).

The brief review above of three landmark works makes evident some of the patterns in their conclusions. They each argue that members of small local groups can design institutional arrangements to help manage resources sustainably. They go further and identify a small set of conditions that are positively related to local self management of resources. Finally, they use theoretical insight to defend and explain the empirical regularities they find.

The regularities in successful management that they discover pertain to one of four sets of variables: (*a*) characteristics of resources, (*b*) nature of groups that depend on resources, (*c*) particulars of institutional regimes through which resources are managed, and (*d*) the nature of the relationship between a group and external forces and authorities such as markets, states, and technology. Characteristics of resources can include, for example, such features as well-defined boundaries of the resource, riskiness and unpredictability of resource flows, and mobility of the resource. Characteristics of groups, among other aspects, relate to size, levels of wealth and income, different types of heterogeneity, power relations among subgroups, and past experience. Particulars of institutional regimes have an enormous range of possibilities, but some of the critical identified aspects of institutional arrangements concern monitoring, sanctions, adjudication, and accountability. Finally, a number of characteristics pertain to the relationships of the locally situated groups, resource systems, and institutional arrangements with the external environment in the form of demographic changes, technology, markets, and different levels of governance. Table 1 summarizes and lists under these four basic categories the different conditions that the three studies under consideration have identified as significant (initials in parentheses following each condition indicate which of the three studies considers that condition important).

Locating Missing Variables

The analysis of the information in Table 1 reveals significant gaps in the collective conclusions of these three authors. They pay relatively little attention to features of resources that affect sustainable governance; they also attend only cursorily to the social, political-institutional, and physical environment in which commons are situated. It is necessary to turn to other studies of commons that investigate these factors more carefully.

The limited attention to resource characteristics is unfortunate. Extensive movements of many forms of wildlife, and unpredictability of these movements, can render them ill suited to local management alone (Naughton-Treves & Sanderson 1995). The extensive spatial impact of greenhouse gases or ozone-depleting chemicals presents similar dilemmas for managers of commons because of mobility, volatility, and unpredictability in the flow of benefits.

In a carefully argued paper on resource characteristics, Blomquist et al. (1994) focus on two physical features of resource systems: stationarity and storage. Stationarity refers to whether a resource is mobile, and storage concerns the extent

TABLE 1 Synthesis of facilitating conditions identified by Wade (1994)—RW, Ostrom (1990)—EO, and Baland & Platteau (1996)—B&P

1) Resource system characteristics
   i) Small size (RW)
   ii) Well-defined boundaries (RW, EO)

2) Group characteristics
   i) Small size (RW, B&P)
   ii) Clearly defined boundaries (RW, EO)
   iii) Shared norms (B&P)
   iv) Past successful experiences—social capital (RW, B&P)
   v) Appropriate leadership—young, familiar with changing external environments, connected to local traditional elite (B&P)
   vi) Interdependence among group members (RW, B&P)
   vii) Heterogeneity of endowments, homogeneity of identities and interests (B&P)

(1 and 2) Relationship between resource system characteristics and group characteristics
   i) Overlap between user-group residential location and resource location (RW, B&P)
   ii) High levels of dependence by group members on resource system (RW)
   iii) Fairness in allocation of benefits from common resources (B&P)

3) Institutional arrangements
   i) Rules are simple and easy to understand (B&P)
   ii) Locally devised access and management rules (RW, EO, B&P)
   iii) Ease in enforcement of rules (RW, EO, B&P)
   iv) Graduated sanctions (RW, EO)
   v) Availability of low-cost adjudication (EO)
   vi) Accountability of monitors and other officials to users (EO, B&P)

(1 and 3) Relationship between resource system and institutional arrangements
   i) Match restrictions on harvests to regeneration of resources (RW, EO)

4) External environment
   i) Technology: low-cost exclusion technology (RW)
   ii) State:
      a) Central governments should not undermine local authority (RW, EO)
      b) Supportive external sanctioning institutions (B&P)
      c) Appropriate levels of external aid to compensate local users for conservation activities (B&P)
      d) Nested levels of appropriation, provision, enforcement, governance (EO)

to which it is possible to "collect and hold resources" (p. 309). After examining the impact of these two physical characteristics of resources on externalities, Blomquist et al. conclude that these factors have an impact on management because of their relationship to information. Greater mobility of resources and difficulties of storage make management more difficult for users because of problems associated with reliability and costs of information. Naughton-Treves & Sanderson (1995) also note that unpredictability adversely affects the ability of users to allocate available resources or undertake activities that augment supply.

Wade's, Ostrom's, and Baland & Platteau's inattention to external social, political-institutional, and physical environment can be illustrated with reference to three important forces that shape the contexts in which common property institutions function: demographic change, market penetration, and state policies. None of the three studies considers demographic issues carefully. Nor do they place much emphasis on market-related demands that may make local pressures on resources seem relatively trivial. But variations and changes in demographic pressures surely influence the ability of those dependent on common-pool resources to create enforceable rules. Indeed, an enormous literature focuses on questions of population and market pressures and asserts their importance.

Writings on the role of population in resource management have a long history and an impressive theoretical pedigree (Ehrlich 1968, Malthus 1960). Many conclude that population growth leads rather straightforwardly to environmental degradation (Low & Heinen 1993, Pimental et al. 1994). A smaller but vocal group of scholars suggests the impact is far more limited (Tiffen et al. 1994, Leach & Mearns 1996). The story is similar where markets are concerned, except that the terms of the debate are less polarized and there is wider agreement that increasing integration with markets usually has an adverse impact on the management of common-pool resources (Colchester 1994, Young 1994). Analogous to market articulation is the question of technological means available to exploit the commons. Sudden emergence of new technological innovations that transform the cost-benefit ratios of harvesting products from commons are likely to affect the sustainability of institutions.

The arrival of markets and new technologies, and the changes they might prompt in existing resource management regimes, is not a bloodless or innocent process (Oates 1999). New demand pressures create varying incentives about the products to be harvested, technologies of harvest, and rates of harvest. In many cases, as new market actors gain access to a particular common-pool resource, they seek alliances with state actors to defend the primacy of their claims (Azhar 1993). State officials can themselves become involved in the privatization of commons (Sivaramakrishnan 1999, Skaria 1999).

As the ultimate guarantor of property rights arrangements, the role of the state and overarching governance structures is central to the functioning of common property institutions. Although the three studies are more attentive to the potential role of central governments than they are to the role of population and market pressures, the nature of local-state relations requires more careful exploration. It is true that a number of scholars have begun to focus on resource management–related laws and national policies (Lynch & Talbott 1995, Repetto & Gillis 1988). But systematic examinations and clear understandings of variations in state-locality relationships are still missing.

One reason scholars of commons have focused relatively little on external factors like markets, technology, states, and population pressures lies simply in the nature of their intellectual enterprise. In trying to demonstrate the importance of local groups, institutions, and resource-system-related factors, they have tended

to ignore how the local is created in conjunction with the external and constituted in relation to its context. The almost exclusive focus upon the local has made the work on common property vulnerable to the same criticisms that apply to the work of those anthropologists who saw their field sites as miniature worlds in themselves, changing only in response to political, economic, or cultural influences from outside.

My argument in favor of attention to markets, demography, and the state addresses the nature and importance of contextual factors only to a partial degree. Clearly, the context of any study comprises far more than just markets, demographic changes, and encompassing governance arrangements. Context can be defined as the encompassing variables that remain constant for a given study but not across studies. Precisely because the historical, spatial, social, or political context of a given study likely remains constant for all analytical purposes, it becomes possible to ignore it. But in any real world situation, the state of contextual variables may affect the impact of variables being studied explicitly.

It is worth pointing out that even where the locality itself is concerned, and even where some important features of groups that manage commons are concerned, there are important gaps in our understanding. Take three aspects of groups as an illustration: size, heterogeneity, and poverty.

According to an enormous literature on the commons and collective action, sparked in part by Olson's seminal work (1965), smaller groups are more likely to engage in successful collective action. But later scholars (Hardin 1982) have remarked on the ambiguities in Olson's argument and suggested that the relationship between group size and collective action is not very straightforward. Marwell & Oliver (1993, p. 38) claim, "a significant body of empirical research . . . finds that the size of a group is positively related to its level of collective action." Agrawal & Goyal (2001) use two analytical features of common-pool resources—imperfect exclusion and lumpiness of third-party monitoring—to hypothesize a curvilinear relationship between group size and successful collection action and to test this hypothesis. The current state of knowledge is perhaps best summarized by Ostrom (1997), who says that the impact of group size on collective action is usually mediated by many other variables. These variables include the production technology of the collective good, its degree of excludability, jointness of supply, and the level of heterogeneity in the group (Hardin 1982, pp. 44–49).

Cumulation of knowledge into a consistent and empirically supported theory has proved even more difficult in relation to group heterogeneity. It can be argued fairly that most resources are managed by groups divided along multiple axes, among them ethnicity, gender, religion, wealth, and caste. Especially significant are gender-related differences within groups because of the often critical role women play in the gathering and harvesting of products from common-pool resources. But other forms of heterogeneity within groups can be equally pernicious and, at any rate, can have multiple and contradictory effects on the possibilities of collective action. Empirical evidence on the matter is still highly ambiguous (Baland & Platteau 1999, Quiggin 1993). Thus even in groups that have high

levels of heterogeneities of interest, it may be possible to ensure collective action if some subgroups can coercively enforce conservationist institutions (Jodha 1986, Peluso 1993; but see also Libecap 1990). On the other hand, the role of intra-group heterogeneities on distribution may be more amenable to definition. Significant research on the effects of development projects and also on commons suggests that better-off group members are often likely to gain a larger share of benefits from a resource (Agrawal 2001).

Another critical locality-related factor on which much research has been carried out without a consensus is the impact of poverty on common-pool resources. "Does poverty lead to a greater reliance on the commons (Jodha 1986) and their degradation," or "do increasing levels of wealth, at least initially, lead to greater use of commons by users" are questions on whose answer the contours of many commons-related policies would hinge. But to an important degree, government interventions in this arena are based on limited information and even less reliable analysis.

Whether group size, group heterogeneity, and poverty have a positive, negative, or neutral relationship to sustainability of commons institutions seems subject to a range of other contextual and mediating factors, not all of which are clearly understood. Elster (1992, p. 14) suggests about the study of local justice that "it is a very messy business," and that it may be impossible to identify a set of necessary and sufficient conditions that constitute a theory of local justice. His diagnosis for local justice may be equally applicable to the study of commons, as is also his prescription: Instead of making a choice between theory and description, focus on identifying mechanisms or "identifiable causal patterns" (p. 16). Commenting on a similar tendency in political analysis, Ostrom recognizes that "political systems are complexly organized, and that we will rarely be able to state that one variable is always positively or negatively related to a dependent variable" (1998, p. 16).

Table 2 constitutes an effort to supplement the set of variables presented in Table 1. The additional factors presented in the table are the ones that are not followed by the name of a particular author. Although the factors in Table 2 are among those that many scholars of commons would consider most important for achieving institutional sustainability on the commons, they do not form an exhaustive set. Nor is it likely that an undisputed exhaustive set of variables can ever be created.

Some of the factors in Table 2 are also important to the emergence of commons institutions. The overlap between conditions that facilitate emergence and those that facilitate continued successful functioning of institutions points to the close and complex relationship between origins and continued existence, without any suggestion that the two can be stated as an identical set.

Addressing Problems of Method

The list of factors in Table 2 raises some important methodological obstacles. One important problem stems from the fact that most of the conditions cited in the table are expected to pertain to all common-pool resources and institutions, rather

TABLE 2 Critical enabling conditions for sustainability on the commons. Abbreviations: Wade (1994)—RW, Ostrom (1990)—EO, and Baland & Platteau (1996)—B&P

1) Resource system characteristics
   i) Small size (RW)
   ii) Well-defined boundaries (RW, EO)
   iii) Low levels of mobility
   iv) Possibilities of storage of benefits from the resource
   v) Predictability

2) Group characteristics
   i) Small size (RW, B&P)
   ii) Clearly defined boundaries (RW, EO)
   iii) Shared norms (B&P)
   iv) Past successful experiences—social capital (RW, B&P)
   v) Appropriate leadership—young, familiar with changing external environments, connected to local traditional elite (B&P)
   vi) Interdependence among group members (RW, B&P)
   vii) Heterogeneity of endowments, homogeneity of identities and interests (B&P)
   viii) Low levels of poverty

(1 and 2) Relationship between resource system characteristics and group characteristics
   i) Overlap between user-group residential location and resource location (RW, B&P)
   ii) High levels of dependence by group members on resource system (RW)
   iii) Fairness in allocation of benefits from common resources (B&P)
   iv) Low levels of user demand
   v) Gradual change in levels of demand

3) Institutional arrangements
   i) Rules are simple and easy to understand (B&P)
   ii) Locally devised access and management rules (RW, EO, B&P)
   iii) Ease in enforcement of rules (RW, EO, B&P)
   iv) Graduated sanctions (RW, EO)
   v) Availability of low-cost adjudication (EO)
   vi) Accountability of monitors and other officials to users (EO, B&P)

(1 and 3) Relationship between resource system and institutional arrangements
   i) Match restrictions on harvests to regeneration of resources (RW, EO)

4) External environment
   i) Technology
      a) Low-cost exclusion technology (RW)
      b) Time for adaptation to new technologies related to the commons
   ii) Low levels of articulation with external markets
   iii) Gradual change in articulation with external markets
   iv) State
      a) Central governments should not undermine local authority (RW, EO)
      b) Supportive external sanctioning institutions (B&P)
      c) Appropriate levels of external aid to compensate local users for conservation activities (B&P)
      d) Nested levels of appropriation, provision, enforcement, governance (EO)

than being related to or dependent on some aspect of the situation. Consider the first two conditions in Table 2 under the broad class of resource system characteristics: small size and well-defined boundaries. According to Wade, relatively small-sized resource systems are likely to be managed better under common-property arrangements, and, according to both Ostrom and Wade, resources that have well-defined boundaries are likely better managed as common property. But it is possible in principle, and perhaps more defensible, to think of the effects of resource size or boundary definition as dependent on the state of one or more other variables.

For example, well-defined boundaries of resources may promote sustainable use when flows of benefits are predictable and groups relying on them stationary. But when there are large variations in benefit flows, and/or the group relying on the resource is mobile, then fuzzy resource boundaries may better accommodate variations in group needs and resource flows. A large body of research on pastoralists makes this point especially clearly. This example also brings home the importance of context.

As another example, consider the question of fairness in allocation of benefits from the commons. Typically, intuition as well as much of the scholarship on the commons suggests that fairer allocation of benefits is likely to lead to more sustainable institutional arrangements. But in a social context characterized by highly hierarchical social and political organization, institutional arrangements specifying asymmetric distribution of benefits may be more sustainable even if they are entirely unfair. The caste system and racial inequalities constitute two familiar examples of such hierarchical social arrangements.

The most significant problems of method are a consequence of the sheer number of conditions that seem relevant to the successful management of common-pool resources. Wade, Ostrom, and Baland & Platteau jointly identify 36 important conditions. If one eliminates the common conditions across these three studies, 24 different conditions are still to be found (as in Table 1). It is difficult to eliminate *a priori* any of the conditions they consider important. Indeed, the discussion of their substantive conclusions suggests that even the 24 factors they have identified do not exhaust the full set of conditions relevant to common-pool resource management. Once we take into account additional factors identified in the vast literature on the local governance of common-pool resources as being important, it is reasonable to suppose that the total number of factors that affect successful management of commons may be somewhere between 30 and 40 (Table 2 lists a total of 33 factors). At present, we do not have any reliable way to assess the degree of correlation among these factors.

Further, because the effects of some variables may depend on the state of other variables, any careful analysis of sustainability on the commons needs to incorporate interaction effects among variables. As soon as we concede the possibility that somewhere between 30 and 40 variables affect the management of common-pool resources, and that some of these variables may have important interactional effects, we confront tremendous analytical problems.

When a large number of causal variables potentially affects outcomes, the absence of careful research design that controls for factors that are not the subject of investigation makes it almost impossible to be sure that the observed differences in outcomes are indeed a result of hypothesized causes. If commons researchers do not explicitly take into account the relevant variables that affect success, then the number of selected cases must be (much) larger than the number of variables. But no studies of common-pool resources develop their research design by explicitly taking into account the different variables considered critical to successful management as specified in Table 2. In an important sense, then, many of the existing works on the management of common-pool resources, especially those conducted as case studies or those that base their conclusions on a very small number of cases, suffer from the problem that they do not specify carefully or explicitly the causal model they are testing. In the absence of such specification, qualitative studies of the commons are potentially subject to significant problems of method. Two of the most important of these problems are those stemming from "omitted variable bias" and the problem of endogeneity (King et al. 1994, pp. 168–82, 185–95). These biases, resulting from deficiencies of method, have the potential to produce an emphasis on causal factors that may not be relevant, ignoring other factors that may be relevant, and to generate spurious correlations.

The large number of variables potentially affecting the sustainability of institutions that govern common resources, thus, has important theoretical implications for future research. The most important implication is perhaps for research design. Because the requirements of a random or representative selection of cases are typically very hard to satisfy where common-pool resources are concerned (even when the universe of cases is narrowed geographically), purposive sampling easily becomes the theoretically defensible strategy for selecting cases whether the objective is statistical analysis or structured comparative case analysis. In purposive sampling, the selected cases will be chosen for the variation they represent on theoretically significant variables. This strategy can be defended both because it is easier to implement than an effort to select a representative sample, and because it requires explicit consideration of theoretically relevant variables (Bennett & George 2003).

The large number of variables also has implications for data analysis. One of the strategies that scholars on the commons may need to follow is to reduce the number of closely related variables by constructing indices that combine them. Thus for example, several of the factors listed under Institutional Arrangements in Table 2 may be sufficiently correlated to permit the creation of an index of "Enforcement strength." Especially suitable for such an index may be "Graduated sanctions," "Ease in enforcement of rules," and "Availability of low-cost adjudication." Such indices may also be formed out of variables listed under different headings in that table. Thus, an indicator of stress on existing institutions might be revealed by bringing together such factors as "Gradual change in levels of demand," "Low levels of articulation with external markets," and "Gradual change in articulation with external markets."

There is no general theory of purposive sampling apart from formalizations of the commonsensical consideration that selected cases should represent variation on theoretically significant causal factors. Therefore two factors are likely to be critical in research design: awareness of the variables that are theoretically relevant, and deep knowledge of the case(s) to be researched so that theoretically relevant variables can be operationalized. For example, when constructing a research design, where the variables of interest have to do with mechanisms of monitoring and sanctioning, it would be important for the researcher to be aware of the different forms of monitoring that groups can use. The presence or absence of a guard may only be indicative of the presence or absence of third-party monitoring and may reveal nothing about whether the group being studied has monitoring. Other forms of monitoring would include mutual monitoring and rotational monitoring, where households in a group jointly share the tasks related to monitoring and enforcement.

The information presented in Table 2, organized under four major categories, can therefore be useful in the creation of a research design and case selection for comparative studies or data collection for statistical studies. Given a particular context, the information in Table 2 can help in the selection of the variables that need closest attention in the selection of cases. For example, if the cases to be selected lie in the same ecological zone and represent the same resource type, then variables related to resource characteristics may not be very important for case selection. The obvious trade-off for this reduction in the number of variables is that the research is likely to have limited generalizability. Overall, the problems of contingent and multiple causation make it necessary that even those researchers of the commons who use statistical data (*a*) postulate causal relationships among the critical theoretical variables they have identified, (*b*) explain why the variables they do not examine are likely not important for their work, and only then (*c*) test the causal links they have postulated among their variables.

A two-pronged approach to advance the research program, related to institutional solutions to commons dilemmas, then seems advisable. On the one hand, scholars of commons need to deploy theoretically motivated comparative case analyses to identify the most important causal mechanisms and narrow the range of relevant theoretical variables and their interactions. On the other hand commons scholars also need to conduct large N-studies to identify the strength of causal relations (White & Runge 1994, McCarthy et al. 2003). Only then would it be possible to advance our understanding of how institutional sustainability can be achieved on the commons.

CONCLUSION: BEYOND APOLITICAL INSTITUTIONS AND SOVEREIGN SUBJECTS

The arguments advanced in the previous section do not question any of the basic assumptions on which most studies of the commons are founded. Recent developments in social theory, especially the contributions of scholars of resistance, the

subaltern collective, and poststructuralist work drawing on insights of Foucault, suggest exciting avenues for exploration by students of commons.

Perhaps the most striking question for theorists of commons lies in arguments about the extent to which they attend to intra-group politics and issues of power and resistance. In their preoccupation with sustainable management and successful institutions, they may have ignored the possibility that all successful enforcement institutions are also coercive, and the burden of coercion tends to fall unequally on those who are less powerful. Indeed, if institutions are the product of conscious decisions of specific individuals and groups, as many commons theorists argue, then it may also be reasonable to suppose that institutional choices by powerful groups deliberately aim to disadvantage marginal and less powerful groups. The other side of the coin of institutional sustainability then turns out to be unequal allocation of benefits from commonly managed resources: not as a by-product but as a necessary consequence!

If existing institutions are the expression of past political alignments, attention to current political relationships within communities can help produce a better understanding of how existing institutions are contested and what future institutions may look like. Institutional arrangements for allocating resources are best viewed as an expression of an idealized status quo. Actual human behavior, even in the context of well-enforced institutional rules, is unlikely to conform precisely to institutional contours. Perfect enforcement is far too costly ever to be achieved. When resources devoted to enforcement of institutions are limited, resource use patterns are far more likely to diverge from what rules specify. Attention to power and micro-politics within communities is therefore critical in understanding how resources are used and managed (Gibson 1999; Moore 1998, 1999). The point is not just to try to understand politics because its effects on resource use and governance are mediated through the prism of institutions. Rather, it is also to try to understand how political relationships imbue resource use even without being mediated by institutional arrangements.

Greater attention to the dynamics of resistance and domination is likely to help explicate better the relationship between property and politics. But the investigation of the nature of power and resistance also possesses significant inherent theoretical and practical merit, as subaltern scholars and writers on everyday protest have argued (Guha & Spivak 1988, Scott 1985). Attention to strategies followed by subaltern actors in relation to resource use is critical to understanding how attempts at control and regulation are always challenged by those who are subjected to control. Issues of agency, the mutually productive relationship between domination and resistance, and the creation of institutional arrangements can be understood only with greater attention to micro-politics. Such a shift in focus can also help address the criticism that scholars of common property have, for the most part, ignored how rural residents can shape attempts by outside agents such as the state or aid agencies to intervene in their lives and modify existing patterns of resource use.

An analogous critique of commons scholarship also aims at their interest in sustainable management of resources. It is suggested by some observers of commons

theorists (Goldman 1997) that by not examining the internally differentiated nature of communities commons scholars assume that members of these communities are similarly receptive to ideas of development and efficient resource management, progress, and modernization. But the processes of development and modernization and attempts to make the use and management of commons more efficient can end up increasing state capacities to control and intervene in local affairs. By focusing on how common resources can be more efficiently managed, scholars of commons become enmeshed in the same logic of greater productivity that advocates of privatization talk about (Goldman 1997). This critique of the commons borrows extensively from Foucault's arguments about biopower and biopolitics (1990), effectively deployed by such authors as Mitchell (1991) to critique colonization and modernization in Egypt, by Escobar (1995) to question development, and by Ferguson (1994) to investigate development projects initiated by agencies like the World Bank.

A greater focus on how power works within communities and in the governance of common-pool resources can help strengthen greatly the force of writings on common property. On the one hand, such a shift in focus would facilitate a better understanding of how power and status are related to access and use of resources; on the other hand, it would complement the exclusive focus of common property theorists on institutions and rules. Ultimately, power is not just what planning and management attempt to exclude. Rather, power and politics imbue the process of management thoroughly and unavoidably. Management is not just about providing technical solutions to objective problems of development and environmental conservation. It may be important to consider that these problems and their solutions may themselves be part of a political process. Without attention to the politics that generates underdevelopment and environmental degradation as universal problems, it may be impossible to address poverty, underdevelopment, and environmental degradation effectively.

Finally, one of the most neglected aspects of resource use and management in the commons literature is the changing relationship between the environment and human beings who use environmental resources. If commons scholars consider politics only through the prism of institutions, they fail to attend to human subjectivities in relation to the environment more or less completely. It would be fair to say that changes in human subjectivities, as these occur concomitantly with changes in institutionalized governance of the environment, are the least well understood and investigated of all environment-related changes.

Institutional strategies to govern forests—to allocate, to monitor, to sanction, to enforce, to adjudicate—do not simply constrain the actions of already existing sovereign subjects. Nor is it the case that people's responses to new forms of regulatory strategies are exhausted by the continuum between resistance and conformity. Instead, it is important to recognize how these strategies and their effects on flows of power shape human subjects, their interests, and their agency. By focusing on these strategies as the means through which individuals become different kinds of subjects, it may be possible to specify the micro-mechanisms

at work in the reconfiguration of environment-related subjectivities. Explanations of why and when people respond in particular and differentiated ways to new strategies of institutionalized power require attention to their structural locations and the extent to which they are already privileged or marginalized by new strategies of power. To insist on variations in how subject positions change is also to insist on the evident fact that the effects of new institutions are neither totalizing nor permanent (Agrawal 2004). One reason there have been so few studies of the relationship between changes in subjectivities and shifts in institutional regulation is the limited historical scope of most studies of the commons. Diachronic examination of common-property arrangements together with studies of human understandings and subject positions related to the environment have the potential to transform how governance of common property is understood.

Ultimately, the success of institutional changes in prompting better use and governance of environmental resources may depend crucially on changes in human subjectivities. Attempts to change how people act, when such attempts are based solely on coercive threats in hierarchical organizations, are either formidably expensive or evidently impractical (Holmstrom 1982). It is not surprising therefore that concerns about the relationship between changes in subjectivities and emerging social and political forms have historically elicited vast amounts of investigative energies from social theorists, starting from the late nineteenth century onward (Rose 1999). Commons scholars need to focus more clearly and more directly on this underinvestigated relationship between institutions and identities as a fascinating new avenue of inquiry—one that will help build new bridges to scholarship in the social sciences and the humanities.

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Annual Review of Anthropology
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CONTENTS