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**THE INSTITUTIONAL ANALYSIS AND DEVELOPMENT FRAMEWORK:
AN APPLICATION TO THE STUDY OF COMMON-POOL RESOURCES
IN SUB-SAHARAN AFRICA**

by

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Workshop in Political Theory and Policy Analysis
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Frameworks, Theories, and Models

The intellectual foundations for undertaking institutional analyses and recommending institutional reforms exist at three levels that are often confused with one another. These essential foundations include: (1) frameworks, (2) theories, and (3) models. Analyses conducted at each level provide different degrees of specificity related to a particular problem.

The development and use of a general *framework* helps to identify the elements and relationships among these elements that one needs to consider when doing institutional analysis. Frameworks organize diagnostic and prescriptive inquiry. They provide the most general list of variables that should be used to analyze all types of institutional arrangements. Many differences in surface reality can be expected to result from the way these variables are assigned different values and are combined with or interact with one another. Thus, the elements contained in a framework help the analyst generate the questions that need to be addressed when first conducting an analysis.

The development and use of *theories* enables the analyst to specify which of the elements of the framework are particularly relevant for particular kinds of questions and to make general working assumptions about these elements. Thus, theories focus on a part of a framework and make specific assumptions that are necessary for an analyst to diagnose a problem, explain its sources, and formulate some solutions. Several theories are usually compatible with any framework. Economic theory, game theory, transaction cost theory, social choice theory, covenantal theory, and theories of public goods and common-pool resource provision, production, and consumption are all compatible with the Institutional Analysis and Development (IAD) framework discussed in this paper.

Development and use of *models* make precise assumptions about a limited set of parameters and expected outcomes. Multiple models are compatible with most theories. A recent effort to understand the strategic structure of the games that irrigators play in different organized irrigation systems, for example, developed four families of models just to begin to explore the likely consequences of different institutional and physical combinations relevant to understanding how successful farmer organizations arranged for monitoring and sanctioning activities (Weissing and Ostrom, 1991).

For policymakers and scholars interested in issues related to how different governance systems enable individuals to solve problems democratically, the IAD framework helps to organize diagnostic, analytical, and prescriptive capabilities. It also aids in the accumulation of knowledge from empirical studies and in the assessment of past efforts at reforms. Markets and hierarchies are frequently presented as fundamentally different "pure types" of organization. Not only are these types of institutional arrangements perceived to be different but each is presumed to require its own explanatory theory. Scholars who attempt to explain behavior within markets use microeconomic theory, while scholars who attempt to explain behavior within hierarchies use political and sociological theory. Such a view precludes a more general explanatory framework and closely related theories that help analysts to make cross-institutional comparisons and evaluations.

Without the capacity to undertake systematic, comparative institutional assessments, recommendations of reform may be based on naive ideas about which kinds of institutions are "good" or "bad" and not on an analysis of performance. This is particularly relevant now that so much attention is being paid to the enhancement or reform of various kinds of institutions. One needs a common framework and family of theories in order to address questions of reforms and transitions. Particular models then help organize specific predictions about likely outcomes of highly simplified structures. Models are useful in policy analysis when they are well-tailored to the particular problem at hand. Models can be used inappropriately when the problematic situation varies from the

assumptions of the model in a way that would substantially change the outcomes predicted from a model.

The Institutional Analysis and Development (IAD) Framework

As indicated above, an institutional framework should identify the major types of structural variables present to some extent in all institutional arrangements, but whose values differ from one type of institutional arrangement to another. The IAD framework is a multitier conceptual map that first identifies a highly simplified view of focal arenas. Focal arenas are the arena in which something problematic occurs that is of interest to the analyst. The problematic could be at a operational plane where actors interact in light of the incentives they face to generate outcomes directly in the world. Examples of operational problematics include, but are not limited to, the following:

- the task of designing the incentives of agricultural cooperative societies to ensure that products are of a quality that they command top prices in a competitive market;
- the challenge of organizing farmers to contribute resources to the protection of local watersheds to improve soil quality and water storage; and
- the question of how to invest in irrigation infrastructures so that capital investments enhance, rather than detract, from the organizational capabilities of local farmers.

The problematic could also be at a policy (or collective choice) plane where decision makers repeatedly have to make policy decisions within the constraints of a set of collective-choice rules. The policy decisions then affect the structure of arenas where individuals are making operational decisions and thus impacting directly on a physical world. The problematic could as well be at a constitutional level where decisions are made about who is eligible to participate in policy making and the rules that will be used to undertake policy making.

The first step in analyzing a problematic is to identify a conceptual unit—called an *action arena*—that can be utilized to analyze, predict, and explain behavior within institutional arrangements.

Action arenas include an *action situation* and the *actors* in that situation. An action situation can be characterized using seven clusters of variables: (1) participants, (2) positions, (3) outcomes, (4) action-outcome linkages, (5) the control that participants exercise, (6) information, and (7) the costs and benefits assigned to outcomes. An actor (an individual or a corporate actor) includes assumptions about four clusters of variables:

1. the *resources* that an actor brings to a situation;
2. the *valuation* actors assign to states of the world and to actions;
3. the way actors acquire, process, retain, and use *knowledge contingencies and information*;
and
4. the processes actors use for *selection* of particular courses of action.

An action arena refers to the social space where individuals interact, exchange goods and services, solve problems, dominate one another, or fight (among the many things that individuals do in action arenas). In field settings, it is hard to tell where one action starts and another leaves off. Life continues in what appears to be a seamless web as individuals move from home to market to work (action situations typically characterized by reciprocity, by exchange, or by team problem-solving or command). Further, within arenas, choices of actions *within* a set of rules as contrasted to choices *among* future rules are frequently made without recognizing that the plane of action has shifted. So, when a "boss" says to an "employee," "How about changing the way we do X?," and the two discuss various options and jointly agree upon a better way, they have shifted from taking actions within previously established rules to making decisions about the rules structuring future actions. Or, using IAD language, they have shifted to a collective-choice plane.

Thus, two additional steps are taken after an effort is made to understand the initial structure of an action arena. One step digs deeper and inquires into the factors that themselves affect the structure of an action arena. From this vantage point, the action arena is viewed as an intermediate conceptual unit. The values of the variables in an action arena are now viewed as dependent upon other factors.

These factors include three clusters of variables: (1) the rules used by participants to order their relationships, (2) the attributes of states of the world that are acted upon in these arenas, and (3) the structure of the more general community within which any particular arena is placed (see Kiser and Ostrom, 1982). The next section of this paper explicitly examines how shared understandings of rules, states of the world, and nature of the community affect the values of the variables characterizing action arenas (see Figure 1).

Then one can move outward from action arenas to consider methods for explaining complex structures that link sequential and simultaneous action arenas to one another (see Figure 2).

Diagnosis and Explanation within the Frame of an Action Arena

As mentioned above, the term *action arena* refers to a complex conceptual unit containing one set of variables called an *action situation* and a second set of variables called an *actor*. One needs both components—the situation and the actors in the situation—to diagnose, explain, and predict actions and results.

An Action Situation

The term *action situation* is used here to refer to an analytic concept that enables an analyst to isolate the immediate structure affecting a process of interest to the analyst for the purpose of explaining regularities in human actions and results and potentially to reform them. A common set of variables used to describe the structure of an action situation includes: (1) the set of participants, (2) the specific positions to be filled by participants, (3) the states of the world that can be affected (outcomes), (4) the set of allowable actions and their linkage to outcomes, (5) the level of control each participant has over choice, (6) the information available to participants about the structure of the action situation, and (7) the costs and benefits—which serve as incentives and deterrents—assigned to actions and outcomes. In addition, whether a situation will occur once, a known finite number of times, or indefinitely many times, affects the strategies of individuals. When explaining actions and

cumulated results within the framework of an action arena, these variables are the "givens" that one works with to describe the structure of the situation. Most operational activities can be conceptualized as involving provision, production, appropriation, and assignment (see E. Ostrom, Gardner, and Walker, 1994; E. Ostrom, Schroeder, and Wynne, 1993).

In analyzing appropriation problems having to do with overharvesting from a common-pool resource situation, for example, one needs answers to the following questions before one can begin an analysis:

- Who and how many individuals withdraw resource units (e.g., fish, water, fodder) from this resource system?
- What positions exist (e.g., members of an irrigation association, water distributors-guards, and a chair)?
- What geographic region and what events in that region are affected by these participants in these positions?
- Which types of harvesting technologies are used? (e.g., are chain saws used to harvest timber? are there open and closed seasons?, do fishers return fish smaller than some limit to the water?)
- Do appropriators take the above actions on their own initiative or do they confer with others? (e.g., before entering the forest to cut fodder, does an appropriator obtain a permit?)
- How much information do appropriators have about the condition of the resource itself, about other appropriators' cost and benefit functions, and about how their actions cumulate into joint outcomes?
- How costly are various actions to each type of appropriator, and what kinds of benefits can be achieved as a result of various group outcomes?

The Actor

The *actor* in a situation can be thought of as a single individual or as a group functioning as a corporate actor. In order to derive inferences about the likely behavior of each actor in a situation (and, thus, about the pattern of joint results that may be produced), the analyst must make assumptions about what and how participants value, what resources and information they have, their information-processing capabilities, and the internal mechanisms they use to decide upon strategies. The term "action" refers to those human behaviors for which the acting individual attaches a subjective and instrumental meaning.

For many problems, it is useful to accept the classical political economy view that an individual's choice of strategy in any particular situation depends on how he or she perceives and weighs the benefits and costs of various strategies and their likely outcomes (Radnitzky, 1987). These perceived costs and benefits include the time and resources devoted to establishing and maintaining relationships (Williamson, 1979), as well as the value that individuals attach to establishing a reputation for being reliable and trustworthy (Breton and Wintrobe, 1982). Furthermore, one can assume that the individuals who calculate benefits and costs are fallible learners who vary in terms of the number of other persons whose perceived benefits and costs are important to them and in terms of their personal commitment to keeping promises and honoring forms of reciprocity extended to them.

Fallible learners can and often do make mistakes. Settings differ, however, as to whether the institutional incentives involved encourage people to learn from these mistakes. Fallibility and the capacity to learn can thus be viewed as assumptions of a more general conception of the individual. One can then presume that the various institutional arrangements that individuals use in governing and managing common-pool resources (or other problematic situations) offer them different incentives and opportunities to learn. In some settings, the incentives lead them to repeat the mistakes of the past. In others, the rate of effective learning about how to make a resource sustainable over time is rapid. In all cases, the repertoire of institutional design principles known to individuals also affects their

capacity to change their institutions in order to improve learning and other outcomes when faced with repeated failures.

When fallible, learning individuals interact in frequently repeated and simple situations, it is possible to model them as if they had complete information about the relevant variables for making choices in those situations. In highly competitive environments, we can make the further assumption that the individuals who survive the selective pressure of the environment act as if they are maximizers of a key variable associated with survival in that environment (e.g., profits or fitness) (Alchian, 1950; Dosi and Egidi, 1987). When individuals face a relatively simple decision situation where institutions generate accurate information about the variables relevant to a particular problem, that problem can be adequately represented as a straightforward, constrained maximization problem.

The most fully developed, explicit theories of individual choice compatible with the IAD framework—game theory and neoclassical economic theory—involve extreme assumptions such as unlimited computational capability and full maximization of net benefits. For some field settings, these theories generate empirically confirmed explanatory and diagnostic results. When analyzing commodity auction markets that are run repeatedly in a setting where property rights are well defined and enforced at a relatively low cost to buyers and sellers, theories of market behavior and outcome based on complete information and maximization of profits predict outcomes very well. Using these assumptions about individual choice turns out to be a very useful way of doing institutional analysis when the problematic settings closely approximate this type of very constrained and competitive choice.

But many of the situations of interest in understanding common-pool resources and infrastructure development and maintenance are uncertain, complex, and lack the selective pressure and information-generating capabilities of a competitive market. Therefore, one can substitute the assumption of bounded rationality—that persons are intendedly rational but only limitedly so—for the assumptions of perfect information and utility maximization used in axiomatic choice theory (see

Simon, 1965, 1972; Williamson, 1985). Information search is costly, and the information-processing capabilities of human beings are limited. Individuals, therefore, often must make choices based on incomplete knowledge of all possible alternatives and their likely outcomes. With incomplete information and imperfect information-processing capabilities, all individuals may make mistakes in choosing strategies designed to realize a set of goals (V. Ostrom, 1986). Over time, however, they can acquire a greater understanding of their situation and adopt strategies that result in higher returns.

Individuals do not always have access to the same information known by others with whom they interact. For example, how much any one individual contributes to a joint undertaking is often difficult for others to judge. When joint outcomes depend on multiple actors contributing inputs that are costly and difficult to measure, incentives exist for individuals to behave opportunistically (Williamson, 1975). Opportunism—deceitful behavior intended to improve one's own welfare at the expense of others—may take many forms, from inconsequential, perhaps unconscious, shirking to a carefully calculated effort to defraud others with whom one is engaged in ongoing relationships. The opportunism of individuals who may say one thing and do something else further compounds the problem of uncertainty in a given decision situation. Moreover, the level of opportunistic behavior that may occur in any setting is affected by the norms and institutions used to govern relationships in that setting, as well as by attributes of the decision environment itself.

Predicting Outcomes

Depending upon the analytical structure of a situation and the particular model of the actor used, the analyst makes strong or weak inferences about results. In tightly constrained action situations under conditions of little or no uncertainty, where participants are motivated to select particular strategies or chains of actions that jointly lead to stable equilibria, an analyst can make strong inferences and specific predictions about likely patterns of behavior and outcomes.

When there is no limit on the number of appropriators from a common-pool resource or on the amount of harvesting activities they undertake, for example, one can develop a mathematic model of

an open-access, common-pool resource (see, for example, E. Ostrom, Gardner, and Walker, 1994). When the net benefits of harvesting to each entrant increase for the initial set of resource units sought and decrease thereafter, each appropriator acting independently tends to make individual decisions that jointly yield a deficient (but stable) equilibrium. In fisheries, this results in too many fishers chasing too few fish. In groundwater, this results in too much water being produced and depths to water becoming dangerously long. A model of an open-access, common-pool resource generates a clear prediction of a race to use up the resource leading to high social costs. Both field research and laboratory experimental research strongly support the predictions of overuse and potential destruction of open-access, common-pool resources where appropriators do not share access to arenas in which to change the open-access structure they face (E. Ostrom, Gardner, and Walker, 1994).

Many situations, however, do not generate such unambiguous results. Instead of completely independent decision making, individuals may be embedded in communities where initial norms of fairness and conservation may change the structure of the situation dramatically. Within these situations, participants may adopt a broader range of strategies. Further, they may change their strategies over time as they learn about the results of past actions. The institutional analyst examining these more open, less-constrained situations makes weaker inferences and predicts the patterns of outcomes that are relatively more or less likely to result from a particular type of situation. In laboratory experiments, for example, giving subjects in a common-pool resource situation opportunities to communicate generally increases the joint outcomes they achieve. In field settings, one can assume that helping individuals engage in face-to-face discussions will increase the probability of improved outcomes, but there are many historical factors that also affect this likelihood. Even weak inferences about likely results have an importance in specifying general tendencies. At times, it is possible to predict what will *not* occur. Predictions of impossible or very rare results are very useful when contemplating reforms.

Evaluating Outcomes

In addition to predicting outcomes, the institutional analyst must also evaluate the outcomes that are being achieved as well as the likely set of outcomes that could be achieved under alternative institutional arrangements. While there are many potential evaluative criteria, let us briefly focus on (1) economic efficiency, (2) equity through fiscal equivalence, (3) redistributive equity, (4) accountability, and (5) adaptability.

Economic Efficiency

Economic efficiency is determined by the magnitude of the change in the flow of net benefits associated with an allocation or reallocation of resources. The concept of efficiency plays a central role in studies estimating the benefits and costs or rates of return to investments, which are often used to determine the economic feasibility or desirability of donor-assisted projects. A principal reason for government intervention in an otherwise competitive market is the existence of public goods: a private market is generally not capable of efficiently allocating goods with public goods attributes (nonexcludability and nonsubtractability). Similarly, opportunistic behavior like shirking can lead to an inefficient allocation of resources. When considering alternative institutional arrangements, it is, therefore, crucial to consider how revisions in the rules affecting participants will alter behavior and, hence, the allocation of resources.

Fiscal Equivalence

There are two principal means to assess equity: (1) on the basis of the equality between individuals' contributions to an effort and the benefits they derive and (2) on the basis of differential abilities to pay. The concept of equity that underlies an exchange economy holds that those who benefit from a service should bear the burden of financing that service. And those who derive greater benefits are expected to pay more. This concept essentially expresses a concern for fiscal equivalence between the benefits derived from a public service and the costs of providing that service.

Perceptions of fiscal equivalence or a lack thereof can affect the willingness of individuals to contribute toward the development and maintenance of resource systems.

Redistributional Equity

Policies that redistribute resources to poorer individuals are of considerable importance in developing countries where distributions of wealth are highly skewed. Thus, although efficiency would dictate that scarce resources be used where they produce the greatest net benefit, equity goals may temper this objective, resulting in the development of facilities that benefit particularly needy groups. Likewise, redistributional objectives may conflict with the goal of achieving fiscal equivalence. Only wealthier individuals may have the assets to contribute resources that fully reflect the benefits they derive from using infrastructure.

These two views of equity can lead to quite different conclusions regarding the equity of institutional arrangements, particularly those used to finance goods and services. For example, if a water pump provides benefits to all users, the benefit or fiscal equivalence principle would hold that everyone using the pump should be required to pay the marginal costs associated with their use of the facility. But under the ability-to-pay principle, such fees may be deemed inappropriate because they would reduce low-income individuals' access to the pump. This view would suggest that the service be subsidized through other means (which will have equity implications of their own).

Accountability

Officials should be accountable to citizens concerning the development and use of public facilities and natural resources. Without accountability, actors can engage successfully in the various strategic behaviors. Accountability regarding the use of scarce resources is often of paramount concern, particularly in the case of donor-financed facilities. Without adequate accountability, the targeted groups are unlikely to receive the benefits of donor-assisted projects, and resources can more easily be wasted.

Concern for accountability need not conflict greatly with efficiency and equity goals. Indeed, achieving efficiency requires that information about the preferences of citizens be available to decision makers, as does achieving accountability. Institutional arrangements that effectively aggregate this information assist in realizing efficiency at the same time that they serve to increase accountability and to promote the achievement of redistributive objectives.

Adaptability

Finally, unless institutional arrangements are able to respond to ever-changing environments, the sustainability of resources and investments is likely to suffer. Rural areas of developing countries are often faced with natural disasters and highly localized special circumstances. If an institutional arrangement is too inflexible to cope with these unique conditions, it is unlikely to prosper. For example, if an irrigation system is centrally controlled and allocates only a specific amount of resources for annual and periodic maintenance, it may not be able to meet the special needs associated with a major flood that destroys a section of the canal system. Institutions subject to greater local control might have anticipated such an emergency and would have had a reserve fund and rules that made it possible to respond appropriately to various crises.

Trade-offs are often necessary in using performance criteria as a basis for selecting from alternative institutional arrangements. It is particularly difficult to choose between the goals of efficiency and of redistributive equity. This trade-off issue arises most explicitly in considering alternative methods of funding public projects. Economically efficient pricing of the use of an existing resource or facility should reflect only the incremental maintenance costs and any external or social costs associated with its use. This is the well-known, efficiency-pricing rule that requires that prices equal the marginal costs of usage. It is especially problematic in the case of goods with nonsubtractability attributes. In such instances, the marginal cost of another user utilizing the good is zero; hence, the efficient price is also zero. Zero user prices, however, require that all sources of resource mobilization are tax-based, which induce other kinds of perverse incentives and potential

inefficiencies. Evaluating how institutional arrangements compare across overall criteria is quite a challenge. Because these criteria require a summary of all costs and all benefits, only very detailed studies can even begin to derive approximate measures of efficiency, equity, and accountability. Analytical examination of the likely trade-offs between intermediate costs is valuable in attempting to understand comparative institutional performance (see E. Ostrom, Schroeder, and Wynne, 1993: ch. 5).

Explanation Viewing Action Arenas as Intermediate Conceptual Units

Underlying the way analysts conceptualize action arenas are implicit assumptions about the *rules* individuals use to order their relationships, about attributes of *states of the world and their transformations*, and about the *nature of the community* within which the arena occurs. Analysts tend to make more explicit assumptions about states of the world than they make about rules or the nature of the community.

The Concept of Rules

Rules, as we use the term, are potentially linguistic statements that refer to enforced prescriptions about what actions (or states of the world) are *required, prohibited, or permitted*. All rules are the result of implicit or explicit efforts to achieve order and predictability among humans by creating classes of persons (positions) who are then required, permitted, or forbidden to take classes of actions in relation to required, permitted, or forbidden states of the world (Crawford and Ostrom, 1995; V. Ostrom, 1991).

Rules are linguistic entities that are *contextual, prescriptive, and followable* (Shimanoff, 1980). They are *contextual* in the sense that they apply to a general set of action arenas but do not apply everywhere. The rules of chess apply *only* to situations in which participants wish to play chess, but they apply in *every* instance in which individuals want to play chess. The game of chess provides the context for the application of its rules. Rules are *prescriptive* in the sense that "those who are

knowledgeable of a rule also know that they can be held accountable if they break it" (ibid.). Rules provide information about the actions an actor "must" perform (*obligation*), "must not" perform (*prohibition*), or "may" perform (*permission*) if they are to avoid the possibility of sanctions being imposed. Rules are *followable* in the sense that it is possible for actors to perform obligatory, prohibited, or permitted actions as well as it is possible for them NOT to perform these actions. In other words, it is physically possible for actors to follow or not to follow a rule. This distinguishes *actions* that are explained by reference to *rules*, from *behavior* that is explained by *scientific laws*.

To be concerned with governance, one needs to ask where the rules that individuals use in action situations come from. In totalitarian governance systems, a ruler attempts to impose rules on most action situations occurring within its domain. It attempts to be the source of all rules and invest heavily in police and organized terror mechanisms in this effort. In totalitarian governance systems, action systems that are organized in the open rely primarily on the rules that come down from central authorities. Given the extreme sanctions that can be imposed, individuals interacting with strangers try to stay within the "letter of the law" as prescribed. Behind the scenes, however, many activities are organized using rules other than those prescribed by a central regime. Government officials try to extort bribes from citizens (or businesses) who may try to evade government regulations by keeping some things hidden and paying off officials.

As Vincent Ostrom (1993) has argued, an overcentralization of authority may actually produce an extreme break-down of authority. Special accommodations are made in secret that are exactly contra to the "letter of the law." Thus, in a totalitarian regime where individuals have had an opportunity to begin to make accommodations with one another, there are many sources of the rules used in daily life. Some of these rules are exactly contra to the prescriptions laid down by the formal government.

In an open and democratic governance system, there are also many sources of the rules that individuals use in everyday life, but it is not considered illegal or improper for individuals to self-

organize themselves and craft their own rules, so long as the activities they engage in are not illegal. In addition to the legislation and regulations of a formal central government, there are apt to be laws passed by regional, local, and special governments. Within private firms and voluntary associations, individuals are authorized to adopt many different rules for who is a member of the firm or association, how profits (benefits) are to be shared, how decisions will be made. Each family constitutes its own rule-making body.

It is possible that a governance system that is called "democratic" in its name or in the press, may still attempt to have only a single source of rules that are made by one set of officials who are elected for this purpose. This is a very barren notion of the term "democratic" or "self-governing." A truly self-governing society is one in which individuals are authorized to participate in the crafting of nested sets of rules at many different scales from the family, to the neighborhood, for particular common-pool resources or local public goods, to the workplace, to the region, to the country as a whole, or to an international realm.

When individuals genuinely participate in the crafting of multiple layers of rules, some of that crafting will occur using pen and paper. Much of it, however, will occur as problem-solving individuals interact trying to figure out how to do a better job in the future than they have done in the past. Colleagues in a workteam are crafting their own rules when they say to one another something like: "How about if you do A in the future, and I will do B, and before we ever make a decision about C again, we both discuss it and make a joint decision." In a democratic society, problem-solving individuals do this all the time. They also participate in less fluid decision-making arrangements, including elections to select legislators. Elected representatives may then engage in open, good-faith attempts to solve a wide diversity of problems brought to them by their constituents. It is also possible in a governance system where individuals are elected, for patterns to emerge that are not strictly problem solving in their nature but rather to involve the imposition of clout on one another and to find ways of differentially treating elements in the population.

Thus, when we do institutional analysis, we attempt first to understand the working rules that individuals are using in making decisions. Working rules are the rules-in-use by participants in ongoing action arenas. They are the set of rules to which participants would make reference if asked to explain and justify their actions to fellow participants. While following a rule may become a "social habit," it is possible to make participants consciously aware of the rules they are using to order their relationships. Individuals can consciously decide to adopt a different rule and change their behavior to conform to such a decision. Over time, behavior in conformance with a new rule may itself become habitual (see Shimanoff, 1980; Toulmin, 1974; Harré, 1974). The capacity of humans to use complex cognitive systems to order their own behavior at a relatively subconscious level makes it difficult for empirical researchers to ascertain what the working rules are for an ongoing action arena may be.

Once we understand the working rules, then, we attempt to understand where those rules come from. In a system governed by a "rule of law," the general legal framework in use will have its source in actions taken in constitutional, legislative, and administrative settings filled in by decisions taken by individuals in many different particular settings. In other words, the rules-in-form are consistent with the rules-in-use (Sproule-Jones, 1993). In a system that is not governed by a "rule of law," there may be central laws and considerable effort made to enforce them, but individuals attempt to evade rather than obey the law.

Rule following or conforming actions are not as predictable as biological or physical behavior explained by scientific laws. All rules are formulated in human language. As such, rules share all the problems of lack of clarity, misunderstanding, and change that typifies any language-based phenomenon. Words are "symbols that name, and thus, stand for classes of things and relationships" (V. Ostrom, 1980: 312). Words are always more simple than the phenomenon to which they refer.

The stability of rule-ordered actions is dependent upon the shared meaning assigned to words used to formulate a set of rules. If no shared meaning exists when a rule is formulated, confusion

will exist about what actions are required, permitted, or forbidden. Regularities in actions cannot result if those who must repeatedly interpret the meaning of a rule within action situations arrive at multiple interpretations. Because "rules are not self-formulating, self-determining, or self-enforcing" (V. Ostrom, 1980: 312), it is human agents who formulate them, apply them in particular situations, and attempt to enforce performance consistent with them. Even if shared meaning exists at the time of the acceptance of a rule, transformations in technology, in shared norms, and in circumstances more generally, change the events to which rules apply. "Applying language to changing configurations of development increases the ambiguities and threatens the shared criteria of choice with an erosion of their appropriate meaning" (ibid.).

What rules are important for institutional analysis? A myriad of specific rules are used in structuring complex action arenas. Scholars have been trapped into endless cataloging of rules not related to a method of classification most useful for theoretical explanations. But classification is a necessary step in developing a science. Anyone attempting to define a useful typology of rules must be concerned that the classification is more than a method for imposing superficial order onto an extremely large set of seemingly disparate rules. By asking how rules affect the structures of action situations, we can hopefully begin to develop a useful way to cluster rules that can serve as a first step in a theory about how rules relate to the structure of action situations, thereby affecting the way individuals act and achieve or produce results.

Rule Configurations

A first step toward identifying the working rules can be made, then, by examining how these working rules affect specific variables in an action situation. A set of working rules about these variables should constitute the minimal but necessary set of working rules that one would need to offer an explanation of actions and results based on the working rules used by participants to order their relationships within an action arena. Since states of the world and their transformations and the

nature of a community also affect the structure of an action situation, working rules alone never provide both a necessary and sufficient explanation of the structure of an action situation.

Adopting this view of the task, seven types of working rules can be said to affect the structure of an action situation. These are: *boundary rules*, *position rules*, *scope rules*, *authority rules*, *information rules*, *aggregation rules*, and *payoff rules*. The cumulative effect of these seven types of rules affect the structure of an action situation (partially setting the values of the variables that structure an action situation).

Boundary rules affect the number of *participants*, their attributes and resources, whether they can enter freely, and the conditions they face for leaving. Position rules establish *positions* in the situation. Scope rules delimit the *outcomes* that can be affected and working backwards, the actions linked to specific outcomes. Authority rules assign sets of actions that participants in positions at particular nodes must, may, or may not take. Authority rules, combined with the scientific laws about the relevant states of the world being acted upon, determine the shape of the decision tree—the *action-outcome linkages* and *number of iterations*. Information rules affect the *knowledge contingent information sets* of participants. Aggregation rules affect the level of *control* that a participant in a position exercises in the selection of an action at a node. Payoff rules affect the *benefits and costs* that will be assigned to particular combinations of actions and outcomes and establish the incentives and deterrents for action. The set of working rules is a *configuration* in the sense that the effect of a change in one rule may depend upon the other rules-in-use.

Let us return to the example of conducting an analysis of common-pool resources discussed above on page 6. Now, we will focus on a series of questions that are intended to help the analyst get at the rules-in-use that help structure an action situation. Thus, to understand these rules, one would begin to ask questions such as:

- Are the appropriators from this resource limited to local residents; to one group defined by ethnicity, race, caste, gender, or family structure; to those who win a lottery; to those who

have obtained a permit; to those who own required assets (such as a fishing birth or land); or in some other way limited to a class of individuals that is bounded? Is a new participant allowed to join a group by some kind of entry fee or initiation? Must an appropriator give up rights to harvest upon migrating to another location?

- How does someone move from being just a "member" of a group of appropriators to someone who has a specialized task, such as a water distributor-guard?
- What understandings do these appropriators and others have about the authorized or forbidden geographic or functional domains? Do any maps exist showing who can appropriate from which region? Are there understandings about resource units that are "off-limit" (e.g., the historical rules in some sections of Africa that particular *acacia* trees could not be cut down even on land owned privately or communally).
- What understandings do appropriators have about mandatory, authorized, or forbidden harvesting technologies? For fishers, must net size be of a particular grossness? For forest users, must they use some cutting tools and not others? What choices do various types of monitors have related to the actions they can take?
- What understandings exist concerning the rules affecting individual harvesting activities? Must certain actions require permission from or agreement of others prior to taking the action?
- What information must be held secret and what information must be made public?
- How large are the sanctions that can be imposed for breaking any of the rules identified above? How is conformance to rules monitored? Who is responsible for sanctioning nonconformers? How reliably are sanctions imposed? Are there any positive rewards offered to appropriators for any actions they can take? (e.g., is someone who is an elected official relieved on labor duties?)

The problem for the field researcher is that many of the rules-in-use are not written down. Nor can the field researcher simply be a survey worker asking a random sample of respondents about their rules. Many of the rules-in-use are not even conceptualized by participants as rules since they view rules as those prescriptions made by external authorities. Thus, in settings where the rules-in-use have evolved over long periods of time and are understood implicitly by participants but not in a self-conscious manner, obtaining information about rules-in-use requires spending some time in a site and learning how to ask nonthreatening, context-specific questions about rule configurations.¹

Physical and Material Conditions

While a rule configuration affects all of the elements of an action situation, some of the variables of an action situation are also affected by attributes of the physical and material world. What actions are physically possible, what outcomes can be produced, how actions are linked to outcomes, and what is contained in the actors' information sets are affected by the world being acted upon in a situation. The same set of rules may yield entirely different types of action situations depending upon the types of events in the world being acted upon by participants.

The attributes of states of the world and their transformation are explicitly examined when the analyst self-consciously asks a series of questions about how the world being acted upon in a situation affects the outcome, action sets, action-outcome linkages, and information sets in that situation. The relative importance of the rule configuration and states of the world in structuring an action situation varies dramatically across different types of action situations. The rule configuration almost totally constitutes some games, like chess, where physical attributes are relatively unimportant. There is little about the size of a chessboard or the shape of the pieces that contributes to the structure of a chess game. On the other hand, imagine, for a moment, switching the balls used in American and European football. The strategies available to players in these two games, and many other sports, are strongly affected by the physical attributes of the balls used, the size of the field, and the type of equipment.

The relative importance of working rules to attributes of the world also varies dramatically within action situations considered to be part of the public sector. A legislature is closer in many respects to chess than to football. Rules define and constrain voting behavior inside a legislature more than attributes of the world. Voting can be accomplished by raising hands, by paper ballots, by calling for the ayes and nays, by marching before an official counter, or by installing computer terminals for each legislator on which votes are registered. In regard, however, to organizing communication within a legislature, attributes of the world strongly affect the available options. The principle that only one person can be heard and understood at a time in any one forum strongly affects the capacity of legislators to communicate effectively with one another (see V. Ostrom, 1987).

Let us consider several attributes that are frequently used to distinguish goods and services that are more effectively provided by diverse institutional arrangements. Goods that are generally considered to be "public goods" yield nonsubtractive benefits that can be enjoyed jointly and simultaneously by many people who are hard to exclude from obtaining these benefits. Common-pool resources yield benefits where beneficiaries are hard to exclude but each person's use of a resource system subtracts units of that resource from a finite total available for harvesting.

Nonexcludability and the Free-Rider Problem

The nonexcludability of the benefits generated by a good is frequently cited as the hallmark of a good that must be provided publicly, rather than privately. When the benefits of a good are available to a group, whether or not members of the group contribute to the provision of the good, that good is characterized by nonexcludability. Where exclusion is costly, those wishing to provide a good or service face a potential free-rider or collective-action problem (Olson, 1965). Individuals who gain from the maintenance of an irrigation system, for example, may not wish to contribute labor or taxes to maintenance activities, hoping that others will bear the burden. This is not to say that all individuals will free ride whenever they can. A strong incentive exists to be a free-rider in all

situations where potential beneficiaries cannot be excluded for failing to contribute to the provision of a good or service.

When it is very costly to exclude individuals from enjoying benefits from a common-pool resource or an infrastructure facility, private, profit-seeking entrepreneurs, who must recoup their investments through *quid pro quo* exchanges, have few incentives to provide such services on their own initiative. The attribute of nonexcludability can thus lead to the problem of free-riding, which in turn leads to underinvestment in capital and its maintenance.

Because the public sector possesses the authority to finance a good using taxes and fees and to regulate usage of the good, this attribute, therefore, often requires the public sector to actively participate in the provision of the good. Public sector involvement, however, raises difficult questions concerning (1) the design of collective-choice mechanisms that accurately reflects the desires of those who will benefit from the good and (2) the means to be used to finance the construction and maintenance of the good.

A variety of institutional arrangements help beneficiaries of collective action to prevent free-riding. Provision by a governmental unit organized at a local, regional, or national level is one strategy to overcome free-rider problems, but it is not the only available approach. Private groups that can control their own membership are also able to overcome some of the problems of collective action.² Strictly private institutions can prevent free-riding if they have coordination mechanisms assuring their members that (1) the benefits they receive will be greater than the costs they pay, (2) their contributions are necessary to achieve the collective benefit, and (3) most beneficiaries will contribute their share of needed inputs (Popkin, 1981; Frohlich and Oppenheimer, 1970, 1974; Frohlich, Oppenheimer, and Young, 1971).

Public sector provision of common-pool resources or infrastructure facilities that yield nonexcludable benefits raises additional problems in determining preferences and organizing finances. When exclusion is feasible, preferences are revealed as a result of many *quid pro quo* transactions.

Producers learn about preferences through the consumers' willingness to pay for various goods offered for sale. Where exclusion is difficult, designing mechanisms that honestly reflect beneficiaries' preferences and their willingness to pay is complex, regardless of whether the providing unit is organized in the public or the private sphere. In very small groups, those affected are usually able to discuss their preferences and constraints on a face-to-face basis and to reach a rough consensus. In larger groups, decisions about infrastructure are apt to be made through mechanisms such as voting or the delegation of authority to public officials. The extensive literature on voting systems demonstrates how difficult it is to translate individual preferences into collective choices that adequately reflect individual views (Arrow, 1951; Shepsle, 1979; Buchanan and Tullock, 1962).

Another attribute of some goods with nonexcludable benefits is that, once they are provided, consumers may have no choice whatsoever as to whether they will consume. An example is the public spraying of insects. If an individual does not want this public service to be provided, there are even stronger incentives not to comply with a general tax levy. Thus, compliance with a broad financing instrument may, in turn, depend upon the legitimacy of the public-choice mechanism used to make provision decisions.

Subtractability of the Flow

Jointly used infrastructure facilities can generate a flow of services that is entirely subtractable upon consumption by one user; in other instances, consumption by one does not subtract from the flow of services available to others. The withdrawal of a quantity of water from an irrigation canal by one farmer means that there is that quantity of water less for anyone else to use. Most agricultural uses of water are fully subtractive, whereas many other uses of water—such as for power generation or navigation—are not. Most of the water that passes through a turbine to generate power, for instance, can be used again downstream. When the use of a flow of services by one individual subtracts from what is available to others and when the flow is scarce relative to demand, users will be tempted to try to obtain as much as they can of the flow for fear that it will not be available later.

Effective rules are required if scarce, fully subtractive service flows are to be allocated in a productive way. Charging prices for subtractive services obviously constitutes one such allocation mechanism. Sometimes, however, it is not feasible to price services. In these instances, some individuals will be able to grab considerably more of the subtractive services than others, thereby leading to noneconomic uses of the flow and high levels of conflict among users.

Allocation rules also affect the incentives of users to maintain a system. Farmers located at the tail end of an irrigation system that lacks effective allocation rules have little motivation to contribute to the maintenance of that system because they only occasionally receive their share of water. Similarly, farmers located at the head end of such a system are not motivated to provide maintenance services voluntarily because they will receive disproportionate shares of the water whether or not the system is well-maintained (E. Ostrom, 1995).

Consequently, for common-pool resources whose flows are highly subtractive, institutional arrangements related to the allocation of the flow of services are intimately tied to the sustainability of the resource. It is highly unlikely that one can achieve sustainability without careful attention to the efficiency, fairness, and enforceability of the rules specifying who can appropriate how much of the service flow, at what times and places, and under what conditions. Furthermore, unless responsibilities are linked in a reasonable fashion to benefits obtained, the beneficiaries themselves will resist efforts to insist that they take responsibility.

Additional Attributes

In addition to these general attributes of physical and material conditions that affect the incentives of participants, resource systems are also characterized by a diversity of other attributes that affect how rules combine with physical and material conditions to generate positive or negative incentives. Whether resource units are mobile or stationary, and whether there is storage available somewhere in a system, affect the problems that individuals governing and managing common-pool resources face (Schlager, Blomquist, and Tang, 1994). The problems of regulating a lobster fishery, for example,

are much simpler than those of regulating a salmon fishery. Similarly, allocating water in a predictable and efficient manner is easier to achieve when there is some storage in the system than when it is a run-of-the-river system.

If a natural resource system is renewable, such as many groundwater basins, the relevant time horizon for sustaining use is very long and achieving appropriate rules may mean the difference between creating a sustainable conjunctive use system and destroying a groundwater basin. Devising an effective set of rules for regulating the use of an oil pool, on the other hand, involves determining an optimal path for mining a resource. The cost of withdrawing the last units of oil will be much higher if producers have not coordinated their withdrawal patterns, but the lack of a future may not generate the incentives needed to achieve adequate regulation early in the development phase.

The size of a resource system can also have a major impact on the incentives facing participants. The length and slope of a main canal of an irrigation system not only affects the cost of its maintenance but also the strategic bargaining that exists between headenders and tailenders on an irrigation system (E. Ostrom, 1995). Increasing the number of participants is associated with increased transaction costs. How steeply the costs rise depend to a large extent on the rules-in-use and the heterogeneity of the users.

The productivity, predictability, and patchiness of a resource affects the likelihood that private-property arrangements will be successful and enhances the likelihood that common-property arrangements will be necessary (Netting, 1982). Similarly, the resilience of a multispecies ecosystem affects the sensitivity of the system to both the rules used to govern the particular system and to changes in economic or environmental conditions elsewhere (Holling, 1994). These additional attributes are slowly being integrated into a body of coherent theory about the impact of physical and materials conditions on the structure of the situations that individuals face and their resulting incentives and behavior. Analysts diagnosing resource problems need to be sensitive to the very large

difference among resource settings and the need to tailor rules to diverse combinations of attributes rather than some assumed uniformity across all resources in a particular sector within a country.

Attributes of the Community

A third set of variables that affect the structure of an action arena relates to the community. The attributes of a community that are important in affecting the structure of an action arena include the norms of behavior generally accepted in the community, the level of common understanding potential participants share about the structure of particular types of action arenas, the extent of homogeneity in the preferences of those living in a community, and the distribution of resources among those affected. The term "culture" is frequently applied to this bundle of variables.

When all appropriators from a common-pool resource, for example, share a common set of values and interact with one another in a multiplex set of arrangements, the probabilities of their developing adequate rules and norms to govern resources are much greater (Taylor, 1987). The importance of building a reputation for keeping one's word is important in such a community, and the cost of developing monitoring and sanctioning mechanisms is relatively low. If the appropriators from a resource come from many different communities and are distrustful of one another, the task of devising and sustaining effective rules is substantially increased.

Whether individuals use a written vernacular language to express their ideas, develop common understanding, share learning, and explain the foundation of their social order is also a crucial variable of relevance to institutional analysis (V. Ostrom, 1995). Without a written vernacular language, individuals face considerably more difficulties in accumulating their own learning in a usable form to transmit from one generation to the next.

Linking Action Arenas

In addition to analysis that digs deeper into the factors affecting individual action arenas, an important development in institutional analysis is the examination of linked arenas. While the concept

of a "single" arena may include large numbers of participants and complex chains of action, most of social reality is composed of multiple arenas linked sequentially or simultaneously.

When individuals wish to intervene to change the structure of incentives and deterrents faced by participants in socially constructed realities to guide (or control) participants toward a different pattern of results, they do so by attempting to change the rules individuals use to order their interactions within particular types of action arenas. How rules affect behavior and results has not, until recently, been a question at the forefront of intellectual inquiry in political science, public administration, policy sciences, organization theory, and other disciplines that study the public sector.

Some interesting and important institutional arrangements for coordinating complex chains of actions among large numbers of actors involve multiple organizations competing with one another according to a set of rules. Markets are the most frequently studied institutional arrangements that achieve coordination by relying primarily on rule-governed competitive relationships among organizations. Rule-governed competition among two or more political parties is considered by many analysts to be an important requisite for a democratic polity. Less studied, but potentially as important means for achieving responsiveness and efficiency in producing public goods and services, are arrangements that allow rule-ordered competition among two or more potential *producers* of public goods and services.

Most efforts to analyze the effects of institutional arrangements in the public sector have focused primarily on single arenas such as elections, legislatures, administrative agencies, courts, etc. A complex series of processes must be channeled through many simultaneous and sequential action arenas, however, for citizens to receive bundles of public goods and services.

Multiple Levels of Analysis

Besides there being multiple and nested action arenas, the nesting of arenas can also be conceptions across several levels of analysis. All rules are nested in another set of rules that define how the first set of rules can be changed. The nesting of rules within rules at several planes is

similar to the nesting of computer languages at several levels. What can be done at a higher level will depend on the capabilities and limits of the rules (or the software) at that level and at a deeper level. Whenever one addresses questions about *institutional change*, as contrasted to action within institutional constraints, it is necessary to recognize the following:

1. Changes in the rules used to order action at one level occur within a currently "fixed" set of rules at a deeper level.
2. Changes in deeper-level rules usually are more difficult and more costly to accomplish, thus increasing the stability of mutual expectations among individuals interacting according to a set of rules.

It is useful to distinguish three levels of rules that cumulatively affect the actions taken and outcomes obtained in any setting (Kiser and Ostrom, 1982). *Operational rules* directly affect day-to-day decisions made by the participants in any setting. *Collective-choice rules* affect operational activities and results through their effects in determining who is eligible and the specific rules to be used in changing operational rules. *Constitutional-choice rules* affect operational activities and their effects in determining who is eligible and the rules to be used in crafting the set of collective-choice rules that in turn affect the set of operational rules. There is even a "meta-constitutional" level underlying all the others that is not frequently analyzed. One can think of the linkages among these rules and related level of analysis as shown in Figure 3.

At each level of analysis there may be one or more arenas in which the types of decision made at that level will occur. In the collective choice, constitutional, and meta-constitutional situations, activities involve prescribing, invoking, monitoring, applying, and enforcing rules. The concept of an "arena" as described above does not imply a formal setting, but can include such formal settings as Legislatures and Courts. Policy making (or governance) regarding the rules that will be used to regulate operational-level choices is usually carried out in one or more collective-choice arenas as shown in Figure 4.

The working parts of the IAD framework do not always overtly show in an institutional analysis. That is the case with all frameworks. Since a framework orients the analyst to ask particular questions, it is the questions that are generated by using the framework that appear in most analyses rather than the intellectual scaffolding used by the analyst to diagnose, explain, and prescribe. The IAD framework has influenced the analysis of a diversity of questions during the past several years. These have included questions related to the organization of institutions for the provision and production of fertilizer, arabica coffee, roads, irrigation, fisheries, forest resources, primary education, and primary health. Work has been carried on in Bangladesh, Bolivia, Cameroon, Ecuador, Ghana, India, Indonesia, Ivory Coast, Liberia, Mali, Madagascar, Nepal, Nigeria, Poland, Uganda, and the United States. For readers who may be interested in seeing some of the recent applications of this approach, let me refer you to the following *partial* list of *recent* work.

Advisory Commission in Intergovernmental Relations (Ronald J. Oakerson). 1987. *The Organization of Local Public Economies*. Washington, D.C.: ACIR.

Alchian, Armen A. 1950. "Uncertainty, Evolution, and Economic Theory." *Journal of Political Economy* 58(3):211-21.

Arrow, Kenneth. ¹⁹⁶³ 1951. *Social Choice and Individual Values*. 2d ed. New York: Wiley.

Breton, Albert, and Ronald Wintrobe. 1982. *The Logic of Bureaucratic Conduct: An Economic Analysis of Competition, Exchange, and Efficiency in Private and Public Organizations*. Cambridge: Cambridge University Press.

Buchanan, James M. 1965. "An Economic Theory of Clubs." *Economica* 32(125) (Feb.): 1-14.

Buchanan, James M., and Gordon Tullock. 1962. *The Calculus of Consent*. Ann Arbor: University of Michigan Press.

Cornes, Richard, and Todd Sandler. 1986. *The Theory of Externalities, Public Goods, and Club Goods*. Cambridge: Cambridge University Press.

Crawford, Sue E.S., and Elinor Ostrom. 1995. "A Grammar of Institutions." *American Political Science Review* 89(3) (Sept.): 582-600.

Davis, Gina, and Elinor Ostrom. 1991. "A Public Economy Approach to Education: Choice and Co-Production." *International Political Science Review* 12(4):313-35.

O Dosi, Giovanni, and Massimo Egidi. 1987. "Substantive and Procedural Uncertainty: An Exploration of Economic Behaviours in Complex and Changing Environments." Paper prepared for the International Workshop on Programmable Automation and New Work Modes, Paris, April 2-4.

Eggertsson, Thráinn. 1990. *Economic Behavior and Institutions*. New York: Cambridge University Press.

~~Firmin-Sellers, Kathryn. 19xx. Cambridge University Press.~~

O Frohlich, Norman, and Joe A. Oppenheimer. 1970. "I Get By with a Little Help from My Friends." *World Politics* 23 (Oct.): 104-20.

O Frohlich, Norman, and Joe A. Oppenheimer. 1974. "The Carrot and the Stick: Optimal Program Mixes for Entrepreneurial Political Leaders." *Public Choice* 19 (Fall): 43-61.

H Fröhlich, Norman, Joe A. Oppenheimer, and Oran Young. 1971. *Political Leadership and Collective Goods*. Princeton, N.J.: Princeton University Press.

O Gibson, Clark. 1995. "Transforming Rural Hunters into Conservationists: An Assessment of Community-Based Wildlife Management Programs in Africa." *World Development* 23(6):941-57.

Self
essay
from
pubs
O Gibson, Clark, Margaret McKean, and Elinor Ostrom, eds. Forthcoming 1995. *Forest Resources and Institutions*. Forests, Trees and People Programme, Phase II, Working Paper no. 3. Rome: Food and Agriculture Organization of the United Nations.

H Herzberg, Roberta, and Vincent Ostrom. 1991. "Votes and Vetoes." In *The Public Sector—Challenge for Coordination and Learning*, ed. Franz-Xaver Kaufmann, 441-50. Berlin and New York: Walter de Gruyter.

O Hilton, Rita. 1992. "Institutional Incentives for Resource Mobilization: An Analysis of Irrigation Schemes in Nepal." *Journal of Theoretical Politics* 4(3):283-308.

Hyden, Goran. 1990. "Reciprocity and Governance in Africa." In *The Failure of the Centralized State: Institutions and Self-Governance in Africa*, ed. James Wunsch and Dele Olowu, 245-69. Boulder, Colo.: Westview Press.

Kaminski, Antoni. 1992. *An Institutional Theory of Communist Regimes: Design, Function, and Breakdown*. San Francisco, Calif.: ICS Press.

Keohane, Robert O., and Elinor Ostrom, eds. 1995. *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*. London: Sage.

Kiser, Larry L., and Elinor Ostrom. 1982. "The Three Worlds of Action: A Metatheoretical Synthesis of Institutional Approaches." In *Strategies of Political Inquiry*, ed. Elinor Ostrom, 179-222. Beverly Hills, Calif.: Sage.

Lam, Wai Fung. Forthcoming. "Improving the Performance of Small-Scale Irrigation Systems: The Effects of Technological Investments and Governance Structure on Irrigation Performance in Nepal." *World Development*.

H ✓ ^{if =} *Sub into from Path*
_____. Forthcoming. "Institutional Design of Public Agencies and Coproduction: A Study of Irrigation Associations in Taiwan." *World Development*.

Lam, Wai Fung, Myungsuk Lee, and Elinor Ostrom. Forthcoming. "The Institutional Analysis and Development Framework: Application to Irrigation Policy in Nepal." In Derick W. Brinkerhoff, ed. *Policy Analysis Concepts and Methods: An Institutional and Implementation Focus*. Greenwich, Conn.: JAI Press.

Netting, Robert McC. 1982. "Territory, Property, and Tenure." In *Behavioral and Social Science Research: A National Resource*, ed. R. McC. Adams, N. J. Smelser, and D. J. Treiman, 446-501. Washington, D.C.: National Academy Press.

_____. 1993. *Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture*. Stanford, Calif.: Stanford University Press.

Oakerson, Ronald J. 1992. "Analyzing the Commons: A Framework." In *Making the Commons Work: Theory, Practice, and Policy*, ed. Daniel W. Bromley et al., 41-59. San Francisco, Calif.: ICS Press.

_____. 1993. "Reciprocity: A Bottom-Up View of Political Development." In *Rethinking Institutional Analysis and Development: Issues, Alternatives, and Choices*, eds. Vincent Ostrom, David Feeny, and Hartmut Picht, 141-58. San Francisco, Calif.: ICS Press.

Olson, Mancur. 1965. *The Logic of Collective Action: Public Goods and the Theory of Groups*. Cambridge, Mass.: Harvard University Press.

Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.

_____. 1992. *Crafting Institutions for Self-Governing Irrigation Systems*. San Francisco, Calif.: ICS Press.

Ostrom, Elinor. 1995. "Incentives, Rules of the Game, and Development." In *Proceedings of the World Bank Annual Conference on Development Economics 1995*, forthcoming.

Ostrom, Elinor, Roy Gardner, and James Walker. 1994. *Rules, Games, and Common-Pool Resources*. Ann Arbor: University of Michigan Press.

Ostrom, Elinor, and Mary Beth Wertime. 1994. "IFRI Research Strategy." Working paper. Bloomington: Indiana University, Workshop in Political Theory and Policy Analysis.

Ostrom, Elinor, Larry Schroeder, and Susan Wynne. 1993. *Institutional Incentives and Sustainable Development: Infrastructure Policies in Perspective*. Boulder, Colo.: Westview Press.

Ostrom, Vincent. 1986. "A Fallibilist's Approach to Norms and Criteria of Choice." In *Guidance, Control, and Evaluation in the Public Sector*, ed. Franz-Xaver Kaufmann, Giandomenico Majone, and Vincent Ostrom, 229-49. Berlin and New York: Walter de Gruyter.

_____. 1991. *The Meaning of American Federalism: Constituting a Self-Governing Society*. San Francisco, Calif.: ICS Press.

_____. 1993. "Cryptoimperialism, Predatory States, and Self-Governance." In *Rethinking Institutional Analysis and Development: Issues, Alternatives, and Choices*, eds. Vincent Ostrom, David Feeny, and Hartmut Picht, 43-68. San Francisco, Calif.: ICS Press.

_____. 1995. *The Meaning of Democracy: The Vulnerability of Democracies*. Bloomington: Indiana University, Workshop in Political Theory and Policy Analysis.

Ostrom, Vincent, David Feeny, and Hartmut Picht, eds. 1993. *Rethinking Institutional Analysis and Development: Issues, Alternatives, and Choices*. 2d ed. San Francisco, Calif.: ICS Press.

H ✓ Popkin, Samuel L. 1981. "Public Choice and Rural Development—Free Riders, Lemons, and Institutional Design." In *Public Choice and Rural Development*, ed. Clifford S. Russell and Norman K. Nicholson, 43-80. Baltimore, Md.: Johns Hopkins University Press.

O ✓ Radnitzky, Gerard. 1987. "Cost-Benefit Thinking the Methodology of Research: The 'Economic Approach' Applied to Key Problems to the Philosophy of Science." In *Economic Imperialism: The Economic Approach Applied Outside the Field of Economics*, ed. Gerard Radnitzky and Peter Bernholz, 283-334. New York: Paragon House.

Sandler, Todd, and J. Tschirhart. 1980. "The Economic Theory of Clubs: An Evaluative Survey." *Journal of Economic Literature* 18(4) (Dec.): 1481-521.

Sawyer, Amos. 1992. *The Emergence of Autocracy in Liberia: Tragedy and Challenge*. San Francisco, Calif.: ICS Press.

Schlager, Edella, William Blomquist, and Shui Yan Tang. 1994. "Mobile Flows, Storage, and Self-Organized Institutions for Governing Common-Pool Resources." *Land Economics* 70(3) (Aug.): 294-317.

Schlager, Edella, and Elinor Ostrom. 1992. "Property-Rights Regimes and Natural Resources: A Conceptual Analysis." *Land Economics* 68(3) (Aug.): 249-62.

H ✓ Schroeder, Larry. 1989. *Managing and Financing Rural Road Maintenance in Developing Countries: The State of the Art*. Burlington, Vermont: Associates in Rural Development.

O ✓ Shepsle, Kenneth A. 1979. "The Role of Institutional Structure in the Creation of Policy Equilibrium." In *Public Policy and Public Choice*, ed. Douglas W. Rae and Theodore J. Eismeier, 249-83. Sage Yearbooks in Politics and Public Policy, vol. 6. Beverly Hills, Calif.: Sage.

O ✓ Simon, Herbert A. [1947] 1965. *Administrative Behavior: A Study of Decision-making Processes in Administrative Organization*. New York: Free Press.

O ✓ _____ . 1972. "Theories of Bounded Rationality." In *Decision and Organization: A Volume in Honor of Jacob Marschak*, ed. C. B. McGuire and Roy Radner, 161-176. Amsterdam: North Holland.

Sproule-Jones, Mark. 1993. *Governments at Work: Canadian Parliamentary Federalism and Its Public Policy Effects*. Toronto: University of Toronto Press.

- Tang, Shui Yan. 1991. "Institutional Arrangements and the Management of Common-Pool Resources." *Public Administration Review* 51 (Jan./Feb.): 42-51.
- _____. 1992. *Institutions and Collective Action: Self-Governance in Irrigation*. San Francisco, Calif.: ICS Press.
- Taylor, Michael. 1987. *The Possibility of Cooperation*. New York: Cambridge University Press.
- Thomson, James T. 1992. *A Framework for Analyzing Institutional Incentives in Community Forestry*. Rome, Italy: Food and Agriculture Organization of the United Nations, Forestry Department, Via delle Terme di Caracalla.
- Walker, S. Tjip. 1994a. *Crafting a Market: A Case Study of USAID's Fertilizer Sub-Sector Reform Program*. Decentralization: Finance & Management Project Report. Burlington, Vt.: Associates in Rural Development.
- _____. 1994b. *Pitfalls of Privatization: A Case Study of the European Community's Programme Spécial d'Importation d'Engrais*. Decentralization: Finance & Management Project Report. Burlington, Vt.: Associates in Rural Development.
- Weissing, Franz J., and Elinor Ostrom. 1991. "Irrigation Institutions and the Games Irrigators Play: Rule Enforcement without Guards." In *Game Equilibrium Models II: Methods, Morals, and Markets*, ed. Reinhard Selten, 188-262. Berlin: Springer-Verlag.
- Williamson, Oliver E. 1975. *Markets and Hierarchies: Analysis and Antitrust Implications*. New York: Free Press.
- _____. 1979. "Transaction Cost Economics: The Governance of Contractual Relations." *Journal of Law and Economics* 22(2) (Oct.): 233-61.
- Wunsch, James S., and Dele Olowu, eds. 1995. *The Failure of the Centralized State: Institutions and Self-Governance in Africa*. 2d ed. San Francisco, Calif.: ICS Press.
- Yang, Tai-Shuenn. 1987. "Property Rights and Constitutional Order in Imperial China." Ph.D. diss., Indiana University, Bloomington.

References Cited But Not Listed Above

- 0 Harré, R. 1974. "Some Remarks on 'Rule' as a Scientific Concept." In *Understanding Other Persons*, ed. T. Mischel. Oxford: Basil Blackwell.
- H Holling, C. S. 1994. "An Ecologist View of the Malthusian Conflict." In *Population, Economic Development, and the Environment*, ed. K. Lindahl-Kiessling and H. Landberg, 79-103. New York: Oxford University Press.
- Ostrom, Vincent. 1980. "Artisanship and Artifact." *Public Administration Review* 40 (July/Aug.): 309-17.
- _____. 1987. *The Political Theory of a Compound Republic: Designing the American Experiment*. 2d ed. Lincoln: University of Nebraska Press.
- 0 Shimanoff, S. B. 1980. *Communication Rules: Theory and Research*. Beverly Hills, Calif.: Sage.
- 0 Toulmin, S. 1974. "Rules and Their Relevance for Understanding Human Behavior." In *Understanding Other Persons*, ed. T. Mischel. Oxford: Basil Blackwell.
- 0 Williamson, Oliver. 1985. *The Economic Institutions of Capitalism*. New York: Free Press.

Notes

1. The International Forestry Resources and Institutions (IFRI) research program has faced this problem in developing research protocols that enable a network of research scholars to gather the "same" information from a sample of forestry sites located in multiple countries of the world. The recording forms can be structured and filled in by the research teams in the evening after in-depth group and individual discussions, but there cannot be a standard way of asking the questions. Anthropologists have looked upon the individuals with whom they talk as "informants" and this is the stance that one has to take in any effort to elucidate information about rules-in-use (see E. Ostrom and Wertime, 1994).
2. The theory of clubs has evolved in analyses of situations where strictly private arrangements suffice to overcome free-rider problems (see Buchanan, 1965; Sandler and Tschirhart, 1980; Cornes and Sandler, 1986).

FIGURE 1

A FRAMEWORK FOR INSTITUTIONAL ANALYSIS

Focal Arena

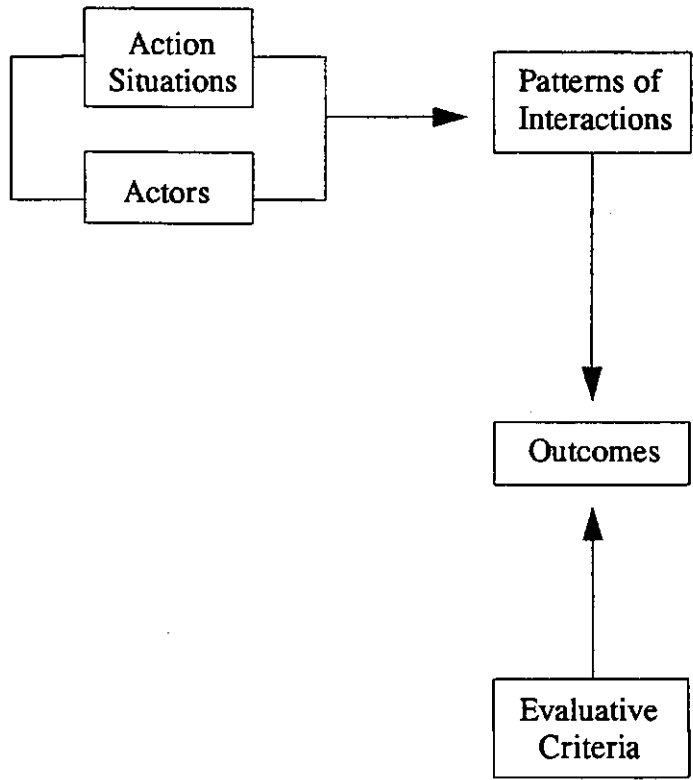


FIGURE 2

A FRAMEWORK FOR INSTITUTIONAL ANALYSIS

Embedded Arenas

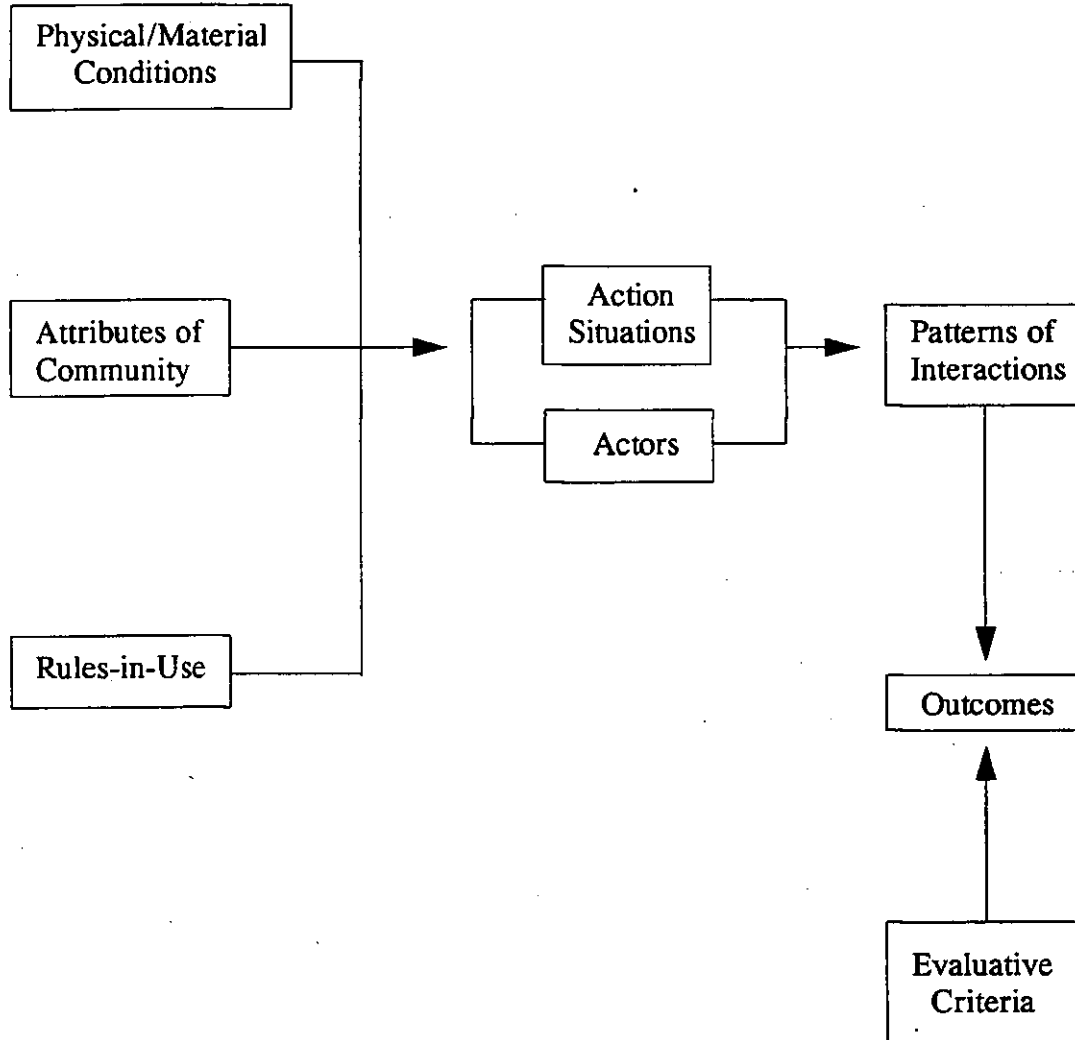


FIGURE 3

LEVELS OF ANALYSIS AND OUTCOMES

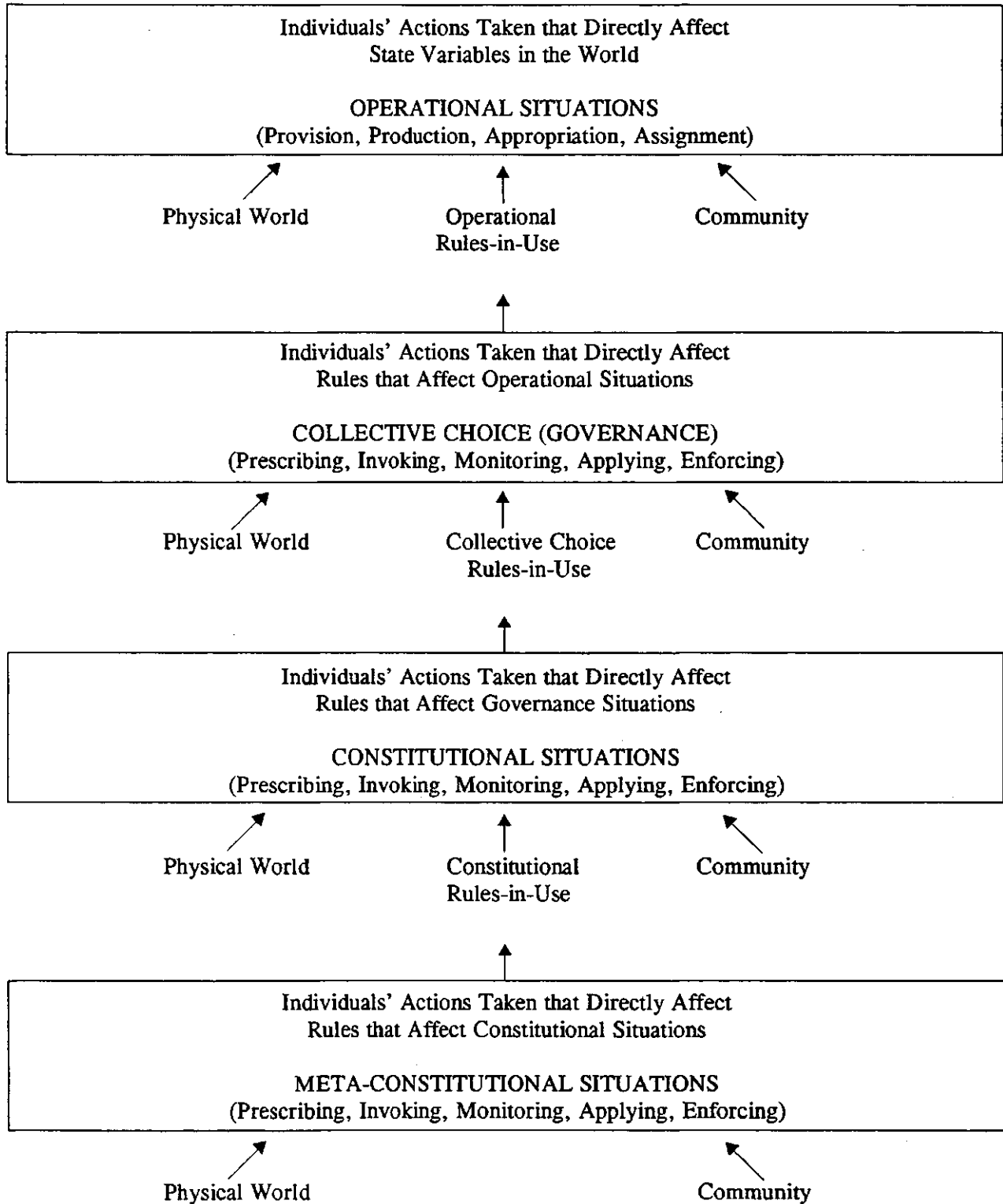


FIGURE 4

RELATIONSHIPS OF FORMAL AND INFORMAL
COLLECTIVE-CHOICE ARENAS

