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Emergence of Self-Organized Cooperation

Bonnie J. McCay

Department of Human Ecology, Rutgers the State University

In this paper I sketch a preliminary theory about the emergence of self-organized cooperation in the use and management of common resources (CPRs). My thoughts are based on what has been learned through case studies, experiments, and logical reasoning about ways that some CPR users overcome free-rider and other problems to develop more-or-less workable systems of CPR management. I have been asked to leave to others in this symposium questions about the persistence and success and failure of self-governance institutions, which would include the many "design principles for collective action" (Wade 1988, Ostrom 1990, Hanna et al. 1995; Pinkerton and Weinstein 1995; Steins and Edwards 1999).

Dominating the "design principle" discussions, and underlying my own, for the most part, is the notion of self-interested, rational behavior as the major driving force of individual and social action. Individuals weigh the pros and cons, the benefits and costs, of alternative courses of action, and if they are "rational," the perceived pros, or benefits, of a particular course of action should be at least as much as if not more than, its estimated cons, or costs. These benefits and costs include those of institution-building itself (Gibson et al. in press; Ostrom 1990; Ostrom in press). This much is easy. It is the world view of rational actors, the principle of least effort, the way of optimal foragers. But how to specify and weigh benefits and costs? There's the rub. And that's where our task becomes interesting. That is where we must recognize the specificity of the natural and social systems involved.

My approach is influenced by the work of psychologists on how people respond to health problems and risky situations (cf. Gardner and Stern 1996). Weinstein in particular has developed and used experimental and observational data to support many elements of a stage theory of human behavior in relation to environmental or health risks (Weinstein et al. 1998). Questions about what leads people to adopt precautions to protect themselves from threats of exposure to radon (Weinstein and Sandman 1992) or ticks bearing Lyme disease are different from questions about what motivates people to change their behavior --and hence institutions--*vis-à-vis* common pool resources. Changing behavior to protect a water supply, a forest, a fishery or the functioning of a computer server is less likely to be grounded in fears about the personal health or oneself or one's family than is wearing seat belts, avoiding restaurants where people smoke, and getting rid of lead-based paint. However, in theory the differences concern

the state of the variables, not the variables themselves. That is, perception of one's personal susceptibility is likely to be important across the board, the difference being one of greater or lesser immediacy and salience.

Stage theories are useful didactic tools, reminders that there is no simple situation, that much depends on "where people are" with respect to environmental changes and potential behavioral changes. Thus, some people may simply be unaware of environmental problems; others may be aware but not convinced that there is anything they can do about them; and others may simply not have the resources required to do something about them, or may reckon that it's not worth it, given costs and other obligations. This is a decidedly psychological perspective. I hope that you will grant me a bit of intellectual imagination and a loosening of methodological requirements in applying it to people as social actors as well.

A THEORY OF THE EMERGENCE OF CPR INSTITUTIONS

Recognition of a Serious Problem

The emergence of institutions for self-governance, or local-level governance, of CPRs will depend, then, on the following step-wise conditions. First, whether a problem calling for institutional change is actually recognized by the people involved, particularly the people with the resources and power required to make changes. That may not be enough, however. How serious is this problem, compared with other issues as well as with past experience?

Attributes of the resource or environmental system make a big difference to these "stages": can people really know what is happening? The kinds of attributes that can make a difference include degrees of scarcity, abundance; variability, stochasticity; density, sparseness; aggregation, dispersal; temporal patterns such as seasonality; boundedness, permeability; simplicity, complexity; mobility, settlement; and of course risk and uncertainty. These and other ecological aspects make a difference with regard to questions such as:

1. whether a particular "resource" is actually a resource, to the people involved, and what kind of resource to which people;
2. whether people can accurately see what is happening, accurately assess the status of the resource and their interactions with it;
3. whether they can more-or-less predict what happens next;
4. whether they can act with some confidence about the results;
5. whether they can control the behavior of others on the landscape and vis-a-vis the resource.

For example, for the Koyukon people of northern Alaska, moose and caribou differ significantly with implications for how people think about and act towards them. Moose are less migratory, more territorial and tend to be found alone or in small groups; consequently, people know more about particular moose and their habits, and the moose are less likely than are caribou to be hunted by different groups of people (see Nelson 1973). For the Miskito Indians of the Atlantic coast of Nicaragua, the presence, absence and abundance of sea turtles off their shores seemed to have little to do with their own behavior, even when they began intensive commercial harvesting (see Nietschmann 1973). Although there are several ways to interpret this fact, it has a certain rationality given the fact that the sea turtles migrated over huge areas and were at their most vulnerable, when egg-laying, far from the shores of Nicaragua.

Attributes of experience and social organization and political system also make a difference, for example, to the ability of CPR users to communicate and teach others about what they see as a problem and to deliberate the seriousness of the problem in comparison with the past and other issues. The challenge is to get people's attention, to put it on the agenda.

Thus, many cases of the non-emergence of self-governance can be due to problems at this level. Some groups may not be able to appreciate the magnitude of the problems confronting them (let's say, declining productivity of an estuary or increased soil erosion due to grazing practices) because of the subtlety, novelty, or stochasticity of the ecological systems or because of imperfections in their monitoring systems. If some people in the group do recognize the problem, they may or may not be able to effectively communicate it to others, to get it onto the larger agenda. Clearly, in complex socio-economic systems, some people are affected more than others, and differing interests and access to political power and communicative resources greatly affect the agenda.

Finally, in some situations "so what?"; there is much else to contend with. During civil war or a famine, protecting a forest or water supply is not likely to galvanize action. If most people in a community are making money from the destructive practice of dynamiting fish on a coral reef, protecting that reef is not likely to happen. Those are the obvious examples. More subtle examples come from situations of complex, multiple-use resources (Steins and Edwards 1999). For example, a forest is used for cutting timber; it may also be used for grazing cattle, for recreation, and as a key component of a watershed's ecological integrity (for example, moderating run-off that otherwise silts up rivers and diminishes habitat for fish). A harbor or other body of water may be used for fishing (subsistence, recreational, commercial), for hunting, for transportation, for municipal and industrial waste disposal, as an aesthetic backdrop or vista, and as a critical component of an estuarine ecosystem. In the New York/New Jersey harbor system, for example, the attempts of shellfishermen to organize to protect shellfish from dredging by the U.S. Army Corps of Engineers becomes a "so what" issue for most

people of the region, who would rather have the economic benefits of a viable deep-water port.

Determining Cause-and-Effect

Once on the agenda, a whole new set of questions arise. Do people see and accept any cause-and-effect or action-and-consequence relationship between their behavior and the environment issue at hand?¹

In many situations, the resource users do not see their actions as having any real effect on the resources in question, either as causes of problems or as potential sources of solutions. Carrier (1987) shows this for Ponam Islanders of Papua New Guinea, who believed that God, not people, caused change in fish, shellfish and turtles, and thus were unwilling to accept the need to change their harvesting practices. Similarly, many New England fishermen have resisted changes in fishery management because they were convinced that chaotic-like processes in nature had long resulted in cycles of abundance and decline (M.E. Smith 1990).

The role played by such dismissals of human agency is likely to be greater with respect to resources such as fish than for resources like forests which are easier to monitor, and other ecological factors are important as well (such as variability and uncertainty, with or without visibility). As noted above, features of the natural world influence whether people are able to accurately see what is happening to a CPR, much less appraise the effects of human activities on it and predict what happens next.

However, one should not focus too much on features of the natural environment at the expense of recognizing ethno-ecological and cosmological differences in knowledge systems and philosophy. Nor should one discount the social construction of skeptical and oppositional ethno-ecologies in the course of political conflict over CPR management, as is a reasonable interpretation for the skepticism of New England fishermen (see Miller and van Maanen 1979 for background to this conflict).

If there is acceptance of a serious problem and the possibility that human behavior has contributed to it, another question that arises is whether the problem is "too far gone" by the time it is recognized and accepted (Ostrom in press). The community may decide that they can do nothing about it. And doing something about it may prove very difficult. Hanna's (1995) analysis of user participation in fishery management in the Pacific US showed the difficulties of sustaining cooperation where the natural resource had declined sharply.

¹ This can also be a reason that a resource issue does not get on the agenda of a group.

In sum, institutions for CPR management may or may not arise depending on whether people accept that human behavior is a cause of problems and whether they feel that the situation is too far gone to do something about it.

Emergence of CPR Institutions for Other Reasons

It must be noted that the "problem" to which CPR institutions arise is less likely to be one of decline in the "flow of resource benefits" or the abundance and quality of common pool resources than to be the more immediate issue of conflict over rights and access to limited resources. Those institutions are more likely to come about because of competition for limited resources, with the purpose of reducing conflict and, in some cases, creating exclusive access, rather than directly restricting use of resources. We can see this at national and international levels too, for example, in the Law of the Sea proceedings, where nations eagerly grabbed 200 nautical miles off their coasts as exclusive territory while initially paying little attention to the requirement that they manage their own fisheries as well as restrict outsiders' fisheries in the new EEZs.

Stepping back to the discussion of cause-and-effect, it appears that a major source of emergent CPR institutions is blaming others. If people outside the user group at hand are seen as causing resource problems, then there may be a strong incentive to develop rules and institutional boundaries. Indeed, as Doug Wilson recently argued (personal communication) most CPR institutions in fisheries are probably due to user conflicts rather than conservation concerns. "Sea tenure" institutions (Cordell 1989) mitigate conflict by coordinating the use of fishing grounds (i.e. taking turns, spacing out and scheduling the use of techniques). They also are created to protect groups of users against other groups of users (i.e. creating exclusive territories or restricting the use of particular gears; outlawing waste disposal in fishing grounds) They are protective legislation. These CPR institutions need not depend on whether people see or accept a relationship between human actions and the fate of CPRs.

This is not to deny the existence and value of conservation-oriented behaviors among CPR users. In fisheries this has been amply documented, but with the interesting observation that in virtually no case is the amount of catch actually controlled, in contrast with controls over access, timing, spacing, etc. (Schlager 1994; Acheson and Wilson 1996).² Consequently, indigenous "conservation" may be, in many cases, really indigenous conflict management. Polunin (1984) makes a similar argument for the many and various systems of complex sea tenure arrangements in Indonesia and New Guinea.

² See McCay (1980) and Berkes and Pockock (1987) for instances of self-governance with limits on catch but designed for market rather than resource management reasons

What To Do and Whether It is Worth Doing

Accepting human agency (one's own or someone else's) as a cause for environmental problems does not necessarily mean acceptance of the need for institutional changes. Unless the institutional frameworks already exist, these changes can be very costly. Moreover, there needs to be a willingness to accept the possibility that new institutions (or adapted ones) will work. Which leads to the next stage.

In theory nothing will happen unless people see possible solutions to the problem that they, individually or collectively, can take, and then, that they can weigh the costs and benefits of the alternatives and act upon them. One or more of the alternatives must be seen as affordable and potentially effective to be considered worthwhile.

Once again, features of the CPR system or the ecosystem in question will influence this. Even if people accept the premise that human behavior has made a significant difference, the conditions of the natural world (and the capacity of a society to understand it) may be such that it is extremely difficult to (a) figure out what to do; and (b) be confident that the alternative chosen will actually work. For many CPRs, particularly the wild ones we often call "natural resources," there is a high level of uncertainty about their behavior and dynamics.

Compounding this is uncertainty about the ability of a particular group of resource users to control the behaviors of others in their landscape or seascape. For self-governing CPR institutions to emerge, some CPR users must recognize and be willing to act upon the risky possibilities that a group may emerge as an effective unit for collective action. This may be affected by the culture, social structure, and history of the users in question, as well as their relationships to other social units. It will require the ability to convince and coordinate the actions of others, and the capacity to deal with free rider, scale, and other challenges which lead us to redefine collective action as collective dilemma!

Deliberation, Discourse, and Embeddedness

One issue is coming up with good solutions to CPR problems. Given the "bounded rationality" of the human mind (Simon 1983), and the inclination toward "muddling through" when faced with difficult policy choices (Lindblom 1959, 1979), the alternatives available for institutional change are likely to be quite limited, based in large part on the kinds of things people have already done for the same or other problems. A critical factor in some cases may be the ability to share experiences and ideas among members of the group, as well as with other groups, in order to "get out of the box." Doing this requires some kind of deliberative forum, where information can be shared and conflicts and ideas aired.

If there is such a deliberative forum, another question concerns the nature of discourse within it. The nature and functioning of this deliberative process is critical, and it is affected by local leadership, the distribution of wealth, the structure of power and authority, the existence of other institutions, and relationships with outside governmental and non-governmental groups.

In theory, the emergence of self-governing institutions for CPR or ecosystem management depends on the capacity for rational communication (Dryzek 1987). To what extent does a particular forum or ongoing deliberation about a commons problem meet the requirements of "rational communication," of open and honest exchange and deliberation? (Habermas 1984, 1987). To what extent are the decisions the result instead of the dominant position of the "governing mechanisms" of money and political power and authority, on the one hand, or prestige and social influence, on the other? (Wilson and McCay 1999). It is well known that cooperative solutions require communication, trust, and reciprocity, but we have to ask about the sources of trust and reciprocity and the conditions for effective communication (see also Hajer 1995).³

The degree to which deliberation is embedded in local culture, social relations and experiences as well as the extent to which conclusions are reached through "communicative rationality" are thus important conditions for the emergence of self-governing institutions for CPR problems. However, the conclusions reached by those who get to this deliberative process are likely to be highly variable, specific to certain socio-cultural, political-economic, and ecological-productive conditions, making it difficult to predict outcomes.

³ This argument is being developed elsewhere. Rational communication involves trust, information exchange, and joint problem-solving; it works through convincing each other that something is true or right, and it is heavily dependent on shared background assumptions, or embeddedness in a common world view or culture. We have argued that in situations where environmental variables have high uncertainty and variability, institutions based on rational communication (and prestige and influence, to some extent) work better than ones based on the governing mechanisms of money and authority (Wilson and McCay 1999). On the other hand, where the scale of the CPR problems is very large, they may be difficult to resolve without recourse to the constraints of bureaucratic rules, property rights, and other "anchoring institutions" that express the roles of money and authority in social deliberation.

Muddling Through

Although "Muddling through" or incrementalism may constrain the alternatives considered, these approaches to decision-making can be very helpful as well. One of the ways this is so concerns how to increase incentives to contribute to "the supply of institutions," or the so-called "second-order dilemma" created by the strong incentive to be a free-rider on efforts to make institutional changes that amount to public goods.

When CPR users are faced with the need to invest time, energy, money, and other resources in developing or changing self-governing institutions, the rational choice of free-rider strategies can overwhelm the effort. A "privileged group" may be able to counteract free-riding by investing enough to provide benefits and eventually cajole others into contributing --or change the rules in ways that further marginalize or exclude most of the free-riders. However, another way out of this collective action bind is to develop institutional changes in small, incremental steps, starting small and cheap. Ostrom showed this in her analysis of the efforts at collective action among private and public water rights holders in the Los Angeles metropolitan area (1990). Small steps have low initial costs and the prospect of early successes, which can change the decision-making environment: "Each institutional change transformed the structure of incentives within which future strategic decisions would be made" (Ostrom 1990: 137).⁴

A second benefit of "still muddling, not yet through," as Lindblom called it in 1979, is that a go-slow, incremental approach to problem solving may be a very wise strategy vis-à-vis complicated and highly uncertain ecological systems. This was a major lesson we learned when engaged in a program intended to restore productivity to shellfish in New Jersey's bays (McCay 1988). Given the very high level of ignorance and uncertainty concerning clam biology and estuarine hydrodynamics in the area, we found that an incremental approach, where we acted without full prior examination of the situation and alternatives, was very helpful. Although we failed to increase the productivity of clams in the bay by the method we selected, we also reduced ignorance and uncertainty because our method was designed to allow us to learn more about causes of declining productivity. When "muddling through" is combined with efforts to learn and the capacity to adapt, or "adaptive management" (Walters 1986), it can be part of the emergence of effective CPR institutions.

To take the negative case, the non-emergence of self-governing institutions may

⁴ Note that Ostrom's appreciation of how the incentive structure changes, transforming the conditions for dealing with a commons dilemma, nicely fits the "social construction" model for CPR situations as posed by Steins and Edwards (1999), despite their claim that a social construction perspective is in sharp contrast with the institutional approach of Ostrom and others.

be because some people are simply unaware of environmental or CPR problems; others may be aware but not convinced that there is anything they can do about them. In some situations the problem is inability to come up with acceptable and reasonable ways to deal with those problem. And in others, it may be a matter of people not having the resources required to do something about the problem or reckoning that it's not worth it, given costs and other obligations. On the positive side, in addition to the obverse of each of these statements we can include situations with the possibility of truly open and constructive deliberation, decision-making structures that are able to overcome free-rider and other perverse incentives that plague public goods situations.

CONCLUSION

Much more could be added to this brief and preliminary attempt to construct a theory of the emergence of self-governing CPR institutions, including imaginative and politically savvy leadership, and most of the classic design principles, including having enough time to experiment, some autonomy from outside structures, but support from the outside as well ("nested institutions"). We should consider more elusive qualities including faith in people's capacity for cooperative and corrective activity, how a group balances its members' vertical or patronage ties to outsiders, or the group's own dependence on outside government and non-governmental sources of expertise and resources, against its desires for greater local control, etc.

We must also recognize that "the emergence of institutions" is as likely as not to be instead a case of re-direction of existing institutions. Institutions appropriate to handling CPR issues may be created initially for other purposes. I have already discussed the fact that conflict and congestion management is probably the basis for most of the "sea tenure" institutions in fisheries; these provide experience and infrastructure that may be used to handle other CPR problems, including protecting fish stocks from overfishing and their habitats from destruction. Other institutions may exist for entirely different reasons; an example in the Shetland Islands is a community-based thrift institution which has become the vehicle for an innovative method of ensuring community benefits from privatized fishing rights (Goodlad 1999).

The existence of such institutions may be extremely important to the emergence of self-governance of CPRs (see also Ostrom 1990). They can lower "transaction costs," providing the decision-making structures, enforcement powers, experiences, and cultural expectations that might otherwise have to be created anew and at great economic and political expense. This of course raises questions about whether and how institutions can be adapted for new purposes.

Finally, a fuller treatment of this topic would examine resistance and threats to user-based CPR management. Among the obstacles or challenges that seem particularly salient today are demographic changes, including the forced and voluntary movement of

people across landscapes and ecological systems; fiscal and development policies which work against local and cooperative institutional arrangements; unrealistic expectations for privatization policies, e.g. in countries emerging from communism and socialism; problems of mismatched temporal and spatial scale between institutions and environmental phenomena; and the persistence and deepening of poverty and misery in much of the rural and urban world. Each of these can be shown to affect the emergence, as well as the persistence and development, of CPR institutions, at each of the "stages" defined above.

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