

o **Chapter 4: Common Pools and Multiple Uses**

This is the major theoretical chapter in a book length study of the more recent attempts to restore the ecosystems of the Great Lakes Basin in North America. Comments are solicited and welcome.

Mark Sproule-Jones
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Department of Political Science
McMaster University
Hamilton, ON L8S 4M4
Telephone: (905) 525-9140, ext. 23898
Email: sproulem@mcmaster.ca

Chapter 4

Common Pools and Multiple Uses

Common Pools are assets subject to the subtraction principle. This simply means that once some of the asset is taken, then less is available to take again. Common Pools are like refrigerators. You may fill them with food, only to find that others in your household have taken much of it and less is available for you to consume. Unless something is done about, the refrigerator may soon be empty.

Common pools are ubiquitous. They can be given by nature, like a well or an oil pool or a living but hunted animal species. They can be socially constructed, like a government budget or a well stocked refrigerator. Or they can be a combination of both, like a harbour to dump human and industrial wastes.

Gradually the ubiquity and problems of common pools are being understood and solved (intellectually) by scholars. In the real world too, communities working alone or with outside governmental help are beginning to understand and solve the basic logics of common pools.

What are the basic logics? Is there anything more to common pools than a replenishment issue? Can we solve our refrigerator problem simply by restocking it regularly?

One obvious problem is that it gets to be quite costly to keep on refilling the 'frig, let alone going to and from the store (a kind of transaction cost to use an economics concept). One may not have the resources to keep up the replenishment at the rate at which the stock is being reduced.

We may also feel some kind of injustice at allowing others to reduce the stock and for only ourselves being prepared to replenish. In some cases, this injustice can mean that the stock is left to be exhausted. We would rather that than constantly being "suckered" by others.

Many common pools cannot be replenished anyway, given our ignorance about the technical nature of the stock or our inabilities to restock properly. The natural world provides the best examples of these common pool problems. We can restock some fisheries, for example, with hatcheries and laboratory fishes. But captivity bred fishes do not exhibit identical behaviour to those of wild reared fishes, and their resilience in natural waters, let alone their taste to fishers, can be quite different. Nature by itself may restock properly, but this process may take so long that we treat the resource as non renewable - like an oil pool for instance.

So with these limitations, we may decide to devise rules to limit the use of or withdrawals from the common pool in question. Rules can, perhaps, be fashioned so that the rates of withdrawal are approximately equal to the rates of natural replenishment (and/or artificial replenishment by human construction). If one can limit the number of times a refrigerator door can be opened, then perhaps with some judicious shopping, the stock of food will stay about the same. One may also need a cluster of social norms too, to make this work. Frequent comments about greedy people or freeloaders or about the trials of modern shopping can, ironically, be a socially productive use of human guilt. There is a wealth of evidence that smaller communities can fashion enforceable social rules to keep many common pools sustained over time (McCay and Acheson, 1987; Pinkerton (ed.) 1989; Ostrom, E., 1990; McKean, 1992; Bromley et al., 1992; Ostrom, E., Gardner, Walker, 1994 - provide major reviews).

However, it is not a simple matter to construct rules for all common pools in all social and natural environments. One reason is due to the technical characteristics of different pools.

Dimensions of Pools

We seem to have studied common property resources in the physical-biological world perhaps more than we have paid attention to comparable pools in non social situations. My examples will tend to be drawn from the natural resources and environmental area more than from other areas of study.

It is well recognized in the literature that a key dimension associated with common pools is that of exclusion. It can be difficult to exclude some persons from catching or using a resource. Migratory fish, for example, have a way of avoiding international boundaries and the rules devised to limit fishing effort and sustain the resource. Consequently, fishers from neighbouring countries may enjoy what you thought were "your fish". Its the technical issue of fugitivity that makes exclusion difficult. Similarly, a common pool used for dumping liquid wastes may successfully assimilate oxygen-demanding wastes by regular mixing of its waters with the atmosphere. However, the rates of assimilation may be too slow to deal with extra loadings that might come from unexcluded sources - like upstream erosion on a river for example. Again, there are technical characteristics of the good that may make exclusion difficult. These technical characteristics make exclusion difficult, consumption or withdrawals from the pool unpredictable and/or replenishment rates insufficient.

There may also be insufficient or inappropriate rules for excluding users of a pool. Rules that tightly regulate the kind and quantity of wastes pumped into a harbour may be insufficient if no rules exist to regulate non-point sources of pollution like storm water run off for example. Rules designed to control human sewage wastes may and frequently are inappropriate for dealing with persistent organic chemicals discharged into the environment. A lot of the rules that

communities and governments fashioned to control the environment were (and often still are) modelled on the Benthamite public health movement of mid Nineteenth Century England. They involved designing sewers, disinfecting wastes and discharging the resultant effluent away from population centers. Rules which were once sufficient and necessary became, with the development of industrial capitalist societies, necessary but insufficient.

There is a third key dimension of common pools in the case of aquatic environments like the Great Lakes. Living systems are interdependent in differing scales (and times) depending on their functional relationships to each other. This is the primary characteristic of ecosystems (de Groot, 1986). So, as a crude example, there is a functional interdependence between the regulation of nutrients in wetlands, the productivity of wetlands for aquatic animals, and the carrying capacity of the natural environment for human food sources. Stresses on any part of these relationships, such as experienced through massive waste disposal, can threaten the resilience and long run sustainability of the ecosystem as a whole. It is the scale and variety of the interdependencies in an environmental common pool that give it an extra level of complexity (and uncertainty).

Dynamics

Common pools change and adapt over time as a result of changes in any one of their characteristic defining dimensions: technologies; exclusionary rules; ecosystem interdependencies (in the natural resources cases). The economic literature on common pools emphasizes the consequences of changes in the stock (or size or population) of the pool from changes in the intensity of its use, within the parameters of zero technological change and zero ecosystem

connections. A frequent result of this one type of situation is the so-called "Tragedy of the Commons" whereby common pool users increase their intensities of use beyond the sustainable range and the stock of the pool is reduced, if not eliminated. This particular scenario is the subject of extensive research emphasizing, as it does, the incentives on users of a resource to become opportunists within their community of users. It has also been modelled as the so-called Prisoner's Dilemma Game in the formal branch of economics known as game theory. But it is still just one possibility, in the range of theoretical possibilities and practical outcomes.

Let's use the example of the household refrigerator again. The stock is its contents. The flow is the set of items taken by the household members at any one time. The technological conditions are set: one 'frig and one location of edible food. The exclusionary rules are also set if you will: go to the 'frig whenever you want and remove however much you wish. There are no real non-trivial ecosystem interdependencies in this case. The incentive on household members? Withdraw items for consumption, or storage and later consumption, in case your roommates/partners/family members get greedy and eat into the stock. Other household members thinking the same will similarly reduce the stock. The collective interest of rationing the resources until the stock gets replenished is ignored. What a tragedy!

Economics often uses static equilibrium models to understand common pools and their limits; this redirects attention away from their dynamic character and changes in parameters. Early work in understanding ecosystems had the same emphasis, namely a concern that environmental factors set limits on plant and animal populations. In both social and environmental sciences in recent years, there has been a renewal of concern with dynamic changes in pools. Evidence exists that "The Tragedy of the Commons" is a relatively rare

situation and that communities tend to develop over time exclusionary rules to help reduce dynamic fluctuations in common pool populations (e.g. Ostrom, 1990, Ostrom, et al., 1994). Evidence also exists that management of fluctuations of populations is prone to failure because of an inability or unwillingness to manage more than a selected set of variables (Francis, 1994; Lee, 1993; Gunderson, et al., 1995). The result can be major surprises (Holling, 1986). Fish populations, for example, kept high by hatchery stocks can suddenly plunge as the less adaptable hatchery fish fall prone to disease. Long run dynamic adaptations were not understood and thus, in part, ignored in initial decision-making about the sustainability of the resource.

A major reorientation toward the dynamics of common pools is necessary. Some work and investigations of property rights in the natural resources field suggests an effort to understand the dynamics of rights (and rules more formally) may offer a promising approach. We will now review and then extend current understandings about property rights and their adaptations over time. We discover that our knowledge is rooted in our understandings about individuals as private property owners, proprietors, managers and users. We thus explore an extension of these logics into other situations where the stakeholders may be corporate and collective organizations, and where, as a result, different methods of adaptation are developed. Our focus remains on the conditions (or rules) through which changes are made. We term these conditions or rules as collective choice rules that, in part, determine how property rights and what (in other contexts) have been called operational rules change and adapt. It is in these collective choice arrangements that rules about common pools are formulated and implemented by individuals and collective interests. If we are to understand the evolution, development and change of ecosystems, then we hypothesize that we must analyze how collective choice

mechanisms operate and adapt.

A basic framework of analysis of rules, including collective choice mechanisms is presented. This is partially extended to deal with major classes of factors included in the framework. The following chapter develops indicators to test the framework in the context of the Areas of Concern on the Great Lakes.

Property Rights

Property rights are "legally sanctioned" rules that affect the uses of resources and "the corresponding assignment of costs and benefits" (Libecap, 1986, 229). The resources in question include physical possessions, like land or dwellings or equipment.

They can include knowledge as a resource or, in unusual cases, include other human beings perhaps as conscripts in a standing army. Property rights are in fact, "bundles" of rights that can include the right to exclude others that we saw as a key dimension of common pools. Other frequently found rights in this behavioural sense of the concept are the rights of access, withdrawal, management and alienation (transferability) of a resource. (Schlager and Ostrom, 1992). Different configurations of these rights are found for different resources. If we use our refrigerator example again, there may be different limitations placed on access in each household. They would be tailored to ration the different demands for and supply of new food.

Of particular concern for this study is the structure of control and power over these resources. Who can ration the food, when, where and how? Existing theory identifies three classes of persons who can exercise property rights in a comprehensive or less comprehensive sense of the bundles of available rights. There is the individual person, like a "head" of the

household who can set the rules for access, withdrawal, management, exclusion and transferability of the food in the 'fridge. (We sometimes call this person "Mom"!). Besides individual property rights, we also find some rights held collectively by more than one person, like fishers who may control various uses of a fishery in a collective fashion. Finally, we can find resources which are not held by anyone. Many fugitive natural resources are of this character and these form the best cases for understanding "The Tragedy of the Commons". No one can exclude others in such situations.

This threefold division may be useful in describing many situations, but it is a somewhat crude tripartite division that may bring little understanding to real world circumstances. It is like saying there are only 3 ways to husband a resource like that in the household 'fridge, namely put one person in charge, put everyone in charge, or put no one in charge. Most households would fail if presented with only these three choices!

What we can do is disentangle the concept of property rights in order to distinguish between different kinds of "stakeholders" who get to use a resource in some way. Each of these kind of stakeholders possess some degree of control over a bundle of property rights, but each may be subject to different degrees of transaction costs in decision-making. That is, they vary in their abilities to adapt to new circumstances.

At one end of the dimension, one can speak of individual property stakeholding where, for example, a person can own, lease, manage or use a resource for his or her purposes. It is on this kind of arrangement that many formal economic models of resources rest. It is the model too for many legal analyses of property rights, and it is the intellectual grounding (paradigm) for the practical formulation of the common law on property (La Forest, 1969;

Berman, 1984). Individual property ownership clearly specifies who is the stakeholder, and one can assume that the transaction costs involved in changing the modus operandi of the individual in question tend to be close to zero. (Hamlet excepting). Its merit may lie in its adaptive capabilities as well as its clear specification of ownership.

The adaptation or change in the bundle of rights that an individual property owner may possess is in part a function of wider social processes, however. Vernon Smith, in an original effort to discover the origins and changes in property rights, suggests that certain social traditions supporting property rights occurred in the late stages of Neanderthal and the developed stages of a Cro-Magnon Hominid periods (roughly from 90 to 100,000 years ago) (Smith, 1993, 169). The first was the trading of valuables which requires some property rights and contracts to be in place in order for traders to trust an exchange process. The second is a more sedentary lifestyle made possible by the secure accumulation of possessions and knowledge of their acquisition. From these two conditions a form of customary law developed to protect against damages to property and persons (Benson, 1994, 13-14). Enforcement of the customs were made by kinship ties prior to the development of dispute settlement forums. These settlements could be voluntary such as those agreed upon before peers in the merchant courts, or authoritarian such as those developed in Anglo-Saxon courts for breaking "the King's peace" of royal law. Customary law provided for a voluntary adaptation of property rights (and duties). Authoritarian law permitted a more radical form of change, and is the type of law to which most governments aspire.

Adaptation and change can occur more readily when private property owners possess the legal right to transfer their resources on the economic marketplace. These legal rights can be

attenuated. The common law may or may not lend itself to continuous adjustment in these legal property rights. An extended illustrative example now follows.

Adaptations in Property Rights: An Extended Example

In common law jurisdictions, flowing or running waters cannot be owned. Rather, the use of water may constitute a bundle of legal rights, rather than the possession of water per se. This bundle of legal rights to use water is, in common law, a derivative of the right of ownership of land. A riparian is one whose land is washed by water and, in turn, has the right to the natural flow and quality of the water, subject to the same rights as his riparian neighbour.

"No riparian proprietor has any property in the water itself, except in the particular portion which he may choose to abstract from the stream to take into his possession, and that during the time of his possession only." (Canadian Encyclopedia Digest, S35, pp. 148-54)

The riparian is thus enjoined to make reasonable use of (surface) waters, subject to the same reasonable use of his neighbours. However, if the water is diminished by the reasonable use of upstream riparians, the downstream riparians have no legal recourse. Reasonable use is determined through the judicial process. It does not include the right to pollute nor to obstruct and divert the waters, nor includes the right to remove unreasonably large quantities (unless so granted by other riparians).

Riparian rights are transferable, in that a non-riparian may negotiate access to the water, subject to the uses of other riparians. However, "in order to obtain secure rights to flows, a non-riparian is likely to have to acquire rights from all downstream and all upstream riparians in order to secure his supply (Campbell, et.al., 481). A riparian may also negotiate with others

a right to an extraordinary access to water. Again, the agreement of all riparians is necessary since any one of them can claim compensation for a reduced flow resulting from extraordinary use. The riparian need not exercise his right in order to preserve it, and, in fact, is entitled to the natural beauty of the water itself.

Thus the use of surface waters for domestic or farming or other purposes is contingent, in common law, on riparian ownership of adjacent lands, and these uses may undergo continual change as a result of judicial determinations of reasonable use or through bargaining between riparians, through market negotiations between non-riparians and riparians, and finally, through purchase of riparian lands on the open market. The property rights themselves are made adaptable through continual adjustments as represented by the concept of "reasonable use."

Peculiarly, the common law on groundwater is not subject to "reasonable use" and is subject to the rule of capture by any landowner with physical access to the aquifer or groundwater basin. While pollution of groundwater is a private nuisance and hence, if unreasonable, then justiciable,

"this percolating water below the surface of the earth is therefore a common reservoir or source in which nobody has, as far as he can, the right of appropriating the whole..." (Dubrin, J.A., *Jackson v. Drury Construction Co. Ltd.*, 1974, 186).

Thus the groundwater property rights are attached to the land and are not adaptable, although the bundle of rights as a whole may be purchased on the marketplace.

In this context, governments have often intervened to initiate a process of adaptability in property rights, both for surface use rights and for groundwater rights. Generally, governments have replaced or modified the reasonable use doctrine for surface waters and the rule of capture

for groundwater with some form of permit or licence to take water in approved quantities for approved purposes. Thus in the Province of Ontario, (Canada), the Ontario Water Resources Act of 1970 (revised in 1985) establishes that withdrawals of more than 50,000 litres/day require a permit from the Ministry of Environment and Energy. Such withdrawals are considered to be extraordinary and do not attenuate the riparian rights of reasonable use. The Director of Water Resources retains the legal power, however, to limit smaller withdrawals than 50,000 litres/day if the withdrawals may constitute a nuisance for other landowners. These discretionary powers are authorized under some draconian legislative clauses. Section 11, for instance, states:

"The Minister, for and on behalf of the Crown, may for the purposes of this Act, acquire by purchase, lease or otherwise or, without the consent of the owner, enter upon, take possession of, expropriate and use land and may use the waters of any lake, river, pond, spring or stream as may be considered necessary for his purposes and, upon such terms as he considers proper, may sell, lease or dispose of any land that in his opinion is not necessary for his purposes".

The adaptability of property rights to newer socio-economic and environmental conditions can, at one level, depend on the reasonableness of current usage by the owner or proprietor. Other interests must be taken into account at least in the surface waters case. In the groundwater case, the reasonableness test is limited. However, the common law of water resources provides only some operational rules for day-to-day decision making. Governments may implement statutory legislation that can reallocate decisions or, more fundamentally, re-order the bundles of property rights in water uses. The governmental powers are powers of collective choice that are rules about rules, collective rules about operational rules. The characteristic of "rules about rules" will be dealt with later.

Other Stakeholders

Most of the theoretical work and model construction developed to understand property rights deals with the private property case, where the owner possesses a full bundle of rights including transferability. There are, of course, other stakeholders that may possess some property rights, including public enterprises that are major resource owners in both Canada and the United States (Feldman and Goldberg, 1987).

Beyond the private property case are a range of organizational rather than individual enterprises engaged in decision-making about resources uses. The public enterprise, a corporation owned by a government, but at arms length from day-to-day interactions, is one key variant. Another is the private corporation (that legally is termed a public corporation, as its ownership is not privately retained but made available through stock and bond acquisitions) that is often engaged in resources extraction. A third is the private non-profit corporation that may acquire some property rights out of its interest in resource uses. Ducks Unlimited or the Sierra Club foster major acquisitions of property rights to land and water out of their own concerns. All three types of corporations are ostensibly formed to facilitate speedy group decision-making in a way designed to mimic individual decision making as closely as possible. However, all three kinds experience varying degrees of transaction costs in formulating and implementing actions as is well documented in organizational theory and behaviour. For our purposes, we need simply note that they are organizational equivalents to the private property stakeholder in that they may exercise one or more of the bundle of rights enjoyed by the individual private person but that they incur higher transaction costs as a consequence of their own "internal collective choice" arrangements.

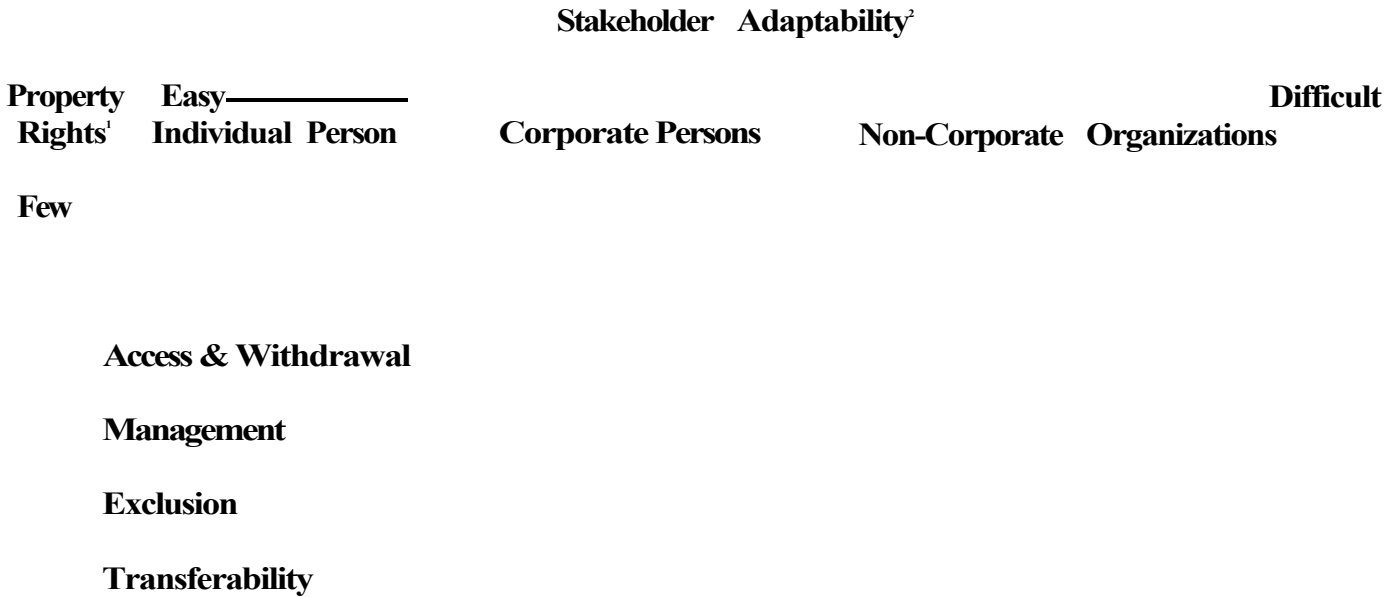
Like the individual private property case, all three kinds of corporate stakeholders are subject to societal collective choice processes for changes in their institutional arrangements. Corporate law is typically a mix of statute and common law where the statutory component, at least, is a framework for specifying the rules that must be followed for the making of internal "by laws" of the corporation. Thus adaptation can, to some degree, take place internally, but the overall framework is subject to statutory legislation and implementation. As legal persons too, these organizational forms are subject to the specific tests of resource usage, like the "reasonableness" test of riparian rights.

Beyond the corporate cases of property rights holders is a third type of stakeholder. This is the non-corporate organization that may have formal institutional arrangements. Major examples are the line departments of government, at all levels of formation, from the local through to the national (federal). They may have lesser opportunity of adaptation than the corporate form due to the complex legislative-bureaucratic arrangements needed to change organizational form and direction. Yet line departments like Interior (of the US Federal Government) or Natural Resources (of Canadian Provincial Governments) may operate on behalf of their "sovereign" governments (or Crowns) with particular and (occasionally specially established) property rights.

These stakeholders may all exercise one or more property rights, and all vary in their ease of adaptation from the individual person (including the squatter) through the corporate person to the non-corporate organization.

Figure 4-1 develops these various kinds of stakeholders in terms of their ease of adaptation, and in relation to various property rights that they may or may not hold.

Figure 4-1: Stakeholders and Property Rights



- Notes:
1. These rights tend to be held cumulatively, e.g. transferability is not held without the previous four major rights.
 2. Transaction costs of decision making.

Table 4-1 reflects alternative behavioural possibilities for stakeholders. For example, a ministry of a provincial government may have management rights and rights to determine access and withdrawals for other resource users, but in other jurisdictions these rights may be more (or less) attenuated.

Perhaps more useful for our purposes is to examine the legal positions that can be held as stakeholders rather than just their possible bundle of property rights. Legal positions or names are associated with different sets of property rights. Schlager and Ostrom use the following typology to assign legal positions to different sets of property rights (figure 4-2).

Figure 4-2: Rights Associated with Positions¹

	Owner	Proprietor	Claimant	Authorized User
Access and withdrawal	x	x	x	x
Management	x	x	x	
Exclusion	x	x		
Alienation	x			

¹ Schlager and Ostrom (1992, 252)

Thus an owner can exercise all four major property rights, perhaps individually or perhaps jointly with others. Similarly, a proprietor can exercise three of these rights, but cannot transfer the resource to another legal person. A claimant has further attenuated rights and an authorized user has only the rights of access to an withdrawal from the resource. A squatter is someone who acts as an unauthorized user of land or water.

Empirically, the different kinds of stakeholders can assume any of the four legal positions noted in figure 4-2. Thus a governmental line department can be found, in some situations, to be an owner with full bundle of rights or simply an authorized user of a resource. Private property rights can include a full bundle or a lesser bundle. The public/private distinction between governmental and non-governmental organizations assumes little value in assessing legal positions. On the other hand, a governmental line department as a slowly adaptive stakeholder is less likely to transfer a resource adroitly than is an individual person or a corporate person. This is because of the relative inadaptability of its exercise of the property rights of alienation. Figure 4-3 arrays the possibilities associated between legal positions and stakeholder adaptability.

Figure 4-3: Rights Associated with Positions

Legal Positions	Stakeholder Adaptability		
	Individual Person	Corporate Person	Non-Corporate Person
Owner			
Proprietor			
Claimant			
Authorized User			

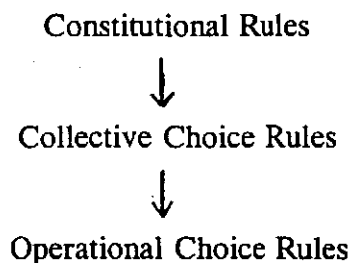
Property rights are thus rules that have been constructed and used by stakeholders engaged in resources "exploitation" in some fashion. They consist of a bundle of rules and can perhaps be best understood as an adaptive and adapting framework within which decisions about resource usage are taken. To return to our refrigerator example from the beginning of this chapter, it is as if a household has drawn up a set of rules about when, how and under what conditions food may be accessed and withdrawn from the 'frig, and when, how and under what conditions it may be restocked. Further, the household may have elaborate rules about adapting these previous operational rules of "exploitation" of the food resource. With a simple head of the household, the rules can be re-adapted relatively easily compared with corporate arrangements that essentially delegate decisions to two or more household members. And non-corporate arrangements, like an equal share of ownership "rights" amongst a large household, can bring about long and arduous decisions about changing the rules on, for example, the use and replenishment of milk cartons or ice-trays. Failure to readapt such operational rules could

lead to a "tragedy of the milk commons" situation or to the exploitation of the "sucker" charged with buying more milk. A set of possible situations could exist, and their readaptation in the light of new circumstances - like an increase in household numbers - will depend on the rules set up for handling collective choices.

Collective Choice Rules

As resources evolve and adapt in dynamic fashions, and as property rights comparably evolve, albeit with lags and leaps, so collective choice mechanisms may also experience dynamic change. Collective choice mechanisms are rules about rules, specifically, rules about how operational decision rules are reviewed and changed. Collective choice mechanisms themselves may be subject to a third level of rules, called constitutional rules. Constitutional rules govern the processes through which collective choice decisions are taken. They can be relatively simple frameworks like the rules governing household decision-making or relatively complex sets of rules like the national constitutions of Canada and the United States. Rules are, thus, stacked from the operational level through the collective choice to the constitutional level. (Figure 4-4).

Figure 4-4: Rule Stacks



Some features about rules and rule stacks deserve mention at this juncture. First, rules do not fully determine outcomes or decisions. Individual situations have levels of discretion to make choices and to learn from these choices over time. They may find that, over time, a recurring pattern of choices is both necessary and optimal. In spot markets, for example, with standardized products and low entry costs, producers may discover over time that marginal cost pricing is their most successful decision choice, as well as necessary to stay in this competitive business. On the other hand, in dynamic natural resource situations, like a harbour or river mouth subject to variations in climate, water flows, nutrient loadings and pollution, owners of a resource like a fishery have a wider range of decision choices and a wider range of uncertainties about the outcomes of these choices. Errors are likely to be more frequent. The property rights regime, no matter of what operational construction, will not eliminate these errors. (It could, of course, amplify them).

Second, many rules at the operational, collective choice or constitutional levels are ignored in practice. They have become simply rules-in-form rather than rules-in-use (Sproule-Jones, 1993), or what Walter Bagehot, the Victorian observer of the British Constitution, once called the "dignified" part of the constitution in reference to the constitutional level of rules (Bagehot, 1964). Examples may help to clarify the distinction between rules-in-form and rules-in-use. Let's use the refrigerator case. One collective choice rule on stakeholder participation could be that all six members of the household have an equal share in decision-making about "replenishment" (shopping) of the resource (food). In practice, however, this rule could become a rule-in-form if one person continuously takes the initiative (with the compliance and then agreement of others) to decide when, where, what and how much to purchase. A new rule-in-

use has evolved. The constitution of the household permits this evolution perhaps because it does not spell out an amending procedure or an enforcement mechanism of on-going collective choice rules. It may be hard to get all of the household together to sit down and redefine an agreement that replenishment decisions can and should be taken by one person rather than "the collective". These kind of changes recur in complex real life situations as we saw in our previous examination of water rights.

Third, considerable time and effort is often expended at a "constitutional level" in formulating precise and practical rules about collective choices. These rules would normally comprise rules about the articulation of stakeholder interests, such as selection and representation of stakeholders, and rules for the aggregation of these interests such as time and frequency of meetings and rules (like voting rules) to resolve conflicts. These rules are critical in establishing the power relationships that could manifest themselves in operational decisions. Allied with these particular collective advice rules may be rules about the implementation of decisions, by whom and how and with what solutions, as well as outcomes and measures of outcomes. Implementation of decisions in the form of operational rules and policy outcomes is necessary to make the governance rules a useful system (pun intended).

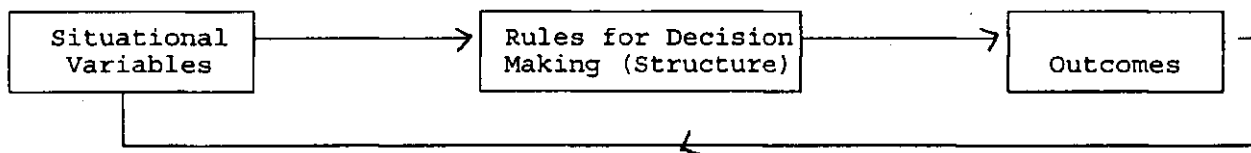
Finally, collective choice rules, like rules at other levels, are contingent upon their peculiar situational conditions. Not only will a resource (or other good) have its own technical characteristics and, perhaps ecosystemic characteristics, but it will be rooted into particular times and places. These times and places will impose constraints and facilitate opportunities for living systems to evolve and develop. Our trivial refrigerator case is no exception. It will be situated in a household with particular characteristics and demands on the resource, and members of the

household will have their own nutritional histories. Moreover, the household will have its geographical location and times of function and change, all of which can have potential effects on refrigerator uses. The pool can change for reasons other than rules or technical discussions or interconnectedness. These situational characteristics always impose limits on the precise applicability of generalizations and hypotheses.

A Basic Framework for Institutional Analysis

The contingencies of time and place may make precise modelling of real world common pools difficult. But they still permit us to advance a framework rather than a model of decisions situations. The basic framework is presented in Figure 4-5.

Figure 4-5: Basic Framework I

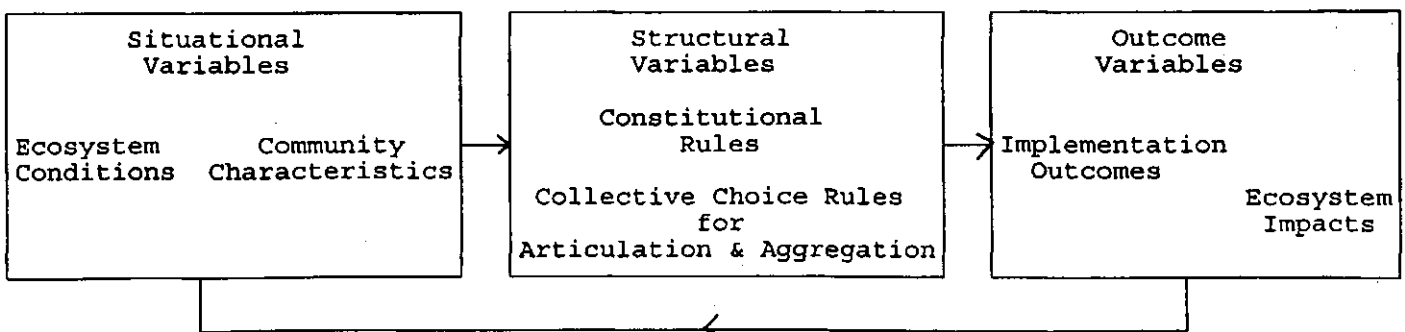


This simple framework cannot capture the detail of all common pool characteristics, decisions and effects of decision-making, let alone the rules within which decisions take place. However, it provides us with a skeleton framework to orient our analyses. It essentially hypothesizes that structural variables like property rights can affect ecosystems (or other common pools). However, other situational factors, like the technical characteristics of the resource or the characteristics of human communities that use that resource, can also affect

outcomes. These latter relationships are reciprocal too.

We can sketch too the outlines of a slightly more complex framework, given our previous discussions of rules (Figure 4-6). It is made expressly applicable to the differing ecosystem and community conditions (the situations) in different Areas of Concern on the Great Lakes. It also includes the constitutional level of rules in the light of our previous chapter on the U.S. and Canadian constitutional frameworks for environmental governance. The outcome variables include both implementation process variables (like the use of special agency structures) which are normally not considered outcomes and actual ecosystem impact variables. The implementation process is distinctly characterized as an outcome variable in this case, because many Remedial Action Plans were formulated with the feasibility of new implementation structures in mind (and hence not, by definition, part of the initial collective choice arrangements). Of course, the entire process gets animated by human motives and energies, and these variables, while endogenous to our concerns, would be necessary to include in a formal model rather than a framework of understanding. Again, we reject the relevance of a formal model due to the variety of situational variables extant throughout the Areas of Concern.

Figure 4-6: Basic Framework II



In the next chapter, we will develop measures of these explanatory factors for examination in our survey and case studies of Areas of Concern.

Multiple Uses and Multiple Externalities

The basic frameworks for analysis emphasize the centrality of collective choice processes for understanding dynamic changes in operational rules like property rights and, in turn, ecosystem conditions. It stands in contrast to much orthodox thinking that emphasizes rules as parameters and socio-economic factors as homeostatic (equilibrating). Our frameworks focus on the very processes of adaptation.

In the context of previous studies of pollution control, environmental management and common pools more generally, this approach also contrasts with traditional intellectual and legal focusses (foci) on simple resource uses and methods to contain negative interdependencies (externalities). These studies embrace models that deal with single not multiple uses, and externalities on one or a few other uses of a resource. The most famous of these studies is the Coase Theorem that we shall develop, for our purposes, in a different direction in the concluding chapter (Coase, 1960).

We have developed no names in the literature to characterize the multiple uses and multiple externalities problems that are the central issues in many real world situations, such as Areas of Concern on the Great Lakes. We might characterize our basic frameworks as the "no name" frameworks for addressing the institutional bases of multiple externalities or ecosystem interdependencies. As a matter of speculation, it might be a condition of human society and development that it cannot satisfactorily address real world concerns until it can find a name to

fit

the concerns. If correct, it might imply that metaphysics is a branch of linguistic anthropology, and that raises issues and conjectures well beyond the scope of this study.

Conclusion

The governance of common pools involves institutional arrangements or rules. In the natural resources situations, societies have developed customary rules and common law rules, encapsulated in the term "property rights", to ensure a fair and sustainable way to access, use and withdraw from the resource (exploit it). All rules will need to adapt, however, to meet new situations, physical, biological and social. So property rights and other so-called operational rules of conduct are made subject to wider societal processes for adaptation. The wider societal processes involve collective choice rules within which stakeholders, possessing varying bundles of property rights, will articulate and aggregate their interests. Decisions will emanate in the forms of revised operational rules and other outcomes. The dynamic character of common pools and ecosystems reflects and is reflected by the "no name" structures of collective choice rules. The Remedial Action Plans for the 43 Areas of Concern on the Great Lakes are an experiment, in essence, in collective choices.

Bibliography

- Bagehot, Walter, 1964, The English Constitution (London: Watts and Co.).
- Benson, Bruce, 1990, The Enterprise of Law (San Francisco: Pacific Research Institute for Public Policy).
- Berman, Harold J., 1984, Law and Revolution (Cambridge, MA: Harvard University Press).
- Bromley, David W., et.al. (eds.), 1992, Making the Commons Work (San Francisco: Institute for Contemporary Studies Press).
- Coase, Richard H., 1960, "The Problem of Social Cost", Journal of Law and Economics. Vol. 3, pp. 1-44.
- de Groot, Rupert, 1986, A Functional Ecosystem Evaluation Method as a Tool in Environmental Planning and Decision Making (Wageningen: Agricultural University of Wageningen).
- Feldman, Elliot J. and Michael A. Goldberg (eds.) 1987, Land Rites and Wrongs (Lincoln, NE: Lincoln Institute of Land Policy).
- Francis, George, 1994, "Ecosystems", Paper delivered at Social Sciences Federation of Canada Conference. "Social Sciences and the Environment", Ottawa: 17-19 February.
- Gunderson, Lance H., et.al. (eds.) 1995, Barriers and Bridges (New York: Columbia University Press).
- Holling, C.S., 1986, "Resilience of Ecosystems: local surprise and global change", in W.C. Clark and R.E. Munn (eds.), Sustainable Development of the Biosphere (Cambridge: Cambridge University Press) pp. 292-317.
- LaForest, Gerard V., 1969, Natural Resources and Public Property under the Canadian Constitution (Toronto: University of Toronto Press).
- Lee, Kai, N, 1993, Compass and Gyroscope (Washington, DC: Island Press).

Libecap, Gary B., 1986, "Property Rights in Economic History", Explanations in Economic History. Vol. 23, pp. 227-52.

McCay, Bonnie J. and James M. Acheson, 1987, The Question of the Commons (Tucson: University of Arizona Press).

McKean, Margaret A., 1992, "Success in the Commons", Journal of Theoretical Politics. Vol. 4, pp. 247-82.

Ostrom, Elinor, 1990, Governing the Commons (New York: Cambridge University Press).

Ostrom, Elinor, Roy Gardiner and James Walker, 1994, Rules, Games and Common Pool Resources (Ann Arbor: University of Michigan Press).

Pinkerton, Evelyn (ed.) 1989, Cooperative Management of Local Fisheries (Vancouver: University of British Columbia Press).

Schlager, Edella and Elinor Ostrom, 1992, "Property Rights Regimes and Natural Resources", Land Economics, vol. 68, pp. 249-62.

Smith, Vernon L., 1993, "Humankind in Prehistory", in Terry Anderson and Randy T. Simmons, The Political Economy of Customs and Culture (Lanham, MD: Rowman and Littlefield) Chapter 9, pp. 157-84.

Sproule-Jones, Mark, 1993, Governments at Work (Toronto: University of Toronto Press).