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Rights, Rules and the Organization
of Environmental Decision Making

by

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I. Introduction

It has been almost 30 years since the publication of Coase's seminal work on social costs (Coase, 1960) and 35 years since the publication of Gordon's seminal work on open access fisheries (Gordon, 1954). Despite a large volume of theory about property rights and natural resources and environmental decision-making published in the intervening years (see De Alessi, 1980; Libecap, 1986; and Schmid, 1988 for recent reviews), there remain considerable differences in the way theorists define and treat the concept of "property rights". One of the purposes of this paper is to illustrate these differences and to suggest an alternative and more inclusive definition and treatment of the concept. Unless theorists can reach common agreement on such key concepts, cumulative knowledge will not be built and studies as well as prescriptive conclusions remain ideosyncratic enterprises.

Much the same may be said about the concept of "citizen participation" or the more recently popular concept of a "stakeholder" in resource and environmental decision-making. It is over 25 years since Buchanan and Tullock explored the ways in which different rule arrangements could affect the articulation and aggregation of individual interests in collective decision-

making (Buchanan and Tullock, 1962), and almost as long since Vincent and Elinor Ostrom first used the concept of an industry or a public economy to characterize the integration of individual and organizational interests in water resources decision-making (V. and E. Ostrom, 1965). Yet most studies of the roles of citizen and organizational participation in natural resource and environmental decision-making tend to be descriptive accounts of the mechanisms available for participation and the varying limits to participation within differing political systems. (Three of the more useful are Lucas, 1976; Smith, 1982; Heberlein, 1985). The rule configurations that make up political systems as a whole are rarely disaggregated and made subject to commonly agreed definition and treatment. At a time when the Bruntland Commission calls for local community participation to facilitate the "sustainable development" of the world's environment (Bruntland, 1987), theorists use basic concepts concerning representative decision-making in different ways.

There is an additional purpose of this paper besides that of clarifying the nature of property rights and representational rules for resource and environmental decision-making. It is to subject key theoretical questions about rights and rules and about rights-holders and rule makers to empirical scrutiny. The paper draws upon empirical evidence gleaned by the author from three "aquatic environments" in Canada at three different times. The first case is that of water quality management for the Lower

Fraser River in the years 1974-75. The evidence was collected and analyzed as part of a multi-disciplinary effort of the Westwater Research Centre of the University of British Columbia (Sproule-Jones, 1981). It should not be confused with later intergovernmental attempts to provide a framework for estuary management.

The second case is that of the planning efforts organized by the Governments of British Columbia and Canada to provide appropriate environmental regulations for oil and gas exploration, drilling and transportation in the Hecate Straits - Queen Charlotte Sound (Sproule-Jones and Richards, 1984). The case is limited to the planning efforts in the years 1981 and 1982, and should not be confused with previous or later environmental assessment processes.

The third case concerns the development of a Remedial Action Plan for Hamilton Harbour from 1986 to the present time. The Plan is requested by the International Joint Commission and implemented by the Governments of Canada and Ontario in conjunction with a 49 member group of "stakeholders". The evidence is part of a larger academic study on the governance of multiple use resources for the Harbour (Sproule-Jones, 1985, 1986A, 1986B, 1988). The evidence is also drawn from this author's role as an observer participant in the process. He is a stakeholder representing McMaster University, chairman of the

implementation and access subcommittees of the stakeholders group and has chaired two public meetings dealing with interim reports of the Plan.

The paper proceeds as follows. In the next section, some major thrusts of property rights and congruent public choice theory are briefly reviewed in order to emphasize how economic and other forms of behaviour occurs within sets of rules including property rights. The third section extends this reasoning. The concepts of property rights, rightsholders and stakeholders are clarified as the terms are frequently used in differing ways in natural resource studies. I then explain how rights and stakeholders may be organized into public economies (provision systems) through institutional and constitutional rules or arrangements. The fourth section focusses on key questions raised by this analysis, and examines the case study evidence to see how rules affect the outcomes of environmental decision-making. The final section summarizes the paper and makes some inferences about how rules or institutional design might be used to integrate economic behaviour, on the one hand, with environmental or ecological issues on the other hand.

II Some Elements of Property Rights/Public Choice Theory for Understanding Economic Behaviour

In their concerns with developing theory about economic

behaviour, modern economists have increasingly treated institutional arrangements (like property rights) and the status of technology as exogeneous factors. These factors could be safely left to the purview of other social sciences, confirming (as it were) the benefits of academic division of labour. The last twenty-five years have seen major challenges to this assumption.

One challenge has come from property rights theorists. The intellectual origins of this analysis may be traced to The Wealth of Nations (Smith, 1937), but modern applications to environmental problems are frequently traced to the work of Coase (Coase, 1960) and modern applications to common property problems are frequently traced to the work of Gordon (Gordon, 1954).

The basic thrust of property rights theory for understanding economic behaviour in general may be briefly summarized. Individuals will voluntarily make exchanges to make themselves better off, in a subjective sense, subject to the structure of relative prices (in the case of goods bought and sold) and subject to the opportunities provided by income (again in the case where goods are bought and sold). However, the ability to make voluntary exchanges, the relative prices of goods and the income available for purchases all rest on a system of property rights.

Property rights themselves are a "bundle of rights to use a resource that is owned" (Alchian and Demsetz, 1973, 17). For

example, some rights are privately owned and may be voluntarily transferred. Other rights, called usufruct rights in the natural resource area, permit private ownership but prohibit voluntary transfer.

The particular "bundle" of rights available to property owners have two major effects for natural resource and environmental decisions. First, different property right regimes will affect the level and distribution of transaction costs for rights holders as they negotiate, monitor and enforce agreements. For example, regimes that permit property rights holders to seek prior approval of other rights holders before residuals are discharged into the ambient environment will impose a different level and distribution of transaction costs than will regimes where prior approval is not necessary. Secondly, the level and distribution of information costs associated with environmental decisions will vary with different property rights regimes. For example, regimes that require a waste discharger to show proof of the benign effects of discharged residuals will raise the level of information costs compared with regimes requiring estimations of adverse effects. We should, therefore, expect positive transaction and information costs to be associated with all property rights regimes, but the size and incidence of these costs will depend on the precise "bundles" of rights extant in any community.

While property rights theory recognizes that some property rights regimes can minimize transaction and information costs and maximize aggregate net wealth, it also recognizes that well-defined and enforced property rights create incentives for any property rights holder to take account of positive or negative effects on third parties. At the limit, there may be no such thing as social costs, only misplaced and misspecified property rights (Cheung, 1980).

Common property may be a different matter. In the classic case of an open access fishery, individual fishermen have an incentive to exploit the resource in case others do so before them. At the limit, fish are harvested beyond the points of rent maximization and physical sustainable yield. Appropriate solutions to the commons dilemma are in dispute, however. On the one hand, full privatization and enforcement of property rights may be more costly than the gains from limiting access. On the other hand, state intervention to limit entry and/or fishing effort by regulations may lead to high transaction costs and costly rent seeking by fishermen, potential fisherman and governmental agencies, and these costs may also exceed the gains from limiting access. (Sproule-Jones, 1982; Baden and Stroup, 1981).

Public choice theory is, at this stage, of value to property rights theory and another challenge to orthodox environmen-

tal economics. Public choice is in part a stream of analysis about institutional arrangements (of which property rights are a subset) and their consequences for the provision of public and private goods. (For one of the many recent reviews, see Sproule-Jones, 1983). Public choice shares with property rights analysis its assumption about individual choice taking place within systems of institutional constraints and opportunities. It also shares the concern that appropriate institutional arrangements will differ depending on the good, or natural resource or ecologies under scrutiny.

However, public choice expressly addresses issues of the self interested behaviour of politicians, bureaucrats and property rights holders. These actors are predicted to respond to incentive systems, such as those associated with public ownership of a resource, governmental regulation of resource users, and governmental agencies as resource users themselves. Such incentive systems are established by institutional arrangements or rules.

Public choice also examines issues of the "rules about rules". For example, it addresses questions about how property rights may be acquired or disposed, or how regulatory organizations may acquire or lose regulatory instruments. In a sense, these concerns with "rules about rules" may be considered as issues of constitutional choice, especially as many of the rules

about rules for governmental organizations are found in formal written constitutions. In another sense, the term "constitutional choice" must be broadly interpreted. Some rules about rules may not be contained in a single formal written document. For example, the common law doctrine of "navigable servitude" which grants priority to commercial shipping over other uses of a navigable waterway in Canada is a rule to be found not in the Constitution Act, 1865, but in court precedents that stem from the Magna Carta. In addition, some rules in constitutional documents may be ignored by governments, such as the rule empowering the Canadian Government to declare any work "to be for the general advantage of Canada" (Section 92, 10, C).

Two features of constitutional rules are important for our subsequent analysis of the representation of rights and stakeholders. These may be called the "stacking" and "nesting" of rules. (For a fuller treatment, see E. Ostrom, 1987). "Stacking" of rules refers to multiple levels of rules from, at the lowest level, operational rules through institutional rules to constitutional rules. Environmental policy decisions, for example, may be taken by rights holders at an operational level; their authority so to decide may be determined at an institutional level; and these latter institutional rules are governed by broader constitutional rules or arrangements.

The "nesting" of rules refers, in contrast, to the

phenomenon of policy decisions occurring within the context of more than one set of operational, institutional and constitutional rules. For example, environmental policy decisions may be taken in the context of multiple use operational rules, with institutional rules established for each set of users, and with constitutional rules similarly varied.

Given the interdependencies between ecological systems in the natural environment, one would anticipate that resource enhancement, rehabilitation or degradation would be subject to many differing operational, institutional and constitutional rules. For any location, environmental goods may be anticipated to "nest" and be "stacked" between multiple rules.

In more general terms, both property rights theory and public choice theory emphasize how economic behaviour occurs within sets of rules including property rights. While market failures and weaknesses occur, such as in cases of environmental degradation, one must examine such rules for a probable source of remedies.¹ One must also examine the terms and conditions of the feasibility of institutional and constitutional rule change. Rule structures have effects not only on economic behaviour but also on environmental decision-making.

¹ Theorists in both traditions would admit also of the possibility of human error.

III Toward a Clarification of the Concepts of Property Rights, Stakeholders and Rules for Their Organization

The design of appropriate rules for environmental decision-making must rest initially on clearly defined and acceptable concepts about the decision-makers and their interactions within systems of rules. We must thus address the definition of concepts like property rights, "stakes" and the organization of rights and stakeholders. We can then raise key issues about rules and their predicted consequences on the appropriate representation of rights and stakeholders for resources decision-making.

The concept of property rights is an example of a widely used term in resource and environmental decision-making that is used differently by different theorists (Schlager and Ostrom, 1987). Three examples may be given. First, in a recent review article, Peter Pearse defined property rights in terms of four criteria:

- (i) Duration of tenure;
- (ii) Comprehensiveness over one or more multiple attributes of a resource;
- (iii) Exclusivity;
- (iv) Transferability. (Pearse, 1988)

In contrast, De Alessi focusses on two criteria:

- (i) Exclusivity;
- (ii) Transferability. (De Alessi, 1980).

Finally, Gordon's classic article defined common property in terms of a single criterion:

- (i) Exclusivity. (Gordon, 1954).

Prescriptions for changes in rules usually follow from the presence or absence of these criteria. For example, both Pearse and Gordon assert that common property problems should be solved with some degree of governmental ownership and/or regulation of resource users (Pearse, 1988, 312 and 318; Gordon, 1954, 135). They imply that common use can mean open access, and that governmental ownership and/or regulation, while costly, may be necessary to ensure exclusivity. Pearse favours increasing the duration, comprehensiveness and exclusivity of private resource users but asserts:

"Canadians are not likely to reverse their commitment to the present degree of Crown ownership of rural land and natural resources in the foreseeable future. So tenure policies will have to be limited to private usufructory rights of some kind". (Pearse, 1988, 313).

Evidence suggests that these prescriptions may be incorrect. First, evidence from the East and West coastal fisheries suggests that resource users have themselves organized de facto property right regimes to limit access, and that

governmental attempts to impose new de jure property right regimes may lead to more rather than less access (Pinkerton, 1987; Matthews and Phyne, 1988). Common use may not be the same as open access under particular conditions related to the nature of the resource and the norms developed as rules by resource users (McCay and Acheson, 1987).

Secondly, evidence suggests that there has been substantial rent dissipation on Crown lands in Canada (Gunton and Richards, 1987) as well as on publicly owned harbours (Sproule-Jones, 1988). Some of this appears to be due to the high transaction costs of monitoring and enforcing usufructory rights and the rights of lease and permit holders (Copithorne, 1979; Webb, 1987). Governmental ownership and/or regulation may decrease resource sustainability under specified conditions and rules.

We may, therefore, need to redefine what we mean by property rights and what we understand by terms like exclusivity before we can make prescriptions about institutional design for rights and stakeholders. In a recent paper, Schlager and Ostrom define the legal positions of five types of rightsholders. Figure I summarizes the "bundles of rights" for each type.

Figure I: Bundles of Rights Associated with Positions

<u>Owner</u>	<u>Proprietor</u>	<u>Claimant</u>	<u>Authorized User</u>	<u>Squatter</u>
Access	Access	Access	Access	No rights
Withdrawal	Withdrawal	Withdrawal	Withdrawal	
Management	Management	Management		
Exclusion	Exclusion			
Transfer				

Source: Schlager and Ostrom, 1987, 10.

Thus an owner of a resource has more extensive legal rights than, at the other extreme, an authorized user. A squatter has no legal rights and no legal way to enforce his or her claims. (Parenthetically in some regimes, squatters can attain some legal rights after the passage of time). We may modify this typology by suggesting that, in Canada, most polluters have the legal status of authorized waste dischargers, although their status will vary from site to site.

Schlager and Ostrom further define the different elements in these bundles of rights:

Access: the right to enter a defined physical property.²

² Access would, I suggest, include the right to discharge wastes.

Withdrawal: the right to obtain the products of the resource.
 Management: the right to regulate use patterns and to enhance the resource.
 Exclusion: the right to determine who will have access or a share thereof.
 Transfer: the right to sell, lease or bequeath all of the above rights in whole or in part. (1987,8).

Thus rights holders may have different elements in their bundles of rights and hence differing legal statuses.

We should anticipate that stakeholders will also have different legal positions and different bundles of rights. Depending on the resource and the resource site in question, stakeholders or citizens may be owners, proprietors, claimants, authorized users or even squatters. This is because the definition of a "stakeholder" is typically broad and inclusive. For example, Environment Canada and the Ontario Ministry of Environment recently made the following definition:

"The public (sometimes referred to as "stakeholder") is defined as any person, group or organization with an interest or stake in the water quality or water use of the area of concern. This includes (but is not limited to):

- citizen and environmental groups;
- government (municipalities, conservation authorities; harbour commissions, federal and provincial agencies);
- native peoples;
- industry and its representative organizations;
- universities, institutes and schools;
- unions;

- user groups (eg. boating clubs);
- waterfront property owners;
- interest groups (eg. agriculture, business);
- private citizens." (Environment Canada and the Ontario Ministry of Environment, 1988, 4-5).

It is difficult to conceive of any property rights holder or any squatter, who may possess an environmental concern but no legal avenues to articulate and enforce such concerns, that are excluded by such a wide definition. The critical theoretical issues raised by such a sweeping definition concern the organization of such widely differing interests and legal statuses. How are such interests articulated and aggregated in forms of cooperative decision-making about environmental goods? At one extreme, the absence of any form of organization may result in mutually destructive strategies of environmental degradation. At the other extreme, coordinated policy making and implementation may occur at an operational level of decision-making about environmental enhancement. Coase's theorem may be applicable at this latter extreme (Coase, 1960), while concerns about the carrying capacity of the planet Earth may be more aptly directed at the former extreme situation.

The concept of a "provision system" has been devised to describe such forms of organization for environmental and other goods. A provision system consists of all persons (in the legal sense of individuals, groups and organizations) whose decisions interact in the provision of goods within a specified locale. (Sproule-Jones, 1978; 1981). Groups of provision systems form

an industry-like structure with differing patterns of vertical and horizontal integration depending, among other factors, on the nature of the good in question (V. Ostrom and E. Ostrom, 1965; Gregg, 1974; E. Ostrom et al., 1978; E. Ostrom, 1983; ACIR, 1987). Provision systems are typically non-hierarchical and may constitute a distinct form of public economy. They may include governmental agencies and units, but they normally include non-governmental agencies and units as well. Traditional political science concepts like "levels of government", "the state", "pressure groups" or "citizen inputs" are descriptively unhelpful, as provision systems for different goods are typically bonded by "stacked" and "nested" rules embracing a number of public and private legal persons, (Sproule-Jones, 1982).

Three theoretical aspects about provision systems are important for the identification and representation of stakeholder interests in environmental decision-making. The first is the institutional rule structure for entry and exit. Because of the interdependencies between ecological systems and thus the potential interdependencies between persons involved with these ecologies, one would hypothesize that the boundaries of provision systems will tend to be permeable. That is, the entry and exit rules will be limited. On the other hand, permeable boundaries may also imply high transaction costs on new and potential stakeholders as they learn how the system is organized and what are the opportunities for decision change. Permeable boundaries

also imply instability as stakeholders may exit before longer run decision options are implemented.

The second major theoretical concern in environmental provision systems centres on the rules for aggregation of stakeholders interests. Provision systems may vary from highly consensual decision-making fora to highly coercive fora dominated by particular interests (including governmental agencies). Consensual forms of decision-making, such as those based on the willing or unanimous consent of stakeholders, tend to produce high transaction costs in reaching agreements and high bargaining costs in dealing with intransigent members. (Buchanan and Tullock, 1962; Sproule-Jones, 1979; Blomquist and Ostrom, 1985). Conversely, forms of decision-making that require less consensus - such as those that use majority and plurality voting systems to aggregate choice or those that must be implemented by a single stakeholder - reduce the probability of high transaction or bargaining costs but increase the probability of certain stakeholders' interests being ignored.

Thirdly, the entry and exit rules (or the transaction costs associated with entry or exit rules) as well as the aggregation rules are subject to constitutional rules for stakeholder governance. In Canada, constitutional rules tend to be dominated by governmental interests both as a consequence of the control of legislative bodies by mass majoritarian parties and as a con-

sequence of crown prerogative powers. Governmental bodies are thus key actors in establishing and changing the boundary and aggregation rules of provision systems, as well as the legal statuses of stakeholders as rights holders. It is in this particular sense that "the state" as an intellectual concept may have analytical value.

Thus the manner with which provision systems are organized may be critical for understanding environmental decisions and the impact of socio-economic processes on the environment. At the limit, where no organization exists, market failure (in the conventional environmental economics sense) may ensue at the operational level of decision-making. However, one would anticipate that institutional rules would emerge to help integrate environmental with economic interests. Some property rights holders or, more generally, stakeholders would have incentives to seek solutions to limit the social costs imposed on them by other rights holders. (Empirically, they may not be immediately successful, and a resource or an ecology may be destroyed or depleted in the interim). The rules for the organization of provision systems, especially the boundary and aggregation rules, will integrate stakeholders into decision-making systems. Provision systems will themselves vary in the effectiveness with which they integrate environmental and economic interests. Constitutional rules of governance for provision systems will ultimately determine which stakeholder inter-

ests are articulated and aggregated.

IV Case Study Evidence

Evidence from three cases of environmental decision-making in Canada may shed light on theoretical questions about the articulation and aggregation of stakeholders' interests: -

- (i) How are stakeholders identified and represented in the provision systems? What are the entry and exit rules for the articulation of their interests within provision systems?
- (ii) How do provision systems organize themselves? What are the institutional rules for aggregation of stakeholder interests, and what appear to be the consequences of such rules?
- (iii) What constitutional rules exist to govern the provision systems? How do the constitutional rules affect the institutional rules of provision systems?

(a) THE FRASER RIVER CASE

This case was not part of any official planning or assessment process; it was an academic study of the provision system for water quality management in the estuary as it existed in 1974 and 1975. (Sproule-Jones, 1981). Stakeholders were identified by using a snowball sampling technique from an initial list of 14 known "stakeholders". 54 stakeholders were identified.³ The snowball technique is a useful method of sampling active stakeholders although it is not, by itself, useful in identifying latent stakeholder interests. Entry into the provision system appeared to be relatively easy, with the major constraints being the high informational costs on potential stakeholders of discovering the legal statuses of each stakeholder and the existing coordinative arrangements developed to manage water quality. One might hypothesize that these costs are associated with many multiple use resource sites, whose organizational complexity is likely to parallel the complexity of interdependencies amongst users.

The organization of the provision system was extensive. Some 781 coordinative arrangements between 2 or more stakeholders were identified, over 50% of which represented frequent and planned provision of services. These arrangements, at the operational level of environmental decision-making, were

³ The provision system consisted of 14 Provincial and 16 Federal agencies and corporations, 6 municipal and 2 local special district agencies and corporations, 1 international governmental organization, and 15 private sector firms, associations and interest groups.

just as likely to exist across levels of government and between government and the private sector as they were between levels and sectors.

The institutional rules affecting the aggregation of interests tended to be consensual. The operational agreements were codified in the form of contracts, referrals, special committees and informal arrangements, all of which required mutual consent of the parties so involved. Many stakeholders expressed frustration, however, at the high transaction costs of developing and monitoring agreements.

The constitutional rules for governance of the provision system consisted of both "nested" rules (such as those for commercial shipping uses) and "stacked" rules (such as those for recreational uses). Governmental stakeholders appeared to play equilibrating strategies; if agencies at one level of government appeared to be constrained by constitutional rules, parallel agencies at a different level would compensate. Caution must be exercised at this stage. The object of the original study did not include an analysis of constitutional rules.

(b) THE QUEEN CHARLOTTE SOUND - HECATE STRAITS CASE

This case was an examination of the planning processes considered and implemented during the two years of 1981

and 1982. Stakeholder interests were focussed on one or both of two planning processes. First, an "Environmental and Land Use" working group, composed of Provincial Government organizations, was developing a preliminary environmental assessment to form the basis of recommendations for regulations of offshore exploration, drilling and transportation of oil. Informal contact and consultation was possible with this process. Second, and more important, a Technical Conference Planning Committee, composed of Federal, Provincial and private sector organizations was established to sponsor a conference on offshore developments, focus the concerns of the stakeholders and foster naturally agreeable solutions to these concerns.

The study developed a different methodology to identify stakeholders. First, a literature review was made of offshore oil and gas discoveries and of the available technologies for exploration, drilling and transportation. Second, a literature review was made of the biological and physical impacts of these types of discoveries and technologies. Third, a review was made of the geology, atmosphere and oceanography of the area to assess which discoveries and technologies were likely to be used. This, in turn, allowed us to develop a listing of potential physical and ecological impacts in the site and to identify classes of uses associated with the impacts. Finally, we used a snowball sampling technique from an initial list of groups

within each class of users to identify a relevant set of established stakeholders. This process allowed us to compare actual representation on the Planning Committee with the range of potential stake-holders. It also allowed us to assess whether stakeholder interests were indirectly articulated by governmental stake-holders (such as fin fishing groups by Fisheries and Oceans, Canada).

We discovered that 8 classes of users would be impacted by the proposal, but that 2 classes remained latent in terms of organization.⁴ Some 15 organizations were associated with the other 6 classes, only 2 of which were "official" stake-holders on the Planning Committee. A further 5 felt they were indirectly represented through contacts with "official" stakeholders. Thus the entry rules for participation of many potential stakeholders were high.

The rules for aggregation of the interests of the "official" stakeholders on the Committee were, as in the Fraser River case, consensual in nature. It may be hypothesized that entry rules for the articulation of interests may be linked with those for aggregation. The transaction costs for consensual aggregation rules may be reduced by limiting representation of dis-

⁴ The organizations were 5 associated with commercial fin fishing, 2 with commercial shell fishing, 1 with marine transit, 4 with environmental and wildlife interests, and 3 with native Indians whose interests spanned all of the above.

parate interests.

These institutional rules were, however, controlled by governmental stakeholders who could assert claims to the ownership of the resource. We have no evidence of the effects of such a constitutional system of governance on the stability or effectiveness of operational decision-making.

(c) THE HAMILTON HARBOUR CASE

This is a case study of the development of a Remedial Action Plan for ecosystem enhancement for one of 42 "areas of concern" on the Great Lakes identified by the Water Quality Board of the International Joint Commission (Great Lakes Water Quality Board, 1985). The planning process for the site began in the Summer of 1986 and will conclude with the submission of the Plan to the IJC in September 1989. The plan will include, however, implementation strategies and structures

The provision system of stakeholders consists, in this case, of 49 organizations and groups working with a "writing team" of Federal and Provincial public servants.⁵ The entry rules and exit rules for the system have been deliberately

⁵Currently, 6 stakeholders are Provincial and Federal agencies, 9 are municipal organizations, 3 are special boards and commissions, 8 represent industry and agriculture, 7 are from environmental groups, 6 are recreational (mainly boating) organizations, and the remainder are from general interest and neighbourhood groups.

limited. Stakeholders were identified by four means. First, an initial list of 20 organizations was supplied by the Ontario Ministry of Environment and Environment Canada. Second, all local newspaper items on watershed water quality published in the 6 months prior to mobilization were scanned for names. Third, all persons involved in a waterfront parks project of the City of Hamilton were identified. Finally, the initial list was snowballed. 43 stakeholders were so identified by May 1986 (Leppard, 1986, 14). Additional members have been added on request. Some 2,000 members of the general public have also been involved through the dissemination of information and the holding of 4 public information meetings.

As in the Fraser River Case, the legal statuses of stakeholders varies considerably - from owners through to squatters - reflecting the multiple use character of the watershed. (Sproule-Jones, 1985). The aggregation rules for the provision system are similarly consensual, and operational rules are developed with the aid of a facilitator using mediation dispute techniques. Mutual agreement has been obtained on operational goals, physical/biological constraints, and implementation strategies and structures. The mutually agreeable solutions established by such aggregation rules have frequently included high cost options financed by the Federal and Provincial Governments and, to a large degree, taxpayers outside the watershed.

The constitutional rules for this provision system are set largely by the Canada-Ontario Agreement Respecting Great Lakes Water Quality, 1985. This gives strategic power over constitutional rules to a federal/provincial agency committee called the RAP Steering Committee. However, some stakeholder interests are "nested" within wider constitutional governance systems (such as commercial shipping) and set constraints to the ability of the RAP Steering Committee to raise entry rules and lower aggregation rules. Such is not the case in other 12 "areas of concern" on the Canadian side of the Great Lakes; stakeholder interests are to be included only through public advisory committees on the plans developed by governmental agencies.

These three case studies represent different attempts by stakeholders who possess differing property rights to organize themselves to provide solutions to perceived environmental problems. Their operational decisions and operational plans for environmental protection, enhancement or remediation have been influenced by the structure of institutional rules and constitutional rules existing in each site. Their decision-making has been critically affected by the institutional rules affecting the articulation and aggregation of different interests, as well as by the constitutional rules of governance for provision sys-

tems.

In two of the three cases (Fraser River and Hamilton Harbour) the rules for entry and exit constrained the transaction costs on stakeholders in the provision systems. In all three cases, the aggregation rules provided few constraints and created incentives for mutually agreeable solutions, sometimes amongst stakeholders with incompatible interests. Thus decision-making could remain costly for many stakeholders, including those that articulated a perceived irreversible environmental interest. Constitutional rules remain important, especially when governmental stakeholders have differential access to manipulate the rules for interest articulation and aggregation. More generally, rules make a difference, and deliberate consideration of the construction of rules for the identification and representation of stakeholder interests must remain a central concern in plans for the environment.

V Conclusion

Current property rights theory, as well as studies of citizen participation in environmental decision-making, suffer from a lack of agreement amongst analysts as to the precise legal status of rights holders (who may or may not be individual

citizens) as well as to the precise "bundles of rights" associated with different legal statuses. This paper has attempted to clarify the meanings of rights, rights holders and stakeholders. The paper has also attempted to clarify the nature of rules in so far as they may organize rights holders and stakeholders into alternative forms of collective decision-making about the environment. Conventional environmental economics with its emphasis on the social costs of environmental degradation, and conventional political science with its emphasis on the role of the state in solving environmental problems may, it is suggested, be explaining those extreme cases where rights and rules have not emerged to facilitate collective decision-making on resources questions.

The theory and evidence presented in the paper suggest that institutional arrangements often emerge to establish the de facto and the de jure statuses of rights and stakeholders and the elements that comprise the bundles of rights for these individual and collective persons. Institutional arrangements also appear to emerge to articulate and to aggregate the interests of such persons in collective decision-making fora or provision systems.

The so-called "emergence" of institutional arrangements must be used in a metaphorical sense. Institutional arrange-

ments are a configuration of rules made possible by constitutional arrangements for collective choice. Whether or not these institutional rule configurations exist and facilitate mutually agreed upon solutions to environmental problems depends, as our case study evidence suggests, on the design of constitutional rules. Rights and stakeholders may be differentially identified and represented within provision systems depending on their access to constitutional rule making authority. Governmental agencies as stakeholders appear, at least within the Canadian parliamentary system, to have greater power to establish institutional rule configurations than do many private stakeholders.

Additional evidence is necessary to firmly establish these conclusions. Further clarification of basic concepts about property rights, stakeholders, rules and provision systems may also be necessary. Cumulative knowledge can only be built with academic agreement about basic concepts, their relationships, and their verification. The more practical world, with its pressing concerns about sustainable development, awaits the development of such knowledge.

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