# Institutional Design for the Economy and the Environment: The Identification and Representation of Stakeholders

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## I Introduction

Any successful attempt to understand the relationships between the environment and the economy must be based on at least three features. First, key terms like "stakeholders", "property rights" and '*ecological interdependencies" must be clarified and defined, so that analysts can reach common agreement as to the objects of study. Without such common agreement, no cumulative knowledge can be built, and studies as well as the conduct of environmental policy will remain idlospncratic and ambiguous.

Secondly, theory must be built with the use of key concepts about the economy and the environment as a sine qua none of reflective understanding. Without theory, knowledge of the relationships between the economy and the environment will remain, at worst, merely descriptive accounts of instances of such relationships, and, at best, partial understandings viewed through the prisms of orthodox assumptions in disciplines like economics, biology, chemistry and political science. Needless to say, those persons charged with formal public authority to influence the conduct of economic and environmental policy will probably gain limited consideration of fundamental issues other than those presented in the '*working place" games of legislative and bureaucratic politics.

Thirdly, theory must be tested and revised in the light of experience about the economy and the environment. Most of the

social and natural sciences are statistical sciences, in the sense that they can advance tendency statements and generalizations but must continuously refine such statements and generalizations in the light of newly-revealed determining conditions or newly-invented social and technological practices. However, tentative resolutions must also be continuously made in order to infuse the practical world with propositions that can act as rules of conduct for assessing projects and programs involving the environment and the economy.

The paper takes steps toward attaining all three of these features. It attempts to clarify the concept of a "stakeholder" and the representation of persons with interests in resource decision-making. Currently concepts like "stakeholder", "property rights" or "citizen participation" are used in widely differing ways by theorists and practitioners.

Secondly, this paper takes steps toward building a theory about the representation of socio-economic interests in environmental decision-making. Most studies of the roles of citizen and organizational participation in natural resources tend to be descriptive accounts of the mechanisms available for participation and the varying limits to participation within differing political systems or for resolving differing resource conflicts. (Three of the more useful are Lucas, 1976; Smith, 1982; Heberlein, 1985). The theoretical propositions that are offered in this paper are drawn from the property rights and public choice

streams of analysis, both of which show promise of developing knowledge about institutional design which, in turn, may provide the appropriate framework for integrating knowledge about socio-economic matters and knowledge about the environment. (Sproule-Jones, 1982).

Finally, 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 analysed 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 organised 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,the major thrusts of the property rights and public choice theorists are briefly reviewed in order to highlight the role which institutional rules may play in structuring economic behaviour. The third section extends this reasoning. The concepts of property rights 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 Economic Behaviour and Property Rights/Public Choice Theory

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 is frequently traced to the work of Coase (Coase, 1960) and modern applications to common property problems is frequently traced to the work of Gordon (Gordon, 1954).

The basic thrust of property rights theory may be briefly summarized (for reviews, see De Alessi, 1980; Libecap, 1986; Schmid, 1988). 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 associa-

ted 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 economics recognize that some property rights regimes can minimize transaction and information costs and maximize aggregate net wealth, they also recognize 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 or may not 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 or may not exceed the gains from limiting access, (Sproule-Jones, 1982; Baden and Stoup, 1981).

Public choice theory is, at this stage, of value to property rights theory and another challenge to orthodox environmental economics. Public choice is 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.

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

## III The Design of Rules and Concepts of Property Rights Stakeholders and Provision Systems

The design of appropriate rules for environmental decision-making, and for the integration of economic behaviour with environmental concerns, 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 governmental ownership and/or regulation of resource users (Pearse, 1988, 312 and 318; Gordon, 1954, 135). They imply that common use necessarily means open access, and that governmental ownership and/or regulation will be relatively costless. 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 common 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 Winkerton, 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, 198'7).

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 Kopithorne, 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. A recent unpublished paper by Schlager and Ostrom is extremely helpful in this regard. (Schlager and Ostrom, 1987).

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

| Owner | Proprietor | Claimant | Authorized User | Squatter |
|---|---|---|---|---|
| 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 authorised 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]

Withdrawal: the right to obtain the products of the

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

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 ail 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. 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):
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> - 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).

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.

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.

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 provi-

sion systems will tend to be permeable. That is, the entry and exit rules will be limited. On the other hand, permeable boundaries 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 larger 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 forums to highly coercive forums 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 consequence 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.

Thus the manner with which provision systems are organized may be critical for integrating socio-economic considerations with operational decisions about 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. These rules, especially the boundary and aggregation rules, will organize stakeholders into provision 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 interests 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?

The more practical implications of our findings will be postponed to the final concluding section of the paper.

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

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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.

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 governnance of the provision system consisted of both "nested" rules (such as those for commercial shipping uses) and "stacked" rules (such as those for water contact recreational uses). Governmental stakeholders appeared to play equilibriating 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 trans-portation 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 sponser 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 ocean-ography 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 disparate interests.

These institutional rules were, however, controlled by governmental stakeholders who could assert claims to the owner-

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[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.

ship 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 March 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 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,

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"Currently, 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.

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 systems.

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

The theory and evidence in this paper imply that rules make a difference. The rules include the legal statuses of property rights and stakeholders, but they also include the institutional arrangements for organizing rights and stakeholders into provision systems. Operational decisions linking socio-economic concerns with environmental and ecological concerns are manifested within provision systems. Thus the precise design of institutional rules for provision systems is critical, as is the governance provided by constitutional rules for institutional rule design.

The paper has focussed on the rules for the articulation of the interests of rights and stakeholders, on the rules for the aggregation of their intersts, and on the constitutional rules affecting these particular sets of institutional rules. Theoretical work on the importance of property rights for natural resources has been extended to cover the issues of the identification and representation of rights and stakeholders.

Some of the more practical planning and assessment implications of the analysis may be suggested. First, institutional rules may not be the only set of factors that can integrate the environment and the economy, but they are factors that are amenable to human intervention and manipulation. Second, negotiations and bargaining between rights and stakeholders (including governmental agencies) takes place within the parameters set by the institutional rules - "the rig of the game". Third, "the rig of the game" may be changed so as to influence both the articulation and the aggregation of different interests. Fourth, because of the nature of interdependencies between ecological systems, institutional rules that lower the transaction costs associated with entry into provision systems will likely be more successful than rules which imply high transaction costs for certain rights and stakeholders. Fifth, techniques exist to widen the articulation of interests; these include snow-ball sampling techniques and other related strategies. At the limit, latent groups may be identified. Sixth, the rules

for the aggregation of interests must be defined. Rules that rely exclusively on the willing consent of rights and stakeholders can lead to high transaction costs amongst all parties, especially for the resolution of conflicts. Strategies to devise, in advance, aggregation rules to resolve conflicts and lower the transaction cost of reaching agreements may be necessary. Finally, the crux of the planning processes for these rules rests on constitutional systems of governance. Governmental agencies charged with identifying and representing stakeholders are engaged in a form of constitution building. Constitution building takes both time and experimentation. There is no "quick fix" to designing rules of governance for complex human and biological systems.

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