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. RAPs for the 43 AOCs on the Great Lakes are, in essence, experiments in collective choice.

RAPs are drawn up by stakeholders that have quite different property rights and different powers to change their property rights. The key empirical question is whether stakeholders can cooperate in order to clean up decades of environmental pollution in the "hot spots" known as AOCs. It is the actual construction of the rules of collective and institutional choices that will determine the scale and scope of cooperative action among stakeholders. Before we look at the construction and operation of these rules, in Chapter 5 we will consider some further concerns about institutional rules for RAPs.

5
From Common Property to the Institutional Analysis of Remedial Action Plans

The theory of common property, reviewed in Chapter 4, suggests that institutional arrangements create incentive systems that lead to stakeholders making decisions in relatively predictable ways. The end result of decision making leads to changes in real-world conditions. Different institutional arrangements will have different consequences. Different remedial action plan arrangements will, for example, have different consequences for action in different Areas of Concern.

Over time, stakeholders will develop and amend decision-making arrangements through collective-choice and constitutional processes and will create further kinds of institutional arrangements beyond operational or implementation-type rules. Institutional arrangements consist of laws, regulations, operating practices, and organizational structures that are "stacked" in simple hierarchies. At the lowest level (the operational level), these arrangements or rules consist of procedures or processes that are agreed upon by parties to a decision in order to facilitate decision making. One important set of operational rules is property rights. Operational rules can be changed at the next level in the hierarchy (the collective-choice level), which itself operates within constitutional rules allocating various degrees of authority to stakeholders. Constitutional rules are thus "rules about rules" and have their own processes for amendment. RAPs are institutional-choice arrangements that attempt, in conjunction with other laws, to manage the various uses of the Great Lakes. On "top" of these are constitutional-choice rules of the various state, provincial, and national governments and their component parts (like the EPA and Environment Canada).

Institutional arrangements or rules of various kinds are not fully predictive of real-world outcomes. One key source of variability involves the situation in which the institutional arrangements are developed and applied. For example, we saw in Chapters 1 and 3 that 43 AOCs in the

Great Lakes had been identified as "pollution hot spots," or places where many beneficial uses of the water had been seriously impaired. In these different situations, one would expect different kinds of rules to be developed and applied for restoration purposes.

The characteristics of stakeholders can also make a difference. Human beings vary in their interests, preferences, capabilities to search for (and distill) information, and abilities to learn from experience. Stakeholders also differ with respect to their relative powers. At an operational level, they may possess different property rights – rights that enable them to act in different ways regarding resource decisions and their implementation. At a collective-choice level or constitutional level, certain stakeholders may hold most of the power.

In the case of RAPs, we saw that state and provincial environmental agencies, in consultation with their federal counterparts and related governmental bodies, were given powers to select stakeholders and to approve agendas at the collective-choice level. The International Joint Commission delegated the issues of institutional analysis and design to the American and Canadian governments, which, in turn, "involved" state or provincial governments according to their respective constitutional requirements. In the American case, this involved a new federal statute and a negotiated application of a variety of environmental statutes. In the Canadian case, it involved, in the early years, an executive agreement between Canada and Ontario (the sole province in the Great Lakes basin). In later years, the Canadian government would act alone, although a new executive agreement was drafted in 2001. Granting the powers of institutional design and analysis to one or two government agencies is a "heady mix" – a mix that (as we shall see) most agencies cannot resist. Fortunately, the discretion and power so afforded to agency stakeholders did not manifest itself in matters of narrow bureaucratic self-interest; bureaucracies were engaged in constitution making, as it were, and were quite self-conscious about including and empowering stakeholders.

RAPs were intended to supplement the regulatory regimes of governments in the basin by enlisting stakeholders in the critically polluted areas. The stakeholders were primarily to be other resource users and parties that had some property rights in the resource. The sites, or AOCs, were the situations that were commanding much of the attention of resource regulators. They were usually areas adjacent to urban and industrial centres; they were resources subject to multiple uses and, most frequently, to degradation due to pollution and habitat destruction. In Chapter 1, we reviewed the specific set of impaired beneficial uses for the AOCs; in Chapter 2, we reviewed the current state of pollution in the basin as a whole.

There are four sites of particular concern here: (1) the St. Lawrence River, (2) the Niagara River, (3) the Menominee River, and (4) Hamilton Harbour. These were explored intensively in our original investigations because we needed to examine how the resource situations affected the decision making of stakeholders when they formulated and implemented their respective RAPs.

Each of the sites differed significantly in institutional design. They were selected because of their differing constitutional status, ranging from the most fragmented case (Hamilton Harbour). The St. Lawrence case involved two national governments, one state and one provincial government, a second provincial government that cooperated only on an administrative level, plus two active Aboriginal governments that believed they were (and are) sovereign governments within North America. The Hamilton Harbour case involved only one national and one regional (provincial) government. It was chosen because of its accessibility and familiarity.

The Niagara River case was not quite as complex as was the St. Lawrence River case, but it, too, involved two national and two regional governments. The Menominee River was selected because it forms the boundary between two states (Wisconsin and Michigan) and, consequently, its major constitutional actors are the two state governments and the American government.

We examined RAPs and supplementary scientific and sociological documents for each of the four sites. We conducted in-depth interviews with RAP coordinators and the chairs/presidents of the public advisory groups of stakeholders (the nomenclature of these groups and their roles vary). Below, we present an overview of the four situations.

We also examined some other situations in more depth, although largely through studying secondary source documents. We wanted to look at the two largest AOCs, Detroit and Toronto, plus examples of successful implementations, such as Collingwood (delisted as an AOC in 1994) and Cuyahoga. (Cuyahoga mirrors the Hamilton case in terms of community concern and the relatively simple constitutional framework of one national and one state government.)

Information derived from these four cases was supplemented by information derived from a mail survey sent to RAP coordinators in the 43 AOCs. RAP coordinators are public officials who are either attached to one of the lead stakeholder agencies in an AOC or to contract

employees of one of the lead agencies. For the most part, their duties are to facilitate the writing of the plan by teams of public servants (who have the appropriate expertise) and then to develop processes for its coordinated implementation. They are thus central figures in the RAP processes, especially with regard to their knowledge of the stakeholders, their priorities, activities, and interdependencies. At the time of the survey, 39 AOCs had coordinators in place; 32 responded to the survey and follow-up telephone calls.

As the discussion of institutional analysis and design proceeds in this and the next chapter, it becomes evident that some useful information about RAPs, their formation, and their implementation can be culled from government documents, books, and articles about the Great Lakes ecosystems in particular and sustainable development in general (as well as from some such academic works as doctoral dissertations). All of these contribute to a balanced assessment of the dynamics of RAPs.*

In Chapter 6, we present the dominant patterns of behaviour exhibited by agencies as they attempt to change the impairments to the beneficial uses of their respective AOCs. We also examine some important exceptions. Before we do this, however, we need to further develop the rationale behind the institutional rules for managing common property.

The Four Study Sites

Hamilton Harbour

The Hamilton Harbour AOC lies at the western edge of Lake Ontario. Its waters measure 40 square kilometres and are accessible to Lake Ontario by a human-made ship canal (completed in 1830) through a natural

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*Some of the more important secondary sources were graduate theses on the origins and design of the planning stages of the RAP (Bixby 1985; Strutt 1993; Gunther-Zimmerman 1994; MacKenzie 1996). For other useful volumes on the early experiences with RAPs, see Boyle (1990) and Hartig and Zarull (1992). A number of books and papers that drew evidence from the Great Lakes and RAPs in order to discuss ecosystem and sustainable development policies were also consulted (Caldwell 1988; Hartig and Thomas 1988; Colborn 1990; Hartig et al. 1995; Gebhardt and Lindsey 1996; Hartig et al. 1996). The more useful government documents with regard to discussing progress in developing and implementing RAPs were Eger and McAvoy (1992); Wayne State University (1994); Hartig and Law (1994); IJC (1997); IJC (1998); and Krantzberg, Ali, and Barnes (1998).

sand bar. The watershed of 500 square kilometres is divided by three main tributaries (Grindstone, Red Hill, and Spencer Creeks).

The watershed has a population of more than 500,000, 95 percent of whom live in urban locations and 60 percent of whom live in the older central city of Hamilton. Manufacturing accounts for 56 percent of employment, including that provided by the largest concentration of iron and steel industries in Canada. These industries, in turn, support the largest commercial port on the Great Lakes, with over 1,000 vessel arrivals per annum.

Some 25 percent of the harbour is reclaimed land, and only 25 percent of the wetlands that existed in 1800 still remain. Seven industrial and four municipal waste point source discharges amount to 27 billion gallons of liquid waste, or 40 percent of the volume of harbour waters. Water quality conditions include elevated levels of phosphorous, ammonia, heavy metals, and PAHs. According to IJC criteria, the harbour has nine impaired beneficial uses, one of which (beach closures) was restored in 1995.

Menominee River

This AOC encompasses the lower 5 kilometres of the river that forms the boundary between Wisconsin and Michigan. It consists of the portion from the upper Scott Paper Company Dam (Wisconsin), flowing between the two sites of Marriette and Menominee, to the river mouth on Green Bay. Also, some 5 kilometres of the shoreline on either side of the mouth are included in the AOC, along with six river islands, which are part of Wisconsin. The watershed drains some 103,600 square kilometres and the river itself flows 184 kilometres.

The AOC has a population of approximately 25,000, with some 12,000 in Marriette and 10,000 in Menominee. Early industrial development, especially in lumber, occurred around the mouth of the river, taking advantage of waterway transportation. Industrial land use remains prevalent along the riverfront. There are six major point sources of pollution, resulting in adverse water quality. These include contaminated sediments (especially arsenic and PAHs) and periodic elevated loadings of BOD (biological oxygen-demanding wastes that need oxygen as they decompose), suspended solids, phosphorous, and heavy metals. Upstream navigation is now limited by two Scott Paper Company dams.

The river mouth area is distinguished by the 20-acre Seagull Bar Natural Area and the underdeveloped Green Island. These natural habitats contrast with the contoured lower reaches of the river, where much of the wetlands were reclaimed. This AOC has six impaired beneficial uses.

Niagara River

This river is a connecting channel between Lakes Erie and Ontario, and it contributes over 80 percent of the annual flows into Lake Ontario. This AOC extends the entire 58 kilometres of the river. It includes the Welland River watershed on the Canadian side. Most of Buffalo is excluded from the AOC, as it drains into the Buffalo River. (The Buffalo River, however, is a separate AOC.) Due to a history of conflicts over toxic pollution in the Niagara River, the Canadian and American sides have developed their own separate RAPs. However, an international advisory committee shares information and facilitates cooperation. In addition, the four senior governments (of the United States, New York, Canada, and Ontario) are parties to the separate Niagara River Toxics Management Plan (NRTMP), which runs parallel to the RAP. The NRTMP focuses on measuring 18 primary toxics both upstream and downstream.

Approximately 400,000 persons live in the AOCs, with the largest concentrations being adjacent to Niagara Falls and the City of Buffalo (North and South). The development of hydropower in the early twentieth century attracted major industrial developments, particularly on the American side, and included major chemical, steel, and heavy manufacturing plants. Currently, over 50 percent of the flow of the river is diverted for hydropower. The Canadian AOC consists largely of small towns supported by agriculture and tourism. The most southerly ports of the US AOC contain the remnants of the once-thriving steel port of Buffalo.

Developments along the river have resulted in "dramatic" losses of wetlands and shore habitats for fish and wildlife (New York State, Department of Environmental Conservation 1994, 4-99). Contaminated sediments, inactive hazardous waste sites (e.g., Love Canal), and discharges from 26 American and six Canadian point sources contribute to highly elevated levels of major toxic organics and inorganics. The major Canadian source, contaminated sediments in the Welland River, was removed by dredging in 1996. Delisting of the AOCs (ten use impairments in Canada; seven in the United States) remains contingent upon success on the American side.

St. Lawrence River

The headwaters of the St. Lawrence River are the site of the two most easterly AOCs. The Cornwall AOC, which extends from the Moses Saunders Power Dam at Cornwall to the Beauharnois Power Dam near Montreal, is a Canadian AOC based on the northern shoreline of the river. The Massena AOC, which runs on the southern shore from Massena, New York, to the River à la Guerre in Quebec, is an American AOC. The Canadian AOC has five watersheds, including three in Quebec, while the American AOC drains three small watersheds. Both AOCs include lands belonging to the Mohawk Nation at Akwesasne. Neither the Akwesasne (who withdrew) nor the Province of Quebec (which never joined) are official participants in the two RAPs. Early attempts to establish a single international AOC floundered. However, both RAPs use a "transboundary impacts" use-impairment indicator in addition to the 14 IJC use-impairment indicators.

The population of the two AOCs is approximately 190,000, including some 11,000 Mohawks. The largest town is Cornwall, Ontario, with 70,000 people. Both AOCs are primarily agricultural, but the development of the seaway and associated hydropower (four dams) attracted industrial plants such as Alcoa, Reynolds Metals, and General Motors. Central Foundry (on the American side) and Domtar Fine Papers and Courtaulds Fibres and Films (on the Canadian side). (The Courtaulds plants are now closed.) Cornwall itself grew, first, due to an extensive textile industry (now defunct) and, second, due to the development of the St. Lawrence Seaway. Some 3,000 vessel transits a year pass through the Montreal-Lake Ontario section of the seaway.

The rocky shorelines of the St. Lawrence, unlike its tributaries, do not favour fish and wildlife habitat. However, the improvement of Lake St. Francis and the construction of the seaway had major impacts on fisheries habitat. Major sports, commercial, and subsistence fisheries remain.

There are ten point sources of pollution in the Canadian AOC that are contributing elevated levels of bacteria, BOD, suspended solids, mercury (around Domtar), and zinc (around CIL). There are 23 small municipal point sources of pollution and 14 industrial point sources in the American AOC. Elevated levels of PCBs, dioxin, mirex, PAHs, and mercury are associated with wastewater discharges and hazardous waste sites owned by Alcoa, Reynolds, and General Motors. There are seven use impairments in the Massena RAP and 12 in the Cornwall RAP. The transboundary indicator is considered impaired; it is believed that this is caused by the transport of PCBs, metals, contaminated sediments, and nutrients to downstream Canadian sites.

Framework for Institutional Analysis

We posed, on the basis of the theory of common-property resources, that outcomes (such as the pollution or remediation of an AOC) were the product of situational variables (such as the ecosystems of the area)

and institutional variables that affected resource decision making and implementation.

The basic frameworks (I and II) for institutional analysis were introduced in Chapter 4 (see Figures 4.4 and 4.5 on pages 71-72). Basic framework II essentially amplifies basic framework I. We will now extend our discussion of these three classes of variables (situations, structures, and outcomes) and explain what they mean and how they are likely to be found in our empirical investigation.

Basic and Amplified Frameworks

If our analysis is correct so far, then RAPs adopted and implemented in the AOCs should have an impact on their ecosystems. One major indicator of these impacts is restoration of the 14 impaired beneficial uses. The goal of the government parties is to restore the AOCs by around the year 2010. The term used by the International Joint Commission to refer to this restoration is "delisting." So far, one AOC (Collingwood) is delisted.

Environmental science is often uncertain, vague, and ambiguous, and this affects the selection of valid indicators of impairment, delisting, and restoration improvements. For example, impaired use number 11 is the presence of fish tumours or other fish deformities. The inclusion of this impaired use as one of the 14 impaired uses can be justified on both intrinsic grounds (it indicates direct ecosystem degradation) and instrumental grounds (it can negatively affect human health through extensive consumption). However, for evidentiary reasons, both justifications are uncertain. Further, the listing guideline indicates that an area should be listed "when the incidence rates of fish tumours or other deformities exceed rates at unimpacted control sites or when survey data confirm the presence of neoplastic or preneoplastic liver tumours." (The delisting guideline indicates the converse.) The rationale for this particular guideline is that "it is consistent with expert opinion on tumours [and] it acknowledges background incidence rates" (IJC 1991b). Thus, at any time, it can be challenged by new science. Appendix A lists the IJC criteria and their rationales.

Even the measurement of a guideline can be challenged for its validity. For example, the incidence rule of fish tumours in bullheads or suckers in the Black River (Ohio) AOC is measured in two ways: (1) no neoplastic liver tumours in a minimum sample of 25 brown bullheads (≥2 years old); and (2) the incidence rule of skin and lip tumours must be less than the incidence rate in a control site. A finding of 150 control-site and 130 contaminated-site fish would be needed to verify a 5 percent

difference (Hartig et al. 1994, 345). Appendix B lists measurement examples of each impaired use.

These kinds of uncertainties suggest some imprecision with regard to indicators or measures of a valid ecosystem outcome. The range of uncertainty is reduced, however, if we are less interested in precision than we are in estimating whether some degree of improvement (e.g., large, moderate, or small) has taken place with regard to an impaired use. Again, while the selection of the 14 impaired uses is debatable, as a whole they do measure some degree of ecosystem degradation or non-sustainability. And, concomitantly, a change in the right direction for one of these impairments can be estimated, albeit imprecisely, when seeking some valid proxies of ecosystem sustainability.

In addition to these so-called "objective" indicators of remediation, we also used "subjective" estimates: improved beneficial uses, improved water pollution problems, and improved beneficial uses due to the RAP that was provided by RAP coordinators. These were supplemented by estimates provided by secondary sources for particular AOCs as well as by case study evidence.

We also classified a number of implementation measures as outcome measures, although, strictly speaking, we would call them operational rules. This is because RAPs tended to produce some newer implementation processes, and we wished to uncover these as part of the results of the RAP deliberative processes (collective-choice arrangements). RAPs also used established processes of implementation where one or more of the governmental and private organizations were listed as stakeholders; we wished to disentangle these conventional processes from the newer ones adopted by each RAP. In general, we wanted to see which agencies were involved in implementation, and what agency might or might not be in a lead or control position with regard to the operational rules.

It is also important to note that the rules for implementation could well differ from the rules for the planning of remedial actions. First, stakeholders might well prefer to delegate projects to a small set of implementers in order to ensure speedier decisions. In other words, the transaction costs of implementation might well be lowered by delegating planning actions to one or more agencies. We would anticipate that delegation to one single agency would occur only when the planning action was a definable activity; a multiple-use resource like an AOC would probably require the coordinated actions of a number of organizations.

Implementation of planned actions necessarily follows the planning phase, but there is some overlap between the two sequences. First, extensive plans often include implementation strategies and activities and

indicate the parties responsible for implementing the strategies and activities. The RAP Stage 2 reports all required an implementation section for acceptance by the IJC.

Second, RAPs were not beginning remediation de novo. Substantial work on remediation, regulation, and prevention had occurred and was occurring in AOCs prior to the RAP process. The strategies and activities of implementation would need to be integrated with ongoing efforts to avoid unnecessary interruptions of current programs.

Third, we know from many decades of work in public administration that the implementation stage is never bereft of planning and policy choices. RAPs are being revised and altered as the implementing parties make choices about priorities and methods of implementation. These need not be inconsistent with the overall plan. But values and facts are intermingled as choices must be made by implementers (V. Ostrom 1974).

Given these implementation issues, one might depict a number of alternative institutional arrangements for implementation. Three kinds of arrangements suggest themselves from the theory and practice of management across interdependent organizations (Sproule-Jones 2000).

The first arrangement is referred to as pooled coupling, whereby organizations are assigned specific responsibilities in the plan or in a subset of the plan (for particular activities). Each organization can proceed with implementation, and while complete implementation requires the effective success of all parties, any one party can proceed even if others are delayed or are postponing their assigned responsibilities. A second arrangement is referred to as sequential coupling, whereby agency C can only implement if agency B has completed its tasks and if, in turn, agency A has successfully implemented its tasks. In some literature (e.g., Thompson 1969) these are referred to as long-linked technologies. The third arrangement is referred to as reciprocal coupling, whereby agency A needs the cooperation of B and C in order to effect a second or recurring phase of its tasks. There is a continual exchange of activities on the part of responsible organizations.

All three arrangements will carry with them differing sets of transaction costs, depending on the complexity of the tasks and the number of coupled organizations. One would also expect that the reciprocal form of coupling would require continuous monitoring and coordination as one break in the linkages could negate the whole set of interlinked activities. The sequential arrangements would also be subject to the threat of breakdowns in the coupling linkages.

In our investigation of RAPs, we will be looking for the various forms of coupling that take place between coordinated agencies and examining the differing rules put in place to deal with such coupling difficulties that may emerge.

In short, our analysis of outcomes will include substantive outcomes in relation to the remediation of the 14 impaired beneficial uses of the AOCs. These substantive outcomes will be indicated through scientific reports and the perceptions of key decision makers. Our analysis of outcomes will also include process outcomes; namely, the rules put in place to implement RAPs across a variety of diverse but interdependent implementers.

Structure

Structure refers to the collective-choice arrangements under which RAPs were formulated. What were the processes or rules through which different interests were or were not included in the decision making? And how were these interests aggregated or weighted by their relative powers in the process? Both these questions are central to decision making at any collective-choice level – federal, provincial/state, local, or watershed/AOC.

We want to know something about the exit/entry rules to the collective-choice process. How are stakeholders selected? How can they join and leave the groupings? Theory would suggest that the more inclusive the membership of stakeholders in the process, the more efficient the ultimate decisions. This is because stakeholders can articulate their concerns directly and make adjustments, trade-offs, and compromises with regard to collective needs (Sproule-Jones and Richards 1984). Indirect representation by others is more likely to introduce errors when calculating the intensity of any stakeholder's concerns, and the marginal value of these concerns, against other values articulated in the process. Even more extreme, zero consideration may mean that a particular set of interests is excluded. So, for example, it is best to include recreational fishers in the decision-making process if their interests are to be articulated rather than guessing or ignoring their political concerns and relevance to a multiple-use harbour, river mouth, or connecting channel. Negotiation and bargaining among stakeholders is a central feature of resource decision making for multiple uses. Stakeholders may be seeking to gain and sustain rents (or a non-competitive advantage over rivals) for the use of the resource. On the other hand, they could be advancing efficiency if their property rights are well defined (Coase 1960) – a situation that seems unlikely in the RAP case.

Comparably, the interests, once represented, need to be aggregated into a final product. One model for doing this might be the following: a lead bureaucracy is named by the relevant constitutional rules (e.g., state officials in consultation with Environmental Protection Agency

officials); this bureaucracy acts to organize expert opinions on how best to technically remove the use impairments and (in turn) to bring these opinions and options to the other stakeholders for choice and amendment. A different model might convene a forum of stakeholders in order to define goals for remediation; these goals could then be used to calibrate and prioritize the range of cleanup strategies that could be developed in dialogue with technical experts. In either case, the collective-choice rules for aggregation could vary from unanimous consent (or consensus) among all stakeholders to domination by one (or a few) stakeholders under an implicit rule (of constitutional authorities) that calls for delegating formation to a small set of interests.

We know from theoretical work that increasing the transaction costs of aggregation may increase the transaction costs of decision making as different interests must be included in any winning coalition. We also know that these transaction costs can be increased exponentially by the strategic and opportunistic behaviour of stakeholders as they exploit their "veto-like" positions. If all stakeholders agree that a particularly important industrial plant must be a partner to a collective decision, then the owners of that plant could indulge in opportunistic behaviour because of the incentives afforded by the partnership rule. Again, the transaction costs of negotiation are increased by such opportunistic costs.

Transaction costs will fall dramatically with decision making that is dominated by a few stakeholders and legitimized by decision-making rules that grant final say to a few interests. The bargaining will be reduced in time and effort, as will the incentives for opportunism. However, the probability of errors in weighing and balancing multiple users and interests will increase. Stakeholders may well resort to destructive strategies if their interests are ignored; turn to the constitutional-choice level to see if decisions can be overturned; or simply opt out, leaving thethypothetical RAP just a wordy document that is ignored in practice by disgruntled stakeholders.

Figure 5.1 is a graphic representation of the major dynamics involved in the aggregation of user interests. It is derived from Buchanan and Tullock (1962) and Sproule-Jones (1974), with some changes in nomenclature. It should be noted that the costs of collective action are zero in terms of domination of one interest over another when consensual decision making is adopted. It comes, however, with higher transactions and opportunistic costs. As well, domination costs can escalate when decision making is limited.

It may be suggested that one of the acts of successful coordination and leadership is to minimize domination costs but, at the same time,
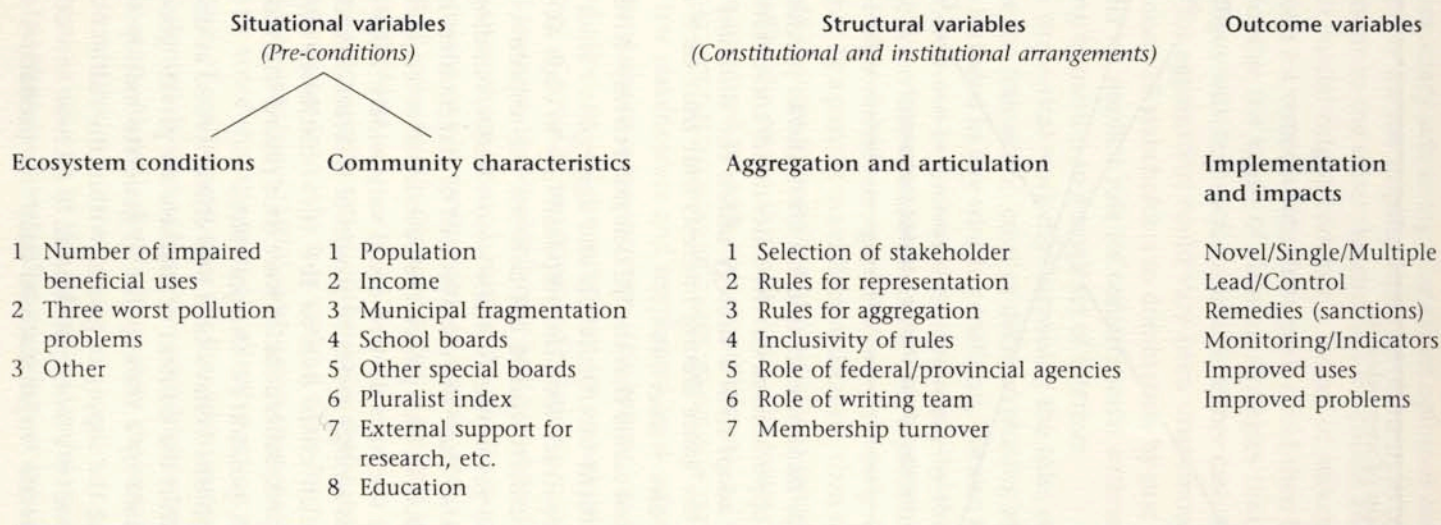
Figure 5.1
Aggregation of user interests
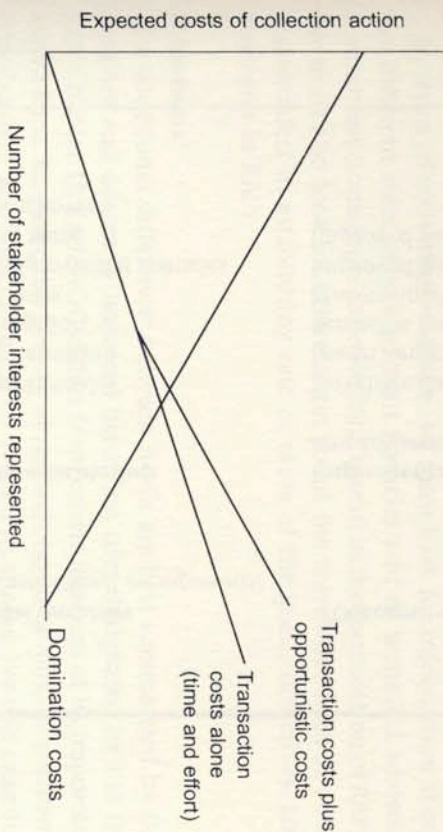
to work to minimize transaction costs and to preclude or foreclose on strategic opportunism. On the other hand, coordination and leadership may not adopt such a strategy unless the situation calls for repeated plays of the game among interests that trust each other (E. Ostrom, Gardner, and Walker 1994).

We noted earlier that the IJC delegated to respective governments the establishment of articulation and aggregation rules for each AOC. A lead bureaucracy took this responsibility in each AOC under constitutional decisions worked out between the respective federal and state/provincial governments. There were no understandings for institutional design other than the involvement of stakeholders in a public participation process. This placed the bureaucracies in question in a situation in which the rules devised could vary widely, from rules encouraging consensus among inclusive groups of stakeholders to rules minimizing transaction costs due to the informational impact of selected stakeholders. Bureaucracies were thus placed in a monopoly, or single-sovereign, position (V. Ostrom 1989).

Monopolistic behaviour is best characterized as discretionary behaviour. Within the context of markets for private goods, this discretion can be used by a monopolist to generate monopoly profits through restricting the supply of goods. Within the context of public goods, it can be used by a monopoly bureau to increase service production levels or to generate "organizational slack" for productive or non-productive

Figure 5.2

Working conceptual framework

Situational variables *(Pre-conditions)*		Structural variables *(Constitutional and institutional arrangements)*	Outcome variables
Ecosystem conditions	Community characteristics	Aggregation and articulation	Implementation and impacts
1 Number of impaired beneficial uses 2 Three worst pollution problems 3 Other	1 Population 2 Income 3 Municipal fragmentation 4 School boards 5 Other special boards 6 Pluralist index 7 External support for research, etc. 8 Education	1 Selection of stakeholder 2 Rules for representation 3 Rules for aggregation 4 Inclusivity of rules 5 Role of federal/provincial agencies 6 Role of writing team 7 Membership turnover	Novel/Single/Multiple Lead/Control Remedies (sanctions) Monitoring/Indicators Improved uses Improved problems

purposes (Niskanen 1971; Breton and Wintrobe 1979; Dunleavy 1991). We should thus expect a variety of responses from monopolistic bureaucracies charged with constructing the institutional design of RAPs.

In terms of collecting evidence, we must look for information about the different roles of government agencies and of technical advisory committees (sometimes called writing teams) in the formulation of RAPs. We must also look for information about the correlative roles of other stakeholders in establishing one or more of the goals, objectives, and strategies in RAPs.

Situations

The situational differences between AOCs are best summarized by the number and degree of impaired beneficial uses designated by the IJC (see Chapter 1). Each AOC differs from others in terms of its important ecosystems, its particular history of research exploitations, its pertinent stakeholders, and the communities around its shores. We will examine further evidence about the worst pollution problems in the AOCs as well as a range of other variables pertaining to the ecosystem and communities. Whether they have a negative or positive impact on RAP formulation and implementation, the size, diversity, institutional fragmentation, and scientific resources available to each community are assessed. We capture all of these measurement concerns in Figure 5.2, which is an expanded framework that we refer to as a working conceptual framework.

Conclusion

We are now in a position to distill the results of our research into a conceptual framework. In this kind of exercise, we do not propose to develop a precise model of institutional analysis and to verify its causal connections with quantitative data; rather, we are concerned with revealing the central propositions of institutional analysis that explain the RAP processes in particular and large-scale, multiple-use processes in general. In essence, we ask the question, "Under what institutional arrangements can holders of different bundles of property rights agree to remediate their immediate aquatic environment?" The answer to this question should give future decision makers some good information about the structure of planning and implementation rules as well as about their linkages to effective policy outcomes. In the short term, we can begin to assess the performance of our institutional rules for the restoration of the Great Lakes.

6

Patterns of Behaviour

The theory of common property isolates the nature of rules (or, as we might prefer, institutions) as an important set of causal factors in explaining environmental and resource management behaviour. These rules/institutions may be analyzed and divided into rules at the constitutional, collective-choice, and operational levels of decision making. At a collective-choice level, stakeholders in polluted Areas of Concern on the Great Lakes have, and are devising, restorative plans and implementing them in coordination with each other. The end product should be, we hope, improved environmental outcomes or, more specifically, restored beneficial uses.

Remedial action plans have been, and are still being, formulated and implemented. Some began as early as 1985; others are still to begin. AOCs are at various stages in the RAP process. This enables us to look at RAP progress as it proceeds through its various stages of problem definition, recommendations for restoration, and delisting. Our survey work was conducted when 4 percent of RAPs were still to begin, 48 percent had completed Stage 1 (problem definition), 44 percent had completed Stage 2 (recommendations), and 4 percent had completed Stage 3 (completed implementation). Our case study work includes sites at the Stage 1 and Stage 2 levels. The key questions are, "What is really happening?" and "How can we explain these happenings?"

Outcomes: Substantive

If we look at the end product of RAP processes, then we discover that RAPs have improved a few uses. RAP coordinators (the public official who facilitates the coordination of RAP implementation in each AOC) report that a few improvements have occurred in 68 percent of the AOCs, particularly in the areas of water chemistry and biota. The Ontario government calculates, again based upon RAP coordinators' reports, that

51 percent of restoration targets in their 12 AOCs have been attained (Krantzberg 1998). Comparable figures exist, albeit at earlier dates, for American sites (Hartig and Law 1994). So far, so good.

However, if we inquire further into the particular improvements that are evident, then we discover that bacterial pollution and lowered point source discharges of toxins (like PCBs) are occurring in roughly two-fifths of the AOCs. Comparably, improvements in biotic problems and human uses of sites are occurring in roughly 30 percent of the AOCs. But the pollution reductions and improvements to beneficial uses are due to programs that existed before RAPs were implemented. Regulations on industrial discharges and municipal sewage treatment plants were largely in place in the mid-1980s, and improvements are reported to be associated with these regulations and their refinement. One RAP coordinator summarizes the RAP program as follows: "Implementation is an ongoing process because we have existing programs that came before the RAP process. The RAP process just coordinates the individually mandated existing programs that are driving the environmental control programs."*

Case study evidence reinforces this mixed conclusion. A recent (1999) update of the Hamilton Harbour RAP reports significant progress in fish and wildlife habitat restoration (made possible through new RAP programs and resources) but only modest improvements in some water quality indicators (Knox 1999). The St. Lawrence (Massena) RAP coordinator reports that "all of the seriously contaminated site cleanups were already underway under federal and state superfund programs or under EPA unilateral cleanup orders ... The RAP was not leading the way in defining problems or identifying the programs required to clean then up ... [But] we have not seriously looked at the non-contamination related issues such as wetland restoration or fish and wildlife habitat restoration."

Similarly, the Menominee (Wisconsin) coordinator comments that "the major environmental problems are being addressed through other [than RAP] enforcement programs ... the coal tar site, the paint sludge site and the arsenic site. Each year we have a bit of Great Lakes Pollution money that can be used for specific issues that are not covered by existing programs." The apt conclusion seems to be that some progress is being made in remediation but that this may, in large part, be due to

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*This and subsequent quotes are taken from either the mail survey of RAP coordinators in the summer of 1996 or from personal interviews conducted in 1997 with coordinators and RAP participants.

pre-RAP programs. It could be concluded that the agencies are choosing to pursue their traditional concerns and that the incentives provided by RAPs (some extra resources and a coordinated response by multiple stakeholders) are insufficient to change or speed up these continuing programs.

There is another institutional incentive that reinforces traditional programs rather than newer RAP efforts. While AOCs have their own combination of impaired beneficial uses, RAPs could (1) define their own set of priority problems that might be linked to beneficial use impairments and (2) identify their own particular set of "stressors" that need to be removed in order to improve their own ecological situation. This gave the implementers of each RAP (who are often collaborators on the authorship of the plans) sufficient discretion to deal with what they perceived to be their major problems. Our survey revealed 18 different priority problems across the AOCs. The cases revealed similar patterns. For example, in the St. Lawrence case, the two RAPs could identify a range of restrictions on fish consumption, but the linkages to sources of pollution are acknowledged as uncertain. In the face of this uncertainty, the American Massena RAP continued to focus on remediating PCB pollution from sites and discharges of three industrial plants (Alcoa, Reynolds Metal Aluminum, and General Motors Power Train Division). On the Canadian side, the Cornwall RAP continued to focus on inorganics (like mercury and zinc) associated with the two industrial plants owned by Domtar Fine Papers and Courtaulds (the latter now closed), and the industrial discharges emitted by the Cornwall Sewage Treatment Plant.

These sources of pollution on both sides of the St. Lawrence might well be linked to fish consumption advisories, although no more than, say, the physical construction of the St. Lawrence Seaway and the associated destruction of wetlands. RAPs could and did make choices regarding priority problems. These tended to reflect the ongoing priorities of the regulatory agencies rather than a new mix made possible through a multiple stakeholder process. This point is further explored below.

Contrasting Differences

RAPs are modestly successful in terms of outcomes, although much of the credit for this is due to pre-existing programs rather than to RAPs themselves. But we are talking of the overall pattern. In contrast, we can highlight two examples of the worst and best situations, both of which point to the importance of institutional design in facilitating successful or failed outcomes.

Port Hope, on Lake Ontario, is a small harbour on the Canadian side that has one single use impairment, that of contaminated sediments (Hartig and Law 1994, 164-66; Canada-Ontario RAP Steering Committee 1995, 58-60). Approximately 90,000 cubic metres of low-level radioactive wastes (plus some heavy metals) exist in the turning basin and west slip areas due to the disposal of wastes from the refining and processing of uranium and radium during the 1930s and 1940s. A multistakeholder public advisory committee (PAC) working as an advisor to a RAP writing team (a conventional model) helped to establish a Stage 1 report outlining goals, problems, and options. The Stage 2 report on implementation is still to be completed because the disposal options for the contaminated sediment is controlled by a different Canadian government agency. This agency, Natural Resources Canada, has its own siting task force and community liaison group whose purpose is to find an appropriate remediation option. This is a case in which local environmental conditions (waste disposal siting), allied with an unambiguous legislative mandate given to the Atomic Energy Board (regulated through Natural Resources Canada), made the local RAP process peripheral to the restoration of the AOC. A key stakeholder was not included in the collective decision making, and this stakeholder is prepared to play a non-collaborative game in order to satisfy its monopoly position over nuclear waste disposal. Over time, it developed its own plan, sought special appropriations from the Canadian government, and is now beginning to implement it.

In contrast, Collingwood Harbour on Lake Huron was delisted as an AOC in 1994. The local contributions to improved beneficial uses were remediated through sewage treatment plant optimization, dredging and capping of shipyard slips, and non-point source controls. The public advisory committee that, with a government writing team, formulated the RAP still exists to promote and to steer aspects of the plan not directly linked to use impairments. These include habitat enhancement, water conservation, and public outreach programs (Hartig and Law 1994, 80-83; Canada-Ontario RAP Steering Committee 1995, 31-34). In this second case, unlike the Port Hope case, local environmental conditions were amenable to an available set of solutions. No stakeholder monopoly or opportunism could jeopardize a fairly rapid implementation (six years from the Stage 1 start to the Stage 3 submission that led to delisting).

Before we examine the institutional rules used to design RAPs, we will look at some of the processes that exist for implementing RAP recommendations.

Implementation Outcomes

The implementation strategies and methods developed by RAPs were and are a product of the RAP planning processes. We are thus calling them outcomes, even though, strictly speaking, they are processes rather than products of institutional rules (in other words, remediation does not occur in the AOCs because these implementation strategies were adopted). Nevertheless, we are calling them outcomes.

The favoured method of implementing the RAP recommendations is referred to as "pooled coupling." This method relies on multiple organizations for implementation, but each organization is a lead or designated agency for implementation, but each organization is a lead or designated agency for different activities. Some (8 percent) attempt to use this as their major strategy. Some 47 percent of RAPs use this as "reciprocal" coupling, which involves joint control of all activities, as the predominant method. Roughly 42 percent were attempting to implement RAP recommendations under more hierarchical arrangements, whereby one agency was designated as in control of implementation. An apt illustration of the two major methods of implementation occurs in the St. Lawrence River. On the Canadian side, the RAP coordinator comments: "We have identified who the potential partners are for each recommendation and it varies depending on the recommendation." Across the river, the RAP coordinator notes that "the DEC [New York Department of Environmental Conservation] is in charge of implementation under various state and federal programs."

When we examine our AOC cases in detail, we see that, in practice, the coupling arrangements tend to be found in combinations; that is, there may be a dominant form of coupling – that of pooled coupling – but the other forms may be used to a lesser extent in the same AOC. Hamilton Harbour provides good examples.

In pooled coupling delivery systems, different organizational units are each responsible for one or more of the activities that comprise a program. In our Hamilton Harbour case, some 14 organizational units are each responsible for implementing one or more of the RAP recommendations for restoration of the harbour ecosystem. If one unit fails or stalls its implementation, then the other units can still proceed. A CDN$2 million fish and bird habitat project was completed in 1999 in advance of major improvements in water quality parameters associated with the municipal sewage treatment plants.

Sequential coupling occurs when the work flows take place in long linked chains and when one activity cannot proceed before others occur. In our Hamilton Harbour case, for example, an $8 million marsh restoration project was organized (1995-2000) by the sequential coupling

of public and non-profit organizations. The Royal Botanical Gardens (RBG) bought cattail seeds, which were distributed by the Bay Area Restoration Council (BARC, a non-profit monitoring and educational organization) to some 140 Grade 7 classrooms under agreements with three school boards. The young, grown cattails were collected by volunteers working with BARC, which stored them at the RBG greenhouses for eventual planting by the Friends of Cootes Paradise. The latter group is a non-profit organization consisting of 70 volunteers; these people are organized by a McMaster University professor to plant and extend the marshland of the tributary to the harbour known as Cootes Paradise.

Reciprocal coupling consists of exchange relationships among units. Unit A produces an activity for Unit B, which, in turn, may pass it back to Unit A for completion. It could also involve the simultaneous coupling of units. The reciprocity may involve two or many units, thereby increasing the possibilities of uncoupling as the number of units increases. One Hamilton Harbour example of reciprocal breakdown involves the contaminated sediment dredging project known as Randles Reef, in which 20,000 cubic metres are scheduled to be removed, treated, and disposed of by four units under a jointly financed partnership. The technical proposals have been successfully blocked for ten years by one partner, Stelco (a steel company), despite the enthusiastic endorsement of BARC, the federal and provincial ministers of the environment, and the three other units engaged in the coupling (Environment Canada, Ontario Ministry of the Environment, and the Hamilton Harbour Commissioners, respectively). The irony is that the contamination probably occurred after a coal-tar spill by the steel company, possibly before but probably after the regulatory legislation was proclaimed in 1975. The reciprocal coupling will probably have to change to pooled coupling if the project is to be completed without Stelco.

This evidence suggests that each AOC may have adapted its implementation strategies to the particular configurations of stakeholders represented in the particular remediation situations at hand. Predictably, not all are successful or appropriate. We need to unravel this issue.

Structural Factors

Representation

Our conceptual framework suggests that the various outcomes of the RAP processes are due, in part, to how stakeholders are represented and how their interests are aggregated into a planning document. At the level of constitutional choice with regard to establishing collective

governance systems for AOCs, we have noted that the IJC allows the respective federal and state/provincial environment agencies to define the rules for the articulation and aggregation of stakeholder interests and for the implementation of a RAP. The discretion so afforded is wide, and a prevailing pattern of "business as usual" pervades the planning and implementation of RAPs. We have also noted that exceptions to this system can and do exist.

At an institutional level, state/provincial and/or federal environmental agencies frequently selected and approved the stakeholders that were to participate at the planning stages (RAP Stages 1 and 2). This resulted in an unrepresentative configuration of interests in many AOCs. Our surveys suggest that most stakeholder committees included federal, state/ provincial, and municipal representatives, plus representatives of industry, farming groups, environmental groups, universities, and "citizens at large." Of the major users, recreational, shipping, and human health groups were frequently not included, and Aboriginals were included in only one of our AOCs. In the St. Lawrence RAPs, the Mohawks of Akwesasne withdrew their participation. According to their representative:

The Mohawk governments agreed to participate and promote the RAP if certain conditions were met. One of these conditions was that the Governments of Akwesasne were to be recognized as an equal partner. On the Canadian side this was recognized and a Mohawk government representative sat on the RAP Team [the scientific technical team that wrote the Stage 1 document]. On the American side, the Mohawk government was invited only as a member of the public. We refused membership ... By 1990, the MASH [Mohawks of Akwesasne for Safe Health] representatives did not see any respect from the [Canadian] public advisory committee. The major problem was there was no democratic or representative process. We came to see the PAC as a way the Canadian government could rubber stamp their research agenda.

This view was confirmed by the two RAP coordinators for the St. Lawrence.

In the Niagara River (NY) AOC the Tonawanda reservation was not invited to participate because it owned no shoreline property. Again, this perception of the status of Aboriginal peoples was different from their perception.

It is worth noting that the New York Department of Environmental Conservation (DEC) rejected the concept of a single international RAP for both the St. Lawrence and the Niagara Rivers. They wished to "avoid these bureaucratic problems where you have different political systems and different goals ... [Also] ... our regulations were much firmer than the Canadians'." The Menominee River RAP experienced some of the high transaction costs of agreement between Wisconsin and Michigan that were so feared by the New York DEC. Ostensibly, Wisconsin was the lead state for the river because it only had five AOCs while Michigan had 14. But the Wisconsin Department of Natural Resources felt that the Michigan Department of Natural Resources was lax in its contributions to the Stage 1 report and that it was generally lax regarding regulatory enforcements. The RAP coordinator stated: "We finally agreed ... that Michigan should comment on the contamination sites on their side of the river and Wisconsin was to do the same. ... As long as there is not a major conflict, we were not to interfere with remediation recommendations at those sites." In practice, this is virtually the same as having two separate RAPs. The federal Environmental Protection Agency appears loath to facilitate an integrated approach, focusing instead on applying its enforcement programs to identified problems in the river. In essence, the presence of two or more sovereign governments has the potential to destabilize resource management decision making.

In sum, most interests are included in most RAP public advisory committees (PACs). This is easier in the larger PACs, and it should be remembered that over 48 percent of RAPs have PACs that are made up of 24 or more persons. Significantly, prior to their appointments, almost 60 percent of the committee members had attended PAC meetings or contacted the RAP coordinator about volunteering. Thus most RAPs were not designed to be exclusive.

Agendas

As important as the representative character of the stakeholders' committee is, the capacity of these committees to set common goals and to establish common recommendations resulting in the achievement of these goals is just as critical. At this stage, the institutional designers exercise major controls over the process. In approximately four-fifths of RAPs, the relevant state/provincial environmental agency and the seconded public servants on the writing teams set the goals and made recommendations for remediation. The other stakeholders were invited to provide input for amendments.

The Niagara River (US) RAP is fairly typical. Their PAC chair comments: "What would happen is that the DEC [Department of Environmental Conservation] would prepare a draft of a chapter. It would come

to the committee for review. We would send it back, it would be revised and come back to us." In contrast, the Menominee chair believes that their PAC was "very influential. Particularly in the Stage 1, but also in the [Stage 2]. The Citizens' Advisory Committee really went page by page through the document." Consequently, in this case, there was often disagreement between the Citizens Advisory Committee and the Wisconsin Department of Natural Resources. For example, Stage 2 was a focus of conflict. The coordinator comments: "The CAC threatened to remove all references to [itself] if their demands were not met. Such as the Menominee Fisheries Plan. The fisheries plan was controversial. There were references to the removal of dams and the installation of fish ladders. The CAC opposed this. Many times the CAC looked out for the best interest of the local economy, but did not necessarily work in the best interest of the River."

Two exceptions to the prevailing pattern of local groups acting as advisors to state/provincial administrators were Hamilton Harbour (Ontario) and Cuyahoga River (Ohio). In the Hamilton case, a group of 50 stakeholders formulated goals for Stage 1 by March 1988 and draft recommendations for Stage 2 by June 1989. Stage 2 was finally approved in 1992. The writing team organized itself as technical support for the local endeavours. This model was not copied in other Ontario AOCs because the Ontario Ministry of the Environment realized that this could result in its losing control over the RAP process to local stakeholder interests. In Cuyahoga, the Ohio Environmental Protection Agency designed a Coordinating Committee (CCC) of 35 stakeholders drawn from multiple interests and sectors and gave it express authority to develop Stage 1 and Stage 2 documents.

We thus have a variety of examples of stakeholders acting as consulting organizations to state/provincial agencies in order to identify the problems and solutions necessary for remediation. We have fewer examples that involve the stakeholders actually identifying the problems and solutions, thus making the necessary trade-offs and compromises to accommodate efficient multiple uses. A suggestive indicator of the importance of decentralized decision making (by stakeholders rather than by agencies with stakeholder advice) is the perception that the RAP has improved beneficial uses due to its use of inclusive decision making and due to collaboration between the stakeholders and the writing team (both were statistically significant, at 99 percent probability.) The top-down model of most RAPs is seen as less effective.

Situations

As we saw in Chapter 1, AOCs differed in the number of impaired beneficial uses, as defined by the IJC. Obviously, the more impairments, and the greater their severity, the more difficult it is to develop successful remediation. However, there are other situational factors that could influence the RAP processes and their success. We have seen how AOCs that span international and state lines have decision-making difficulties and must develop parallel processes in order to account for shared jurisdictions. Fortunately, almost 90 percent of the AOCs are contained within a single national and a single state/provincial situation, and over 66 percent of them contain no Aboriginal reserves/reservations. Again, some 70 percent of the AOCs are situated within no more than six municipal government jurisdictions. Institutional fragmentation of government is not an obstacle for most RAPs, and it is not correlated with organizational processes for implementation.

However, the size of an AOC, in terms of population, may be an issue as it signals greater urbanization and greater impairments of the local environments. Eighteen percent of the AOCs have populations greater than 500,000 people; two, the Detroit River and the Metro Toronto Region RAPs, have populations in excess of 4 million. As of 1998, the Detroit River RAP had completed only 5 percent of the remedial actions (identified in its Stage 2 report) for its eight impaired beneficial uses (Krantzberg 1998, 38). Metro Toronto is roughly comparable, although the extent of toxic contamination in discharges and sediments and the scale of the loadings are substantially less than they are in the Detroit "connecting channel." Metro Toronto has completed only 20 percent of its Stage 2 activities (Krantzberg 1998, 53).

The Detroit River has a long history of degradation manifested in contaminated sediments and destroyed wetlands (IJC 1997a, 3-7). Upstream inputs, especially of PCBs, make some control efforts more difficult than others, and the existence of a successful River Rouge RAP that discharges into the Detroit River has taken attention away from their international connecting channel. The magnitude of the pollution problem is shown in this statistic: there are 14,300 commercial and industrial dischargers connected to the Detroit and Windsor sewage treatment plants, 13,000 of which are on the Detroit side alone.

The institutional design was the responsibility of the Michigan Department of Natural Resources (MDNA) under an agreement with the EPA and the Ontario and Canadian governments. This department, along

with six other agencies, began the task of writing Stage 1 in 1986 and chose to add four members of a binational public advisory council (BPAC) to provide it with advice. The BPAC consisted of 40 stakeholders – 20 from each side of the border – chosen by the MDNR. (The original Windsor participants were suggested by consultants for the Ontario Ministry of the Environment; later participants were elected by BPAC members.) The Stage 2 RAP was developed through four technical work groups that contained both agency and BPAC members. The stakeholders involved in these processes included few property owners or representatives of major sectors that could constitute partners for remediation or even clients for regulation. The efforts of BPAC members to expand their roles, for example by prioritizing remediation strategies, were vetoed by the MDNR on the grounds that "the role of the BPAC is advising as stated in its charge" (Susan Bouzie, MDNR, Minutes of the 29th Meeting of the Detroit River Public Advisory Council, Windsor, 26 August 1992, 7; quoted in Strutt 1993, 27). In 1997, the Michigan department withdrew from its lead agency role and identified the BPAC as the primary implementer, notwithstanding its flawed composition (IJC 1997a, 8). At that time, the remediation of the AOC rested on the environmental efforts of stakeholders acting independently. At the active intervention of the IJC, the four major governments for the connecting channel recommitted themselves to a RAP in April 1998. However, the Michigan Department of Environmental Quality (now the Michigan lead agency) will focus on developing implementation agreements that will empower local implementers to move the process forward. However, specific local recommendations and implementation actions from the American side are still awaited.

In contrast, on the Canadian (Windsor) side, a newly constituted multistakeholder group called the Detroit River Cleanup Committee was formed in 1998 to coordinate remediation. This signalled a move away from a coordinated binational approach to a "two-sides-of-the-river-policy" like the Niagara River RAP. An extensive inventory of completed and required recommended actions now exists (Environment Canada 2000).

The Toronto experience is roughly similar, albeit without the added complexity of international fragmentation. The Toronto AOC is essentially an administrative rather than a geographical unit as it encompasses six watersheds and a population exceeding 4 million. As in the Detroit River case, the Toronto Stage 1 report (Environmental Conditions and Problem Definition) was drafted in 1988 by an intergovernmental writing team consisting of agency personnel (prior to the

formation of a public advisory committee). The Ontario and Canadian environmental agencies, charged with institutional design, thus saw themselves as the control centre of this AOC. The Ontario Ministry of the Environment formed ten public advisory committees, based on sectors, and these committees selected members for an area-wide public advisory committee. At the same time, the federal government went into competition with its own RAP by establishing the Royal Commission on the Future of the Toronto Waterfront, which later became the permanent Waterfront Regeneration Trust. It duplicated the planning activities of the RAP, but with significantly more resources and publicity. The sectoral committees gradually disintegrated, and while a draft Stage 2 report was produced (on implementation strategies), the Ontario government vetoed both its implementation and its coordination. Between 1994 and 1997, the Toronto RAP consisted largely of the uncoordinated individual efforts of some of the stakeholder organizations.

Because of pressure from both the public and Environment Canada, a new effort to revive the Toronto RAP began in 1997. This time the Waterfront Regeneration Trust and the Toronto and Region Conservation Authority (a special regional board charged primarily with flood control management) were designated as lead agencies for Environment Canada and the Ontario Ministry of the Environment. Instead of organizing stakeholders by sector, which only intensified resource-use conflicts between sectors, the stakeholders are now organized into watershed and waterfront organizations. These include the Toronto Bay Initiative, the Humber Alliance, the Don Watershed Regeneration Council, the Rouge Park Alliance, and various subwatershed (creek) associations. New recommended actions – an implementation strategy that parties would accept – based on these watersheds and waterfronts have now been adopted, and special federal appropriations associated with the unsuccessful bid for the 2008 Olympics have been dedicated to the Don Valley watershed. This experience suggests that the institutional designers may have learned from experience about some of the institutional obstacles associated with large-scale multiple watershed sites, not to mention about the limitations of top-down controls. As late as 1994, one PAC member was concluding that "the bureaucracy by and large uses consultant processes as a means of adding or subtracting credibility from the issues as they choose" (cited in Gunther-Zimmerman 1994, 229).

Two large-scale RAPs, already referred to as successes, belie the proposition that size (and thus complexity) make institutional design inoperable. These are RAPs for Hamilton Harbour on Lake Ontario and for the Cuyohoga River, which flows into Lake Erie at Cleveland, Ohio.

In the Hamilton case, we have already noted how a group of 50 stakeholders formulated the Stage 1 and Stage 2 reports using the government agency writing team as technical support. By way of institutional design, it set up two bodies to oversee implementation, which was to be conducted by 14 agencies and organizations, mostly in pooled coupling strategies. The implementers formed the Bay Area Implementation Team, which was serviced by a RAP coordinator who was also an employee of Environment Canada. The other stakeholders were grouped into a Bay Area Restoration Council that would produce annual audits of progress towards implementation and that would run education awareness programs and related activities. The council has expanded into 160 paid members, both individual and organizational, and receives funding from a variety of sources. Its power over the implementation process is solely that of information and prestige. The Ontario Ministry of the Environment vetoed an original scheme to make the RAP a legal document and, hence, make implementers subject to injunctions on the part of other stakeholders. In sum, the stakeholders were and are successfully organized despite the difficulties associated with a watershed population of 500,000 and ten impaired beneficial uses.

The Cuyahoga River RAP parallels the Hamilton Harbour case. The Ohio Environmental Protection Agency designed a coordinating committee consisting of 35 stakeholders and gave it express authority to develop a Stage 1 plan. Stage 1 was completed in 1992, and a draft Stage 2 is now being completed. The AOC covers the lower 45 miles of the river plus ten miles of the Lake Erie shoreline. The river drains an agricultural and urban watershed of 1.6 million people, including the industrial cities of Cleveland and Akron, and it achieved notoriety in 1969 when it caught on fire. It has some ten impaired uses (like Hamilton) so its ecosystem difficulties are many, ranging from conventional problems such as low dissolved oxygen levels in the water to contaminated sediments from urban runoff (especially PCBs) and rural non-point sources (especially pesticides). The implementation report, Stage 2, again involves stakeholder committees working with technical support staff from government agencies. The Cuyahoga River Community Planning Organization, funded by three local private foundations, develops programs for public involvement, education, and research and is roughly comparable to the Hamilton Bay Area Restoration Council.

In this case, size – as indicated by population, industrialization, and impaired uses – is accommodated through careful institutional design. While size often indicates complex environmental problems, it need not present insuperable obstacles to remediation. Deconcentrated planning and well-crafted and adaptable implementation strategies appear to be necessary ingredients for successful RAPs, including the larger AOCs.

Conclusions

The prevailing patterns of behaviour found in this "Great Lakes experiment," which mobilized stakeholders to adjust their property rights to restore beneficial uses, are disappointing. State and provincial environment agencies, in collaboration with their federal counterparts, were empowered to design institutional arrangements for RAPs. They used this opportunity to construct stakeholder organizations to advise them how to plan and implement remedial improvements. They then simply layered RAPs onto their pre-existing programs of environmental management and pollution control. Consequently, little has changed because of RAPs, other than restoration efforts being given legitimacy and/or involved stakeholders being disappointed with the processes. In many cases, it appears as if the environmental agencies in question were/are indifferent to, or cavalier about, institutional design rather than being openly hostile. But the prevailing patterns evolved nevertheless.

There are important exceptions to these prevailing patterns. We have noted the successes of Hamilton Harbour and the Cuyahoga River in organizing stakeholders in relatively large and polluted AOCs. In these cases, and there could be others, stakeholders set goals and made trade-offs among their interests in order to facilitate some kind of efficient solution to multiple-use conflicts. In these cases, the relevant government agencies engaged in institution building and design in order to get stakeholders to work together. The consensual arrangements provided productive solutions at the planning level.

Consensual arrangements can work well to ensure that all representative interests can be aggregated into a commonly planned decision or decisions. They work less well at the implementation stage as they create incentives for opportunism. We saw this in the Randles Reef issue of Hamilton Harbour. It was also exhibited in the Port Hope RAP, where the Atomic Energy Commission of Canada followed a non-cooperative strategy and exercised its monopoly power as an atomic regulatory agency.

We found that consensual arrangements were more difficult to establish in AOCs that spanned international and interstate boundaries. In the cases we examined – the Niagara River, the St. Lawrence River, and

the Menominee River – parallel RAPs had to be developed to deal with differences in priorities from one side of the river to the other side. In the Ontario and New York RAPs, these parallel arrangements were in the form of separate official plans. In the Menominee case, Wisconsin and Michigan had to divide planning recommendations and implementation strategies. And, it also appears the same process is evolving on the Detroit River, where the indifference of the Michigan government (again) contrasts with renewed efforts on the Windsor, Ontario, shorelines and creeks. Currently, the Detroit River appears to have a minimal chance of remediation.

There seems to be some evidence that the institutional designers can and are learning from experience. The totally revamped Toronto RAP is a case in point, as it replaces sectoral committee structures and recommendations with those based on watersheds and waterfronts. The IJC appears anxious to promote success stories from selected RAPs.

In general, we can state that RAPs have done little to alter the behaviour of stakeholders and their bundles of property rights. Institutions, or structures, or rules (whatever term one wishes to use) are, essentially, about incentives. They create incentive systems that render certain behaviours costly and others less so. RAPs were constructed without sensitivity to incentive systems and their relevance to environmental management.

7
Conclusion:
Promises and Performances

In the 1970s, governments and industries around Lake Erie began the costly but successful process of reversing the eutrophication of this, the shallowest of the Great Lakes. Concerted and large-scale actions were undertaken in a resource shared by two countries, four states, and one province. A large-scale common-pool problem was capable of resolution across national and subnational jurisdictions. The International Joint Commission was both a catalyst and a facilitator of this concerted effort.

At the same time, environmental scientists and regulators were discovering some more intractable problems around the Great Lakes. Rivers, bays, and harbours were suffering from environmental degradation because of different kinds of pollution and diverse kinds of resources exploitation. Many uses of these sites had been, and were being, curtailed or eliminated. The flames that burned in 1978 on the Cuyohoga River in Cleveland, Ohio, symbolized these new priorities.

The IJC's Water Quality Board began to assemble information about resource degradation in sites around the Great Lakes basin. As early as 1974, the Water Quality Board identified 69 "problem areas" as being in need of remediation (Colborn et al. 1990, 201). By 1983, it had identified 43 "Areas of Concern" and established common criteria across all of these areas to indicate the scope of their degradation. The criteria were referred to as "impaired beneficial uses," and, in Chapter 1, we have noted how the IJC acknowledges the different impairments in each AOC.

Progress in restoring the beneficial uses is, after 15 years, mixed. Some AOCs have made substantial progress, and one has been delisted. Yet there are others where remediation has not begun, and still others where efforts are partial, sporadic, and incomplete. We need to revisit the promises and practices of remediation before we address the performances that comprise these mixed conclusions.

The Promises

The RAP program was launched with immense hyperbole from officials and from academic scientists. In 1990, William K. Reilly spoke of the RAP process as

an example for the United States, Canada and the world. It provides planning that is geographically focused, ecosystem based, and cuts across environmental media. [It] offers a model of how to make better use of existing programs while determining the other actions needed to restore human and ecosystem health. By including stakeholders, it builds support and creates accountability. It provides a model for successful problem solving and a practical way to attain the goals of the Great Lakes Water Quality Agreement to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem (Hartig and Zarull 1992, 4).

As late as 1995, public officials, striving to publicize "the good news" about RAPs, could write:

Incorporating an ecosystem approach into RAPs has meant viewing different organizations, agencies and stakeholders as equal members of a team in a partnership to identify and solve environmental problems ... Sharing decision-making power and accepting responsibility for action is requisite, as no single agency or organization has the capacity to plan and implement RAPs ... Securing broad based participation in the RAP process takes advantage of the knowledge and expertise that community leaders possess about their Area of Concern and helps create the necessary sense of ownership to establish the political will for plan implementation (Hartig et al. 1995, 8).

The irony is that these aspirations do indeed roughly match the operations of the successful RAPs examined in this study. But they do not spell out the necessary conditions for designing the processes needed to realize the aspirations. The necessary conditions are essentially those of "incentive systems." People respond to incentives, positive and negative, that are structured by rules and learned through experience and peer example. RAP coordinators, for example, who are either employed by a lead environmental agency or hired under contract, have one obvious set of incentives: to respond to the "commands" or suggestions of their managing supervisors. They also have incentives to respond to the RAP participants who may be drawn from a variety of stakeholder

organizations. They must thus manage horizontally as well as vertically. In these circumstances, it would be tempting to adopt institutional arrangements that would ensure that only a limited number of participants—who could agree upon goals, recommendations, and implementing strategies of action—would be deemed relevant. Thus, the managers (vertical) of the RAP coordinators would be satisfied and their stakeholders could operate, with limited transaction costs, in a horizontal management fashion. In this way, the inclusiveness of the stakeholder process (as one institutional concern) can be compromised.

The promises, however, should not be underestimated. The Great Lakes have been a catalyst for economic development, industry, and recreation for almost two centuries. We also saw, in Chapter 2, that, given diminishing shipping and fishing uses as well as the early exploitation of most hydroelectric power sites, the primary use of the Great Lakes nowadays is for waste disposal. Within this context, efforts to fashion and implement plans to restore beneficial uses in the worst polluted areas were both necessary and promising.

There was further optimism because environmental groups, industry, municipalities, and other actors who were not regularly part of the "water quality management agreement process" were now going to be included in plan formulation. The JJC recommended to the two national governments that the RAP processes include stakeholders, in part because it believed that the stakeholders could act as "scrutineers" of the RAP process. It would therefore be more difficult for governments, especially state and provincial governments, to escape their responsibilities (IJC Commissioner, personal interview, October 1999).

The JJC in fact only specified what we might call "implicit constitutional rules" to frame the collective-choice processes for the 43 RAPs. One of these rules was that the respective governments would agree to include multiple stakeholders in the RAP processes. The second was that the respective federal, state, and provincial governments could designate one or two lead agencies to fashion the institutional design. (This rule was implicit in that the "normal" government processes involving the JJC included [1] recommendations of the JJC to the two national governments and [2] agreements between the national governments and their provincial/state member governments to implement the recommendations.) The third implicit rule was that the lead agencies were constrained by the understanding that they could not unilaterally design RAPs or develop implementation strategies. The lead agencies were, however, granted powers to choose stakeholders and to design the rules under which their interests would be included.

The promises of RAPs were thus extensive. New efforts were to be made to deal with pollution, especially of the complex kinds that would be stressful to the ecosystems. These efforts were to be focused on key AOCs that manifested the major problems, posed in terms of impaired beneficial uses. Governments would enlist the help of environmentalists and industrialists and other community members to ensure that the communities in the AOCs would be responsible for remediation. And the stakeholders, in turn, would be empowered to develop their own collective-choice processes to target the stresses of their ecosystems.

Performance

We examined the results of RAPs in Chapter 6. In general, they have had modest success: some RAPs have performed well, with demonstrable effects on restoring beneficial uses; others have not performed well, due to institutional and/or ecosystem difficulties.

We may put forth some of the propositions we discovered through our investigations:

(1) the wider the scope of stakeholder representation, the stronger the performance of the RAP

(2) the more consensual the plan formulation process, the better the RAP performance

(3) however, the greater the number of sovereign jurisdictions involved in plan formulation, the more difficult it is to construct and implement a RAP, and the greater the probability of poor performance

(4) the fewer the interdependencies in plan implementation (as opposed to formulation), the greater the performance

(5) sequential and reciprocal interdependencies in plan implementation were more likely to produce poor performance than were pooled interdependencies

(6) the greater the complexity and number of ecosystem uses (frequently associated with size), the poorer the performance.

These findings, however, are contingent upon the lead agencies fashioning an appropriate institutional design. Lead agencies were engaged in a collective-choice process with little understanding of the wider significance of institutional designs for successful RAP performance. "Getting the science right," which is often a watchword of lead environmental agencies, was not partnered with, for example, "getting the social science right"; instead, many agencies adopted a working assumption that held that the most successful RAPs would be those in which the

stakeholders would help the lead agencies plan, finance, and implement their legislative authority for the AOCs. In other words, bureaucratic self-interest dominated the collective-choice process. Since the collective-choice process was so narrow, it was the interests of the lead agency (or agencies) that prevailed.

Yet there were some exceptions to this constitutional design pattern. Sometimes the monopoly or quasi-monopoly position of the lead agencies gave them sufficient discretion to choose other options. In one case, that of Hamilton, the institutional design was an accident. The lead agencies had no models to copy and hired a consultant who designed the arrangements to include all relevant stakeholders, with an open agenda for decision making. The province never permitted this design to proceed further.

We can thus attribute part of the success, or part of the failure, of the Great Lakes' RAPs to institutional design issues. From a practical standpoint, it is hoped that the IJC and other bodies will learn from the RAP experience and think through the incentive systems for different constitutional and collective-choice processes. Bureaucratic lead agencies currently have neither the interest nor the capacity to engage in the design of well functioning collective-choice processes. If this system of governance persists, then the lakes will not be restored.

We are now in a position to reassess our theory and explanations about common-property resources in order to take account of our findings concerning this multiple-use and large-scale ecosystem.

Theoretical Review

In Chapter 4 we presented the theory of common-property resources in order to better understand the logic and dynamics of user group and stakeholder interdependencies. We explored how RAPs could pick up these interdependencies and fashion "solutions" to the remediation of CPRs in AOCs. We noted three important concerns pertaining to large-scale multiple-use CPRs such as the Great Lakes:

(1) There are multiple and dynamic interdependencies inherent in ecosystems and, hence, comparable interdependencies for stakeholders that enjoy or use these ecosystems.

(2) Rules devised to allocate and distribute bundles of rights among stakeholders are subject to incentives to change because of these multiple and dynamic ecosystem interdependencies.

(3) Collective-choice mechanisms could, potentially, fashion newer operational rules to take account of these incentives. The newer

rules could build upon common and statutory law methods of adaptation (cases, courts, precedents) that have demonstrated some limitations in balancing different uses and in sustaining ecosystems from place to place.

We can now add a fourth major concern pertaining to large-scale multiple-use common-pools situations:

(4) Bureaucracies are inappropriate designers of collective-choice mechanisms in that their incentives may or may not coincide with those needed to balance multiple users and to sustain ecosystems from situation to situation.

All four concerns form the context from which CPR theory may be extended. Three features of this extension are suggested below:

(1) those concerning property rights
(2) those concerning the design of collective-choice mechanisms for interdependent users
(3) those concerning the incentives on designers of collective-choice arrangements

Property Rights and Stakeholders

We noted previously that stakeholders in RAPs could be, and were in practice, individuals, clubs, corporations (private, public, or government), and government departments (national, regional, or local). They reflected wider societal interests that had a stake in the outcomes made possible by RAPs. In most cases, they were direct users of the resource – for waste disposal, container shipping, recreation, irrigation, fishing, and so on. They could also be environmentalists, who place intrinsic rather than instrumental value on the common property.

Using the typology suggested by Schlager and Ostrom (1992), the stakeholders could be owners, proprietors, claimants, authorized users, and (suggested by us) squatters.

The legal scholars Hohfeld (1919) and Commons (1924) clarified the nature of property rights (such as management) by demonstrating that they are not rights to things, as such, but concern the claims and duties that persons have with respect to other persons, "even if these claims and duties are deployed over the uses and dispositions of things" (Ali 2000, 5).

Hohfeld is significant to our analysis of common property in the Great Lakes in that he points out how many of the users (and stakeholders) have privileges as authorized users but do not have reciprocal duties. There may be conditions attached to an authorization to use the lakes, bays, and rivers for the disposal of liquid industrial effluent, but there may be no reciprocal duty to or from other users. In contrast, riparians may have claims on waste dischargers, but these can be attenuated by the conditions of use that may be authorized for in a discharge. The Ontario Environmental Protection Act, for example, removes the common law damage claims that riparians may have with respect to pollution caused by municipal waste water treatment plants. We can have many thousands of users of the Great Lakes for one or more of the uses we have depicted, but many of the users are not made legally interdependent (i.e., they are not made claim holders) with regard to the "technical" interdependencies they may create.

Let us work through this again using the case of a recreational fisher. This person typically requires a licence from a state or provincial agency to gain access to the waters of the Great Lakes and to withdraw fish. There may be conditions attached to the licence, like a quota on the number of particular species that may be harvested in one day. Unless the fisher is a riparian, he or she has no claim on others who fish, discharge wastes, watch birds, or own freighters. The fisher simply has an authorization to use the waters for the purpose of fishing; but neither the fisher nor others have claims with regard to the fishing.

In cases like these, it is the responsibility of the government agencies that issue the licence to police for violations. Uses are not self-formed but, rather, are governed by those with the power to create and remove claims. Obviously, policing is more difficult across sovereign jurisdictions like nation states or states and provinces.

If this analysis is correct, then authorized users (or squatters) have privileges that do not require them to take other users into account (unless so specified in the conditions of authorized use). They can, of course, voluntarily agree to a correlative duty. In these circumstance, it will depend on the values of the person and on the social norms of the community whether voluntary self-regulation occurs. In large group situations, we know that social norms tend to dissipate and that free riding occurs (Olson 1965).

In the large multiple-use legal system that has evolved on the Great Lakes, reciprocal duties on users are either not specified in their conditions of use or they are specified and then policed (somewhat) by

government. In the former case, voluntary reciprocity can potentially take place. However, the Great Lakes contain 32 million people and countless thousands of users. With these conditions, the Great Lakes resemble a large, partially regulated commons whose negative interdependencies have come to dominate the ecosystems. In these circumstances, we can expect failure in managing and balancing multiple uses. Users have little incentive to take other users into account. Degraded bays, harbours, and river mouths are predictable results. However, there are collective-choice mechanisms that may change these incentives and consequences.

Collective Choices

It is through collective choices that the privileges and claims of users of the Great Lakes may be altered. To use Hohfeld's terminology, collective-choice forums can change the powers and immunities of users.

RAPs had the potential to change powers and immunities. However, they were designed to maintain the pre-existing powers and immunities, and to see if the voluntary and largely consensual coordination of users and managers could move the stakeholders towards better performance and, hence, restored beneficial uses. They were and are an exercise in horizontal management and in voluntary reciprocity between stakeholders (Sproule-Jones 2000). No attempts were made by the respective governments to alter the legal arrangements through which RAPs would be fashioned and implemented. (The US Critical Programs Act, 1990, which authorized RAPs, did not alter the pre-existing regulatory regime of American laws.)

Thus, RAPs were modest experiments in collective choice. National, state, and provincial governments were unwilling to fundamentally alter the powers and immunities of the stakeholders. The mixed performance of RAPs that was traced in the previous chapter is partly explained by these collective-choice limitations.

Nevertheless, RAPs performed differently and with different degrees of effectiveness depending upon their designs for formulation and implementation. They were constructed by the lead environmental agencies in each state and, jointly, by the Canadian federal and provincial governments in the Ontario cases. The model that prevailed in many RAPs was the one that included those users whom the agencies perceived to be important advisors as they went about analyzing their different perceived site-specific problems and coordinating their different solutions. This was not a model that would produce the best feasible collective choices within the context of stakeholders' pre-existing bundles of property rights. Occasionally, however, the model produced an inclusive group of stakeholders and (financial and legal) opportunities to implement the plan on the part of individual stakeholders or groups of stakeholders.

Further, some RAPs were able to build upon voluntary goodwill among participating stakeholders and use the social capital to coordinate and implement new programs. Hamilton and Cleveland come to mind. However, with regard to communities that had little experience in collective stakeholder activities, voluntary cooperation was insufficient.

This was particularly true in international waterways like the St. Lawrence, Niagara, or Detroit Rivers, whose cross-national interactions have been infrequent and not particularly productive. Further, AOCs were identified with no social criteria in mind. They were, in fact, largely an accident of water sampling activity – which is hardly an ecosystem criterion. No due care and attention was given to these boundary issues, human or otherwise. Like so much of the RAP story, governments were cavalier with regard to institutional design issues.

The key to understanding large-scale multiple-use common properties, their successes and failures, seems to lie with collective-choice processes that can alter legal relationships among the various users of the ecosystems in question. Bureaucracies, given their own agendas and mandates, are inappropriate designers and should not be charged with these tasks. It would seem that some forms of self-governing collective-choice processes would be more appropriate (V. Ostrom 1997).

Designs and Designers

It would appear, in many situations, that government agencies had neither the skill nor the interest to construct collective-choice mechanisms for successful RAP formations and implementation. This is ironic as many agencies saw themselves as mandated to remediate AOCs (albeit with stakeholder advice). Stakeholders would be advisors and interest groups rather than co-managers of AOCs. With this perspective, the transaction costs of plan formation and implementation could be minimized. Effective solutions were anticipated.

In multiple-use resource situations, however, a government agency is rarely "in charge" and rarely has sufficient expertise and powers to construct and implement effective resource plans. In other words, property rights are scattered and variable, and the comparative advantage of government agencies appears to lie in their powers to facilitate, coordinate,

and partially finance particular resource problems among users. This comparative advantage can be layered onto their regulatory powers over some resource uses. They are important but not omnipotent stakeholders. They are also accountable to governments whose territories exceed any one AOC but that are not extensive enough to contain all AOCs. Agency agendas are set, at best, with other concerns competing prominently with those focused upon remediating impaired beneficial uses in different locations.

However, governments have a body of accumulated knowledge about institutional designs for collective choices. This knowledge could be drawn upon in a way similar to drawing upon environmental science for resource decision making. The institutional design knowledge is arguably comparable in predictive capacity to that of environmental science. It is ignored, in part, because decision makers believe that social science knowledge can be grasped intuitively, without scholarly examination. It is more usually ignored because decision makers presume that they are in charge of, rather than co-managers of, a common property.

The body of accumulated knowledge about institutional designs began to be amassed in the eleventh and twelfth centuries when the first written constitutions were established for European cities, especially in The Netherlands and Italy (Berman 1983). Those constitutions spelled out, among other things, the participatory relationships among members of the community. These municipal constitutional laws were one of a number of codified legal systems (e.g., common law, canon law, mercantile law, and royal law). There were occasional disputes among these rival legal arrangements, and, in some countries (e.g., England), royal law became supreme over the course of four centuries. Royal law was later transformed into statutory law, as parliaments replaced the Crown as a source of law. Canada inherited a tradition of royal law, and this still dominates ideas about the place of parliaments (provincial and federal). The United States also incorporated some major elements of royal law into its democratized state and federal governments (Sproule-Jones 1984). The municipal tradition of self-governance was an acknowledged part of American governance arrangements in the nineteenth century, as Toqueville discovered. But it, too, has been ameliorated over the last century (V. Ostrom 1997).

With this theoretical perspective and its extensions, the designs for RAPs become more understandable, varying, as they do, between (1) stakeholder empowerment in the formation and implementation of plans and (2) limited stakeholder advice and involvement for the lead agencies of American state and Canadian provincial and federal governments. The designs can best be viewed as experiments, and this book can best be viewed as an effort to understand and learn from these experiments. We hope governments can also learn from them.

Conclusion

The promises of RAPs and remediation on the Great Lakes were many and important. The performances were modest; however, the potential remains great. Governments in both countries need to set rules that collective-choice bodies can use to change the legal relationships of users and stakeholders on the Great Lakes. Adaptation is necessary because the dynamics of the ecosystems under use are adapting and changing. The story of the Great Lakes and its governance is far from over. We still await their restoration. And we must hope that the fragile ecosystems can wait too, until human beings have fashioned an acceptable way of integrating themselves into the environment.