Recent Innovations in Managing a Complex CPR:

The Otago Harbour in New Zealand[1]

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1. INTRODUCTION

The purpose of this paper is to characterise the new institutional context for the management of complex common property resources in the natural environment in New *Zealand, and* to illustrate the implications of this context in a local case study of harbour management.

During the past 15 years two major trends have emerged regarding the management of public resources in many western countries. Many functions traditionally undertaken by public bodies have been privatised (Molz 1989), and an associated trend has been to restructure (often to downsize) public bureaucracies. Both trends appear to be driven by a managerialist philosophy which trumpets the private sector's efficiency and "hard nosed" practices, and which prescribes a more limited role for the public sector.

These two trends are finding increasingly wide application in the management of natural resources, including harbours, fisheries, native timber and grasslands. When privatisation and restructuring are applied to natural resource management, a new institutional context emerges, with a tendency toward more comprehensive but also more remote management by central governments, based on guiding principles such as sustainability and assessments of impact, rather than on the regulation of specific uses or behaviours.

New Zealand is in the forefront of this shift to a new institutional context. In the past four years, a groundbreaking restructuring of environmental planning into a comprehensive resource management regime, plus a major reorganisation of local government, has occurred in that country. The combination of these two major pieces of legislation has created a new political and institutional context for resource management' New Zealand is not unique in creating and experiencing this new context, but perhaps as a small and socially, innovative country, it is facing these implications earlier than other nations.

The new institutional context allows us to see mere clearly the interface between heavily used, potentially fragile natural environments and. the users/appropriators - both organised and unorganised - of those environments. The patterns of use and management of many types of natural resources call to mind characteristics of common property resources (CPR). Provision of adequate institutional arrangements for the management of CPRs has been a major theme in recent environmental-management research. This has also been a major, consideration in the recently enacted regime of environmental administration and planning legislation in New Zealand. This paper describes some recent innovations in dealing with the interface of natural resources and development activities. Our guiding question is how do local communities manage fragile ecosystems and address complex resource management problems in these new contexts?

As noted below, fragile ecosystems have some attributes of CPRs, but CPR research has tended not to focus on ecosystems with multiple and overlapping uses, including bays and harbours near urban areas. We call these ecosystems <u>complex CPRs</u>.

This paper is based on the Otago Harbour in southern New Zealand as a case study of potential innovativeness in the management of complex CPRs. This harbour is under stress from increasing, and increasingly diverse, uses and user groups, as well as from historically

weak institutional capacity, political legitimacy and low technical capability. We describe some potentially innovative policy initiatives recently undertaken by the responsible local governmental bodies to deal with this inauspicious situation. We rely on interviews and documentary sources. A number of the issues raised are also applicable to other CPRs, including certain air, land and water resources.

This is a particularly fortunate time to be studying this ecosystem, for the recent policy initiatives documented in this paper appear to highlight a shift in local consciousness and management from a relatively open-access system with some ineffectual attempts at statutory regulation, to a negotiated system of accords designed to achieve more sustainable outcomes. Recent institutional reforms have provided the enabling framework for these negotiations to occur.

2. BACKGROUND

In this section we draw upon recent work on governance of common property resources, planning and policy implementation issues, and voluntary coordination at the interorganizational level. Instead of comprehensively reviewing the literature in these areas, we will attempt to identify themes that bear on the provision of adequate institutional arrangements for managing complex CPRs.

2.1. Complex CPRs

There has been a renewed attention to common property resources in the past decade, as an alternative to organising and managing via markets or hierarchies (Ostrom 1990). This has occurred alongside, but largely independent of, a burgeoning literature in administrative studies concerned with network forms of organisation (Powell 1990), strategic partnerships (Borys & Jemison 1989) and cooperative strategies (Gray 1989; Nielsen 1988). The growing literature on CPRs rediscovers traditional community based mechanisms for managing resource use, and seeks to apply them in situations in more developed societies. This is because, in contrast to market mechanisms,

> "...community-based management systems have the potential of solving the commons dilemma by internalizing the high information and transaction costs. The community has a built-in incentive to stay well within the biological limits of the resource which have been learnt by experience. The community also has at its disposal the requisite social coercive mechanisms to force compliance with expected harvests" (Grima & Berkes 1989: 49).

With the build up of case studies on CPR management during the past ten years has come a propensity to analyse the cases in closer detail, and a willingness to begin the arduous task of comparing cases in order to construct a more general level of theory about natural resources managed as CPRs (see Ostrom 1990). However, the CPR literature deals almost exclusively with single resources and their management, and not with complex resource systems with multiple uses and users, such as urban harbours and bays, or national parks.

One reason for focusing on single-resource cases may be that understanding the actors'

structure of incentives and subsequent strategies is simpler than in complex, multi-use situations. When a resource is vital to a local, homogeneous community of users, then one can assume users' incentives and strategies are similar. This allows one *to* focus on the appropriateness or viability of the rules they have established for themselves. But many "commons" situations in the developed world, such as harbours, fail this idealistic scenario. Runge (1992:30) notes that

> "As the heterogeneity of the group increases, and as the resource constraints facing it become more severe, common-property rules (indeed, any rules) may become -more difficult to maintain."

We would add that as the heterogeneity of the resource itself increases, that is, as it is used or perceived differently by different actors, common property rules may be more difficult to <u>formulate</u>, as well as to maintain. In addition, the more rapid pace of change in developed societies may increase the volatility of uses or perceptions of a complex CPR, or the diversity of stakeholders concerned with it. These factors may in turn make adaptive responses more frequently needed, for instance by changing the rules governing users' behaviour.

One might argue that harbours are not CPRs at all, but public goods, since consumption of the resource is non-subtractive. That is, an appropriator's use of a resource unit in a resource system does not "reduce the general level of [the resource] available in the community" (Ostrom 1990:32); this is a defining characteristic of public goods such as defense expenditures or air. There are two arguments, both based on social behaviour, against this position. First it has been pointed out that

> "there, is no such thing as a common property resource; there are only resources controlled and managed as common property, or as state property, or as private property" (Bromley 1992:4; emphasis added).

Thus, the way that the collective set of users manages the resource system defines its <u>emergent pattern of management.</u> It may be formal and deliberate, or informal and unwitting, or some combination.

Next, whether the consumption of a resource is subtractive or not depends on how it is used. If there are many and overlapping users, then certain uses will prevent or inhibit other uses, irrespective of statutory or community-defined rules. Thus, in specific uses - such as fishing, shipping, or effluent disposal - harbours may be "public goods." But in aggregate, from a <u>systemic</u> perspective, the same harbour may be "common property." In other words, a resource may be analytically defined as a public good, but in practice its <u>emergent pattern of use</u> makes it a CPR.

In rapidly changing societies, the management of a resource can change over time,, depending on its emergent patterns of management and use. A typical evolution might proceed from open access to common property to public management, representing nil, then informal and finally statutory regulation. More commonly perhaps, a mix of regulatory modalities occurs at any one time, with one type dominant (Grima & Berkes 1989). An overarching statutory framework usually exists, which may be intrusive or remote, effective or ineffective in guiding local behaviour. "Co-management" may also occur, in which locals

lobby government policy in a policy area of concern to them (Acheson 1989), or government delegates the management of a resource to a local community of users (Swinth 1991).

Changes in the mix of regulatory modalities are more likely in the management of complex than single-use resources. Transitions from one dominant type of management to another are rare because of inertial institutional pressures, or because users recognise that shifting from independent to coordinated strategies involves transaction costs (Ostrom 1992) and benefits which may be unevenly distributed (Ostrom 1990).

.When a shift in the management of a resource does occur, it is potentially important in highlighting major changes in institutional arrangements. For example increases may occur in the volume or scale of usage, or in the quality or character of usage, such as new uses/users intruding on old, established uses/users. Changes in public attitudes, or the values of powerful stakeholders, may also occasion a shift in management. New information may become available as a result of new monitoring techniques or a major accident. Finally a shift in management may be required to comply with statutory changes in local government responsibilities.

Shifting institutional arrangements, especially in complex resource systems, highlights the importance of coordinated action in planning and policy making.

2.2. Planning In a multi-organisational environment

An organisational perspective can also provide a number of insights into our research problem. A very useful focus is provided by what has been labelled as the "IOR school" of planning (Faludi & Mastop, 1982). In that school, a holistic, integrated approach to environmental management is considered mandatory to recognise and protect the integrity of fragile ecosystems. However, decision-making on environmental issues can rarely be contained within the corporate boundaries of a single public agency. Instead, it is more appropriate to describe the decision-making context in such situations as multi-organisational. A "multi-organisation" is defined as a set of parts of several organisations which are brought together through participation in some common activity (Friend, Power & Yewlett, 1974). Planning in a multi-organisational environment, poses particular challenges, but there is growing recognition for inter-corporate planning initiatives between and among different levels and forms of public and private agencies (including "non-governmental organisations such as environmental groups) to respond to the general ecological crisis (Gray, 1989).

For policy making and planning to be effective in such a context, we need to understand the complexity of interorganisational relationships. Organisations face pressures to achieve mutual adjustment between a multitude of social, political and economic forces, each emanating from a different type of local, regional, national or inter-national constituency. The management of relationships between these various interests is necessary to protect the integrity of the environment and at the same time enable these groups to achieve their particular objectives. This balancing process calls for highly developed networking skills from certain actors who occupy strategic roles in the local and regional institutional structures (Friend, Power & Yewlett 1974). Thus, we need to think of the planning or decision-making process in terms of a continuing and subtle organised negotiation amongst interested parties, rather than as episodic and grandiose technical planning. This is the challenge: How to

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create processes for effective participatory planning in rapidly changing or substantially restructured environments.

Voluntary coordination of actors' behaviour is also an important theme in inter-organisational studies, such as in strategic alliances (Borys & Jemison 1989) and social service agency coordination (Van de Ven & Walker 1984). In such studies the coordination may be mediated or catalysed, but not controlled, by a coordinative structure or "referent organisation" (Trist 1983). Collaboration via multi-party negotiations is often more effective in addressing complex problems of natural-resource management than imposed formal solutions (Gray 1989). Interdependence among actors and their collective capacity to achieve certain system level ends are sources of informal coordination structures in multiorganisations (Chisholm 1989). Some sense of commonality of purpose is crucial:

> "The failure to develop a community of interest...precludes effective coordination. Formal mechanisms are notoriously ineffective at developing such community. Informal devices are often more effective for this purpose" (Chisholm 1989: 29).

But 'informal' does not necessarily mean 'unorganised.' Individual behaviour Is partially a product of embedding institutional structures, whether statutory or grassroots. Institutions can be designed to "foster coordinated expectations in relation to a particular physical and social environment" (Runge 1992: 30).

In CPR situations, the sense of community is buttressed by shared norms, which serve an important function in restricting available appropriatiug strategies, especially opportunistic behaviour (Ostrom 1990: 35-36). Shared norms of trust and mutual obligation reduce expensive monitoring and sanctioning in the resource system. The decision-making process becomes characterised by mutual adaptation, negotiation and interactive learning,

2.3. Implementation issues

Implementation issues in multi-organisational planning contexts become relevant for this research in two ways: (1) how the policy intents of statutory changes are implemented in local contexts; and (2) how local policies and plans developed by sub-national public bodies are accepted by users of the complex CPR, The structural complexity of the problems, compounded by the complexity of political relationships at the local and regional interface, creates a situation in which the success or otherwise of policy initiatives can only be gauged in terms of the degree of influence exercised over incremental commitment at many diverse points of decision-making. This is because

> "...many implementation efforts involve not simply a single organization but rather a loosely-coupled network of organizations, from different levels of government, none of which is preeminent" (Sabatier 1985: 315).

In other words the implementation problem mirrors the structural complexity of the policy making process noted above.

The separation of policy making from implementation may be convenient for analytical reasons. However, this "top down" view has. tended to lead to the weakness of

overemphasising the distinctiveness of the two processes. There has been a tendency to treat policies as clear cut, uncontroversial entities, whose implementation can be quite separately studied (Ham & Hill 1986). Recent research recognises the overwhelming importance of the negotiation and bargaining which occur throughout the policy process. Many so-called implementation problems arise because there is. a tension between the expectations of government agencies and the competition and conflict between interest groups to gain power to pursue their own goals.

> "In such a situation, the 'program' may actually consist of the sum of negotiated settlements among street-level bureaucrats [e.g. social workers, pollution control inspectors] and target groups - largely irrespective of what is written in the law books... While implementation scholars agree about the substantial discretion usually exercised by street-level bureaucrats, they disagree concerning the ability of elected officials to guide the behavior of implementors and target groups so as to bring their actions within the limits defined as legally acceptable over time" (Sabatier 1985; 315-316).

The groups differ in terms of their range of values and interests, relative power positions and autonomy, and organisational capacity to respond to change. It is important to understand the nature of interactions that result from the combination of these factors. The policy/action relationship should be regarded as dynamic interaction because policy can not be regarded as a static phenomenon.

Implementation issues in CPRs focus on enforcement of the rules governing appropriators' use, such as preventing "defections."

> "The creation of communal property rights consistent with traditional and neotraditional practices, where they exist, has a better chance of success than 'top down' solutions in addressing commons problems. The legal specification of user rights at the community level lowers management costs and helps solve implemen-tation problems. However, there has been little progress in integrating community level with government level management measures" (Grima & Berkes 1989: 52).

The CPR research neglects the significance of private property rights by focusing on communal rights and state intervention. This is an additional dimension that is relevant when researching complex CPR situations in western capitalist, societies.

3. CONCEPTUAL FRAMEWORK

As noted above, our guiding question concerns how local public bodies in western societies manage complex resource systems and address resource management problems in their institutional contexts. We have identified four factors which constitute the institutional arrangements for any resource system: .

> a. *users and uses:* These may be few or numerous, concentrated or diverse, independent or overlapping, compatible or conflictual.

b. their *values and attitudes:* This includes how users and managers think about the resource system, in a holistic or fragmented way, as a communal or private resource.

c. *economic and political arrangements:* This includes the system of private property rights, statutory framework and intergovernmental relationships, and public-private sector relations.

d. *technologies* for appropriating, monitoring and regulating the resource: This includes, for example, specific shipping, fishing and recreational practices; and scientific knowledge, technology and practices to assess the range of uses.

We use these four aspects of institutional arrangements in a descriptive model of behaviour in a complex CPR, as shown in Figure 1. When applied in a specific situation, they produce the actual state of the resource system, that is, its emergent patterns of use, management and regulation. These patterns may be interpreted as strategies, adopted either consciously or unconsciously (Mintzberg 1978), by public officials and other stakeholders. These patterns in turn produce certain, specific environmental outcomes, such as biological and ecological quality, levels of pollution, recognition of social and cultural values, and aesthetic appeal. Thus the emergent patterns serve as a link between institutional arrangements and outcomes.

(physical attributes)   (evaluation)

INSTITUTIONAL   →   EMERGENT   →   OUTCOMES
ARRANGEMENTS   PATTERNS

- users/uses   - biological
                        - use   quality
- values/attitudes
                        - management   - ecological
- econ./political   quality
  arrangements   - regulation
                                                - pollution level
- technologies
                                                - aesthetic appeal

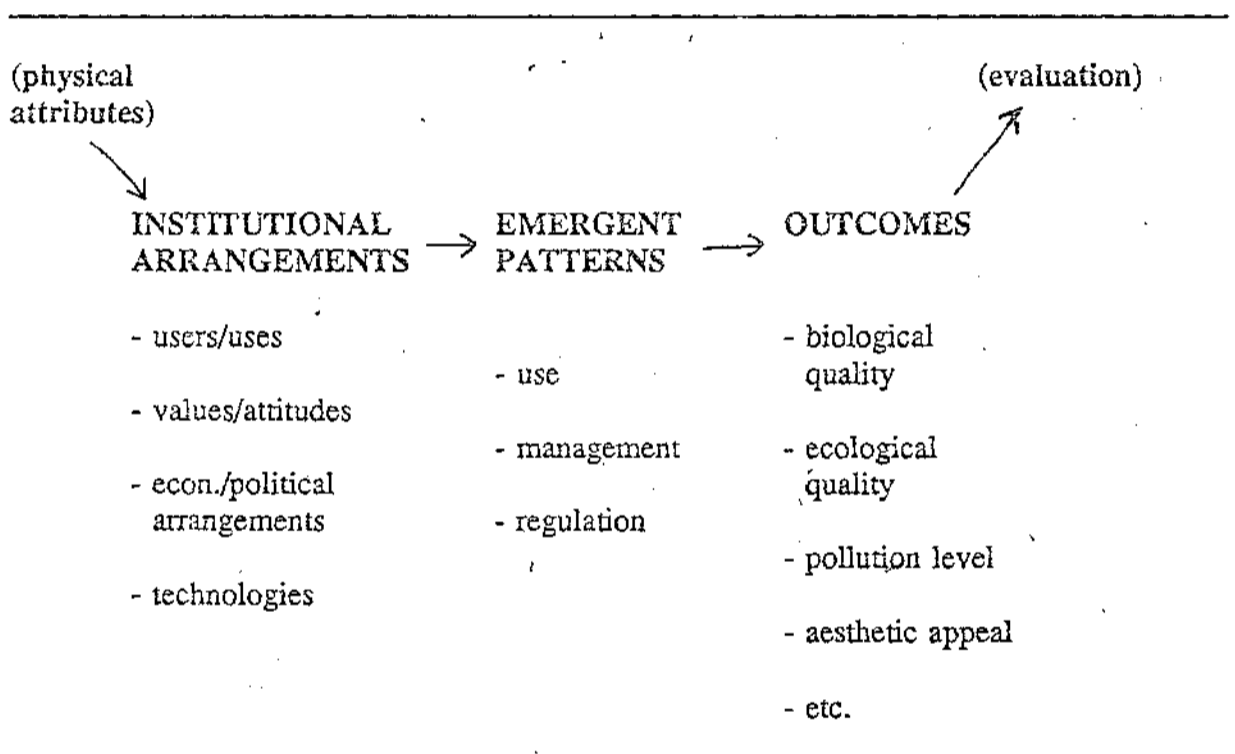   - etc.

Figure 1. Basic Behavioural Model of a CPR

This is consistent with Oakerson's (1992) static model for analysis of CPRs. One might, as Oakerson does, include at the left of the model the physical and technical aspects of the resource system. One could also include at the 'right a component for -monitoring and evaluation. For the purpose of understanding traditional resource systems, this basic model is adequate. In such systems with single uses, which have been the focus of most CPR research, the institutional arrangements remain relatively stable over long periods. This allows users and public regulators to experiment with and fine tune strategies for managing their resource sustainably, sometimes over generations. However, many complex resource systems in western capitalist societies differ from this scenario.

At the end of his article, Oakerson (1992) speculates about using his model to understand institutional change. To do so he introduces feedback loops among all the components. This is important for our purposes because many complex resource systems are under stress from changes in and interactions among these factors in the following way: The uses of the system are (or are anticipated to be) conflictual and overlapping by numerous parties, plus there is difficulty in excluding any users/uses because of customary and private-property rights. Ecological, biological or access problems in the resource system are newly discovered, or emergent, or the resource system itself has recently been conceptualised in a new way. For example a "green consciousness" makes the resource system more widely appreciated than in the past, causing more intensive use of the resource, and more stress on it. In addition social and biophysical impacts of the various uses on the system are poorly understood, and the responsible body(ies) have low technical capability to find out. Political legitimacy or will for dealing with the emergent problems is low, perhaps due to recent changes in legislation governing the regulation of the resource system, which may have upset entrenched interests and arrangements.

We believe these conditions characterise a growing number of resource management situations, and thus represent a distinct class of phenomena for research. Interaction and dynamism in institutional arrangements create acute challenges for local bodies charged with managing natural resources, as well as for interest groups. Note that the emergent pattern of usage is similar to the two basic attributes of CPRs. That is, consumption of units of the resource depletes it (consumption is "subtractive"), and it is difficult to exclude any users of the resource (Ostrom 1990).

Hence, changes in one or more of the four institutional arrangements can be expected to produce changes in emergent patterns and in outcomes. Oakerson (1992: 55) notes that "outcomes disclose the _effect_ of a difficulty that is manifested behaviourally in patterns of interaction." As noted in the last section, the outcomes desired by the local public body may differ from the policy intents of central government.

We propose that an accountable public body subject to a dynamic and complex situation as sketched above will attempt to respond to achieve desired environmental outcomes by adopting one of the three following change strategies:

1. It will attempt *comprehensive changes* from past practice, including designing or changing one or more aspects of existing institutional arrangements. It will attempt to create a new game or playing field among the stakeholders.

2. It will focus on *incremental changes* in practices from past or existing arrangements among stakeholders. This emphasises the same game, with some power (re)balancing and negotiation.

3. It will attempt *symbolic change* to satisfy the clamouring of some stakeholders or central government bodies, but it intends no substantive change(s) in existing arrangements. Symbolic, ritualistic or cynical behaviour characterises this strategy. This also includes a situation where actors make symbolic change(s) in their thinking or mental models about the resource, creating a new symbolic context for resource management.

In terms of our framework, the public body will link institutional arrangements to desired outcomes by means of emergent patterns of use, management and regulation. A similar set of strategies is available to all other stakeholders, but they will not be examined in this paper. Instead we focus on the strategies, or patterns in actions and decisions (Mintzberg 1978) of local public bodies, in their roles as resource management agencies.

The addition of feedback loops acknowledges that actors may learn from their experiences in attempting to manage the complex resource system (Oakerson 1992). The full revised model, applicable to complex CPRs, is shown in Figure 2. For the purposes of this paper, we will use the three above strategies as ideal types in our examination of the case which follows. We recognise they may not be mutually exclusive, and that it may be difficult to distinguish among them in concrete behaviours, attitudes and perceptions. Each strategy becomes a "binary" working proposition guiding our data collection and analysis.
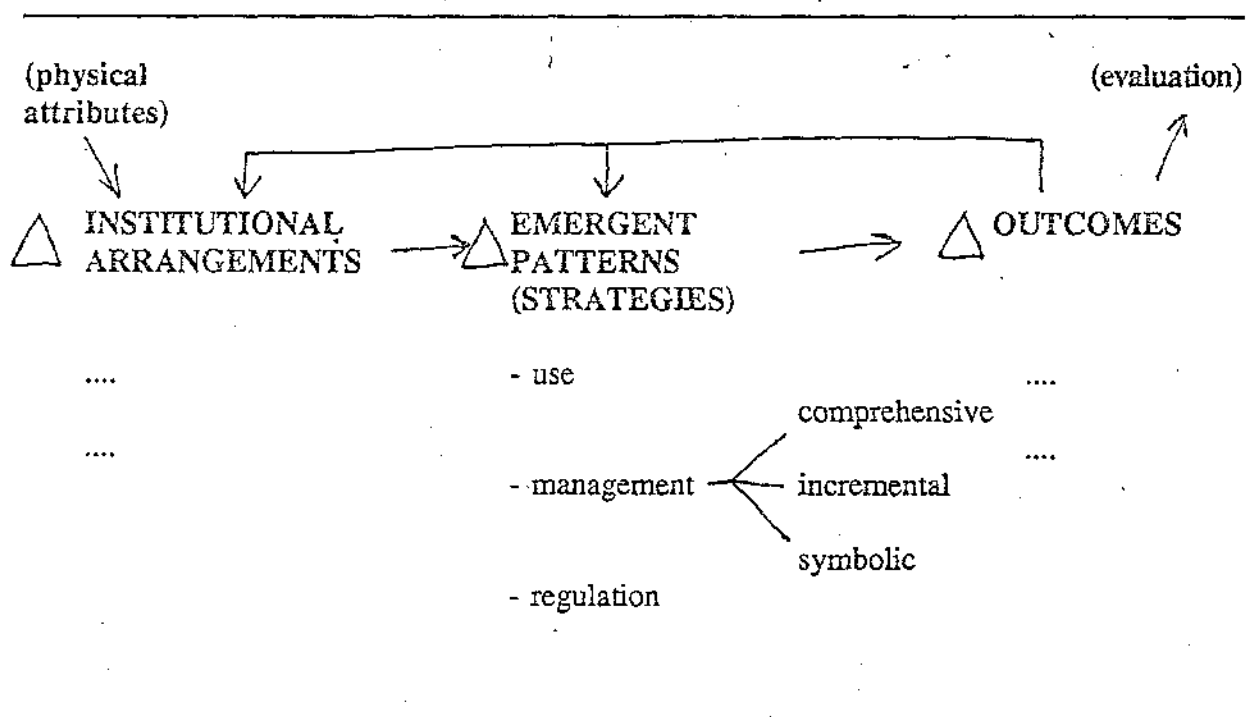

Figure 2. Dynamic Behavioural Model of a Complex CPR

In the Otago Harbour case we believe we are witnessing a shift in management modality from open access to CPR management of a resource, within a substantially new context of enabling statutory regulation. However there are <u>two</u> accountable public bodies, and they have not always worked together amicably in the past. The <u>regional</u> body (Otago Regional Council) has the primary responsibility for environmental planning in the province of Otago and more specifically for the regulation of water uses. The <u>local</u> body (Dunedin City Council) is responsible for the regulation of land uses within its purview. The harbour under study spans this boundary, creating possibilities for conflict.

4. METHOD

In this paper we use a case study methodology to highlight the new configuration of forces acting on local decision makers. A method known as *institutional analysis* helps us to organise the data. In an institutional analysis

> "the basic strategy is to identify those aspects of the- physical, cultural, and institutional setting that are likely to effect the determination of who is to be involved in a situation, the actions they can take and the costs of those actions, the outcomes that can be achieved, how actions axe linked to outcomes, what information is to be available, how much control individuals can exercise, and what payoffs are to be assigned to particular combinations of actions and outcomes" (Ostrom 1990:55).

Based on the information gathered, a composite picture of the situation is formulated, focusing on the particular strategies used by individuals and interests to further their aims, and the essential problems they face.

To date in our case we have conducted interviews averaging 45 minutes with ten members of six working groups formally constituted as part of the recent Otago Harbour Planning Study (henceforth, the Study), out of a total of 39. In addition we have interviewed five of the seven political leaders and planners involved in the organisation and management of the Study. We have not yet begun to interview other stakeholders who did not participate in the formal Harbour Study process.

The initial output of the Study was a draft "Issues and Options Report," which was circulated for public comment in October 1991. One hundred seventy submissions were received. We have initiated a content analysis of these. A final Issues and Options Report was released in July 1992. The two reports, plus a variety of other documents generated by the Study were also reviewed.

As at the writing of this paper, we are in the middle of our data analysis and are able to present only preliminary results. In a future paper we plan to focus on the interacting strategies of all stakeholders we are able to identify.

5. INSTITUTIONAL CONTEXT PRIOR TO 1984

The institutional arrangements for resource management in New Zealand prior to 1984 were underpinned by a strong development oriented ideology, characteristic of western capitalist societies. This can be illustrated with particular reference to the management of harbours.

Harbours occupy an important place historically in the settlement and development of New Zealand. The settlement pattern is characterised by a strong coastal orientation, focused on the four metropolitan port cities and up to ten secondary port towns. These settlements have played a major role in the expansion of the export based economy and in generating the material wealth for a relatively prosperous and affluent society.

But this has been at some cost to the natural environment. Prior to 1984, very limited attention was accorded to managing the harbour resources in a holistic and culturally sensitive way. The institutional context was characterised by a fragmented and overlapping jurisdiction. This was partly a reflection of division of power and functions between central and local government agencies. Multiple statutes led to fragmented governance of harbours (Table 1). As problems became manifest with increasing pressure on harbour resources, ad hoc incremental changes were made to respond to such problems instead of reviewing and reforming the existing institutional arrangements. Traditionally, harbours have been regarded as a local government responsibility and unsuccessful attempts were made at times to regulate harbour activities within the ambit of the statutory local land use planning process and sectoral central government responsibilities such as fisheries, reserves and transport
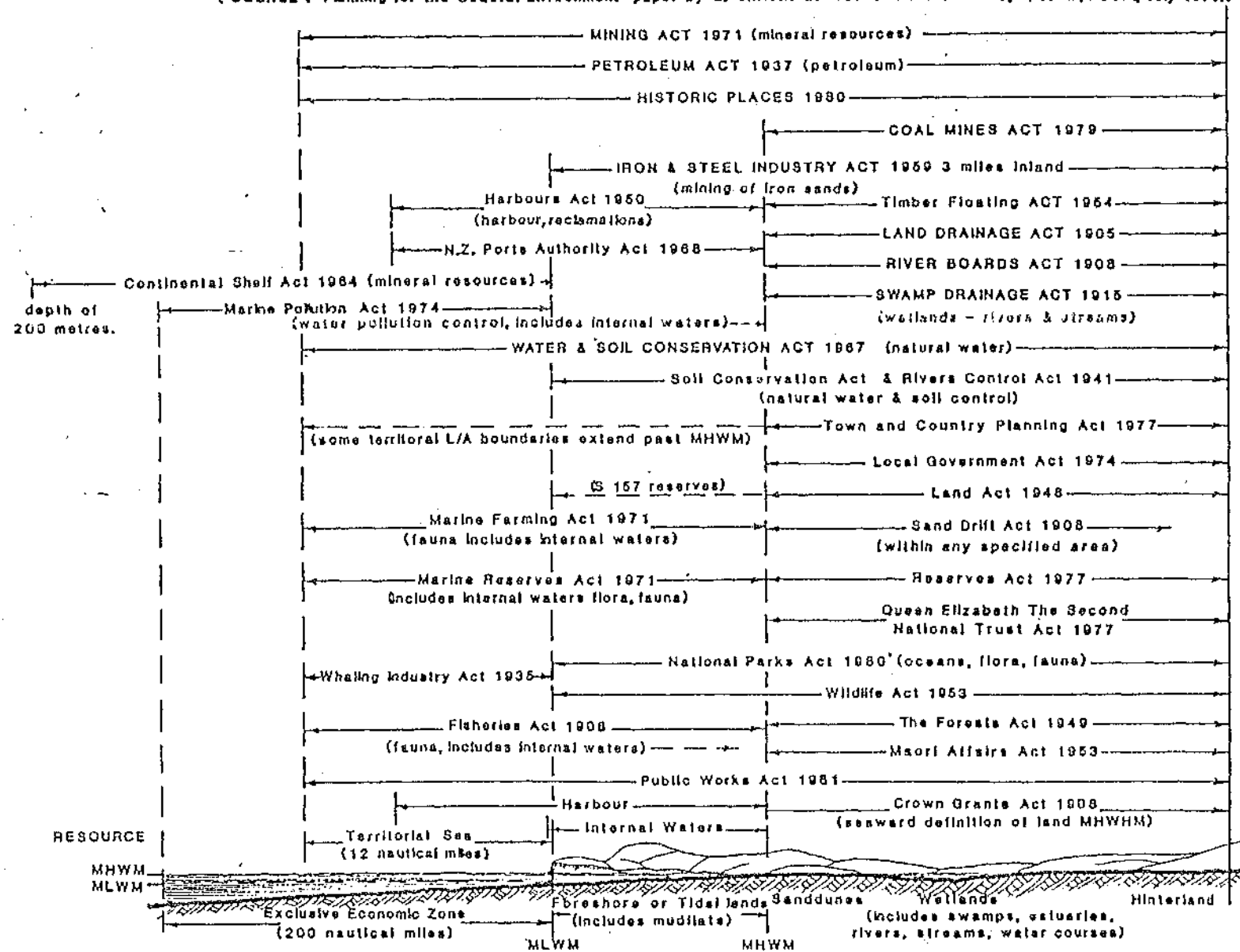
The two primary statutes pertinent to harbours were the Harbours Act 1950 and the Town and Country Planning Act 1953.

The Harbours Act 1950 was the most influential statute directly related to harbour management. It contained provisions for the administration, control and management of foreshores, harbours and the sea bed. The Ministry of Transport was the national supervisory body but the Act made provision for the establishment of harbour boards, with the principal function of operating commercial ports. These locally elected boards occupied a powerful political position on the local scene, with a strong development oriented ethos based on monocultural norms. In addition to their commercial functions, harbour boards were also responsible for regulating other uses of coastal waters and developments affecting the quality of the coastal environment. The dual role of the harbour boards proved to be a major drawback, with commercial aspirations often being in conflict with ecological, recreational, cultural and spiritual values.

The Town and Country Planning legislation, administered by territorial local authorities, was also a significant statute for harbour, management. However, until 1977, its jurisdiction terminated at the edge of land and excluded the adjacent foreshores and harbours. The jurisdictional boundary between harbour boards and territorial local authorities along the land/sea interface also was not clearly defined, giving rise to potential conflicts between the two. Jurisdictional boundaries at the land/sea interface resulted in a artificial fragmentation of decision-making. It was therefore not unusual for a waterfront project to require multiple approvals, adding to the cost of, and delays and frustration in, seeking consents.

TABLE 1.
LEGISLATION AFFECTING COASTAL & MARITIME AREAS

(SOURCE : "Planning for the Coastal Environment" paper by G. Christie at "Between the Tides" Symposium, Nelson, July 1978).

———— MINING ACT 1971 (mineral resources) ————

———— PETROLEUM ACT 1937 (petroleum) ————

———— HISTORIC PLACES 1980 ————

———— COAL MINES ACT 1979 ————

———— IRON & STEEL INDUSTRY ACT 1959 3 miles inland ————
(mining of iron sands)

Harbours Act 1950 ———— Timber Floating ACT 1954 ————
(harbour, reclamations)

————— N.Z. Ports Authority Act 1968 ————— LAND DRAINAGE ACT 1905 ————

———— RIVER BOARDS ACT 1908 ————

———— Continental Shelf Act 1964 (mineral resources) →

———— SWAMP DRAINAGE ACT 1915 ————
(wetlands – rivers & streams)

depth of 200 metres.

————— Marine Pollution Act 1974 ————
(water pollution control, includes internal waters)—+

———— WATER & SOIL CONSERVATION ACT 1967 (natural water) ————

———— Soil Conservation Act & Rivers Control Act 1941 ————
(natural water & soil control)

(some territorial L/A boundaries extend past MHWM) ————Town and Country Planning Act 1977————

———— Local Government Act 1974 ————

(S 157 reserves) ———— Land Act 1948 ————

Marine Farming Act 1971 ———— Sand Drift Act 1908 ————
(fauna includes internal waters) (within any specified area)

————Marine Reserves Act 1971———— ———— Reserves Act 1977 ————
(includes internal waters flora, fauna)

Queen Elizabeth The Second
National Trust Act 1977

————— National Parks Act 1980 (oceans, flora, fauna) —————

←Whaling Industry Act 1935→

———— Wildlife Act 1953 ————

———— Fisheries Act 1908 ———— ———— The Forests Act 1949 ————
(fauna, includes internal waters) — — — ———— Maori Affairs Act 1953 ————

———— Public Works Act 1981 ————

Harbour ———— Crown Grants Act 1908 ————
(seaward definition of land MHWHM)

RESOURCE
———— Territorial Sea ———— Internal Waters ————
(12 nautical miles)

MHWM
MLWM

Exclusive Economic Zone   Foreshore or Tidal lands Sanddunes   Wetlands   Hinterland
(200 nautical miles)   (includes mudflats)   (includes swamps, estuaries,
MLWM   MHWM   rivers, streams, water courses)

During the 1970s, the environmental and Maori groups felt increasingly marginalised by the activities of the territorial local authorities and harbour boards relating to the development and management of harbour resources. Their concerns related to issues such as reclamations, dredging, dumping of tailings, foreshore development, provision of recreational opportunities, harbour access, pollution and recreational and tribal fishing rights. Harbours and estuaries have a particular significance to the Maori. In addition to their spiritual and cultural values, harbour environs provide a source of food. Use and development in and around harbours has led to pollution of Maori fishing and shellfishing areas. The discharge of waste into any water body is unacceptable in the Maori world view for spiritual and cultural reasons. Yet, human sewage effluent is commonly discarded in the vicinity of harbours near many urban areas.

Efforts by successive Local Government Commissions since 1946 to bring about radical reforms in the structure of local government were negated by opposition from local vested interests. Central government did not have the political will to force radical institutional changes in the local government arena.

The Town and Country Planning Act 1977 was the first statute to make a formal provision for harbour planning in conjunction with surrounding land uses. Section 3 of the Act comprised matters of national importance, including the preservation of the natural character of the coastal environment and the margins of lakes and rivers and the protection of them from unnecessary subdivision and development. It made provision for statutory maritime planning of harbour areas by a designated local authority. Maritime planning schemes, comparable to land use planning schemes, could be drawn up for areas of high conflict. A desirable feature of this Act was that a maritime planning authority could impose specific planning controls and was required to abide by its own approved policies. In addition, public participation was a formal requirement. Its major drawback was that the maritime planning areas and schemes were expected to be administered by the harbour boards as designated maritime planning authorities. Thus, land and water planning continued to be separated.

Funding problems and lack of political will meant that few maritime planning authorities were established and these did not prove to be particularly effective.[4] Jurisdictional conflicts occurred between maritime planning authorities, territorial authorities and other government agencies, especially at the land/sea interface. Consents were subject to other statutes and delegated legislation. The designation of harbour boards as maritime planning authorities led to problems when their commercial aspirations were in conflict with the requirement to address other issues associated with harbour and foreshore areas.

The majority of harbour boards, including the Otago Harbour Board, saw little point in becoming maritime planning authorities and expressed a preference for informal management plans. They did not wish to see commercial harbour operations bound by statutory requirements for public notification, objections and appeal.

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[4] Only three maritime planning authorities were established: in Auckland, Wellington and the Marlborough Sounds. These harbours were characterised by complex conflicts between uses.

Management plans were an alternative to statutory planning in areas where the level of conflict in the harbour did not warrant a commitment to statutory planning. Any organisation with a major responsibility for a harbour could initiate the preparation of a management plan which could indicate the policies to be followed for its conservation and development and provide for the coordination of the various activities which occurred there (McCombs & Christie 1980). Any resultant plan could be adopted as policy by the participating bodies with management responsibilities for the harbours, and put into effect through their existing powers. However, management plans had no statutory basis and were therefore reliant on the goodwill and co-operation of all the major actors with a stake in harbour resources. Attempts by the Otago Harbour Board to prepare a harbour management plan in 1983 did not prove fruitful, primarily on account of political opposition within the Board (OHB 1983).

In conclusion, the implicit objective of the Town and Country Planning Act 1977 to provide an integrated framework for coastal planning was not achieved because it dealt with land and water based planning issues separately. While district schemes were required to consider the relationship between water and land use, this was not perceived to be a major consideration in the local government decision making processes. Central government, in its role as the largest developer in New Zealand, was not bound by the Act The absence of a national coastal policy meant that there was no overall context in which to make decisions and resolve conflicts.

6. THE NEW INSTITUTIONAL CONTEXT

The above discussion has identified deficiencies in managing harbours in New Zealand since the advent of European settlement in the 1840s. Radical changes have taken place in the institutional context for harbour management in New Zealand recently. As stated at the beginning of the paper, the central question is the significance of the new institutional context in addressing problems which have proved evasive during the last one hundred and fifty years. We will demonstrate that from the perspective of harbour management the reforms that have been implemented cannot be described as merely symbolic and perpetuating the past practices. Nevertheless, our provisional conclusion is that it would be unrealistic to expect radical improvements in the quality of the harbour environment on account of these reforms.

Environmental restructuring was a major achievement of the fourth Labour government during its tenure of office from 1984 to 1990. But it is important to stress that these reforms have been part of a wider ranging reassessment of the role of governmental intervention in New Zealand society, based on a New Right ideology. In order to appreciate the significance of these reforms for harbour management, it is appropriate to summarise them.

* During the mid-1980s, a series of unprecedented changes took place in New Zealand which have left the once highly protected economy open to deregulated market forces and external competition. Under the aegis of the fourth Labour government, these changes were conceived and executed by a small elite group of politicians, business people and government officials whose primary objective was to increase the competitiveness of the economy in the global economic order. Besides deregulating the production and financial sectors of the economy, these reforms have been comprehensive in scope - including central and local

* From the perspective of harbour management, the central government has a major role under the RMA. National coastal policy statements are optional, with one exception: a New Zealand Coastal Policy Statement (NZCP), prepared and administered by the DoC. The definition of the coast zone in the proposed NZCP is predicated on an integrated approach across the land/sea interface. Central government can also prescribe national environmental standards. These standards could impact on the harbours as they may include matters such as discharge of contaminants. Central government also exercises other functions with respect to harbour management such as the approval of regional coastal plans, calling in of major coastal consent applications, coastal tendering and the approval of restricted coastal activities.

* Regional councils exercise an overarching role in harbour management. They hold the primary control of the use of water, the discharge of contaminants, and land use regulation where the effects are of regional significance. They share the responsibility for the management of the coastal marine area in partnership with the Department of Conservation. These roles are exercised under the RMA by preparing and administering regional policy statements and plans. Regional councils are also responsible for safety and navigation within harbours.

The regional policy statement is an important tool to achieve the objective of sustainable resource management that encompasses the ecological and social inter-relationship between land and water. It is binding on regional plans, regional coastal plans and district plans. Regional coastal plans deal with the coastal marine area but unlike regional policy statements and plans that do not require central government approval, these must be approved by the Minister of Conservation. Regional coastal plans, akin xo district plans for land areas, cover every aspect of coastal management including water, foreshore, seabed and water surface activities but exclude adjacent land areas. A section of a regional coastal plan may be devoted specifically to a harbour.

* Under the Maori Fisheries Act 1989, Taiapuri fisheries may be established to recognise their special significance to a tribe (an *iwi)* or a sub-tribe h*apu),* as a source of food or for spiritual or cultural reasons.

7. OTAGO HARBOUR CASE STUDY

7.1. Patterns of use and management

The Otago harbour is an integral component of the Dunedin urban area and its hinterland. The Maoris, the early sealers and the whalers made use of its sheltered waters. The combination of ship access and land for urban development led to dramatic growth of the port and the surrounding city during the last Century. During the last two decades, the port functions became polarised between the upper and the lower harbour when Port Chalmers was designated as a container port for the South Island (Figure 3). To-day, the harbour is home to numerous water and related land based commercial, industrial, shipping and recreational activities. The harbour provides food gathering grounds for the Maori community based at Otakou. It is also an important wildlife area with the only mainland Royal Albatross colony in the world being located at the head of the harbour, and with significant sea-bird breeding areas. It provides breeding grounds for fur seal colonies and yellow-eyed penguins. Its

government administration, resource management and environmental planning, education and the provision of social services. The dominance of the ideology of the market place, a search for efficiency in the use of resources and the influence of "Treasury have the common hallmarks of these fundamental changes in policy direction. The Resource Management Act 1991 was conceived and enacted within this broad political context.

* The long standing role of the central and the local state as a major developer has teen abandoned. The former central government development bureaucracies had conflicting developmental and environmental protection objectives. For example, the Ministry of Transport combined the control of commercial port operations and foreshore management under a single administrative hierarchy. The commercial functions of central government agencies have been corporatised or privatised. The environmental regulatory functions, with some exceptions, have been devolved to sub-national government

* Three new central government environmental agencies have been created: the Department of Conservation (DoC), the Ministry for the Environment (MfE) and the Parliamentary Commissioner for the Environment (PCE). Their respective functions have significance for harbour management.

DoC is responsible for advocating conservation values in the central government policy making process and managing the national heritage estate. It has a major role in the coastal marine area as the Crown owns *99* percent of the area below the mean high water spring. The responsibility for foreshore and seabed licensing and for harbour safety and navigation has been delegated to regional councils.

The MfE does not have a direct involvement in harbour management but is nevertheless a significant actor. Its major role is to advise the Cabinet on the environmental implications of significant policy issues and to administer the Resource Management Act 1991.

The Office of the Parliamentary Commissioner for the Environment (PCE) is unique in the world. The Commissioner is an environmental ombudsman and a public watch-dog. Her office is outside the executive branch of the government and she reports directly to the Parliament.

* On the local government scene, the number of territorial authorities has been drastically reduced through amalgamation as part of the local government reform process. The new framework comprises district and regional councils. Harbour boards have been abolished as part of the process of local government re-organisation. The' commercial port activities have been assumed by stand alone port companies established under the Port Companies Act 1988. The residual non-commercial functions of these boards- have been transferred to regional councils. These agencies have been given clearer mandates to achieve their objectives.

* The Resource Management Act 1991 (RMA) has consolidated fragmented legislation and its central purpose is based on the principle of sustainability. It provides a framework for integrated harbour management as it embraces all resources (land, air, water and geothermal). The RMA defines a hierarchical, three-iier planning structure, as discussed below.

wildlife resources are the basis for a growing nature tourism industry.

The uses of the harbour have developed in an ad hoc manner during the past one hundred and fifty years. Geographically, instead of being a focus for the city, the harbour has come to be regarded as its backwaters. The rail and road corridor that encircles the harbour has cut it off from the rest of the urban community. Coupled with this, the decline of the older upper harbour as a consequence of containerisation has led to a general decline of the surrounding inner city commercial and related industrial land uses.

"The institutional reforms described in the previous sections have had significant implications for the management of the Otago harbour. Prior to 1989, the land area surrounding the harbour was administered by three, contiguous territorial authorities. The harbour waters were controlled by the Otago Harbour Board and the MoT Marine Division. The Otago Catchment Board and the Otago Regional Water Board also exercised jurisdiction under the Water and Soil legislation and the Coastal-North Otago United Council under the Town and Country Planning Act. Following restructuring, the management of the harbour and its environs is the responsibility of just two local bodies: the ORC and the DCC (in partnership with central government).
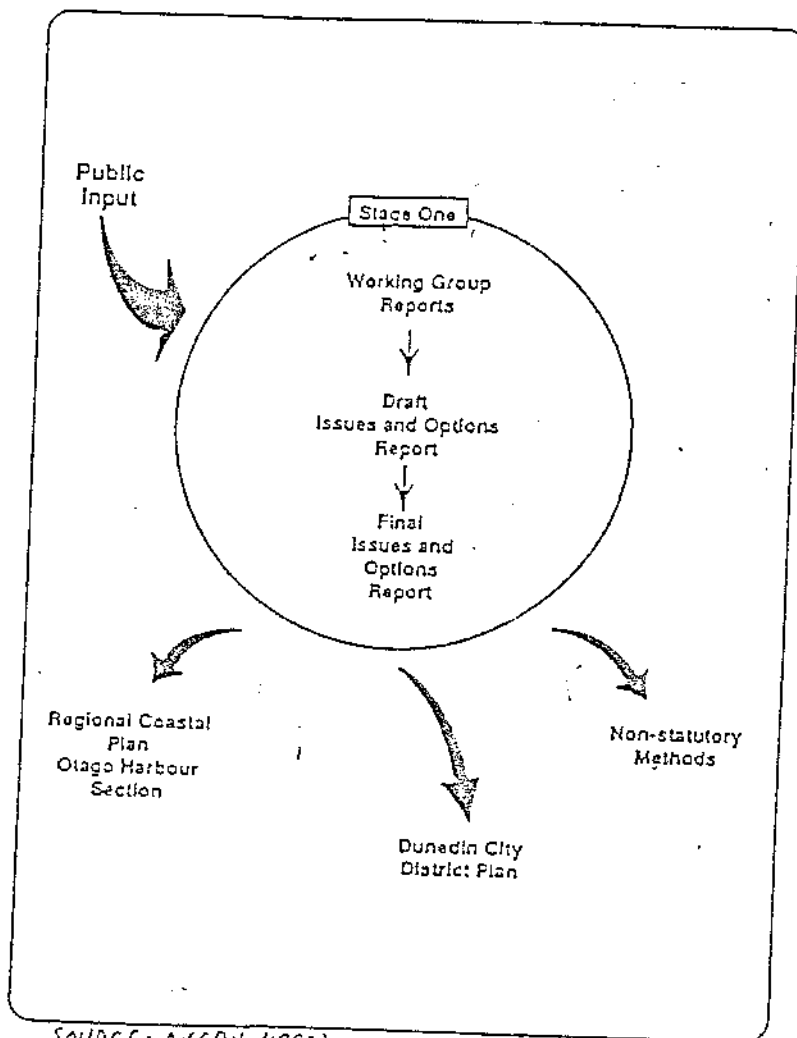
7.2. The harbour planning study

The Otago harbour planning study began as a joint initiative between the two councils in November 1990. Its terms of reference recognised the inter-relationship between the water based and the surrounding land based uses. The need for such a study had long been apparent but the institutional context then precluded it. The proposal was initiated by the council staff in response to public pressure and was accorded a high priority by the elected council members.

The Study was designed as a two stage process (see Figure 4; this graphic was used in the Study's reports): identification of the key issues and the options for addressing' those issues to be followed by implementation in formal plans and "other methods." The first stage was a relatively lengthy exercise, stretched over a period of twenty months and culminated in an Issues and Options Report published in July 1992. It was based on (1) an initial round of public meetings by the Study's manager to determine the broad parameters of interest; (2) an analysis of the available information by six working groups established around major use categories of the harbour; and (3) public submissions reacting to a draft Issues & Options Report circulated in November 1991.
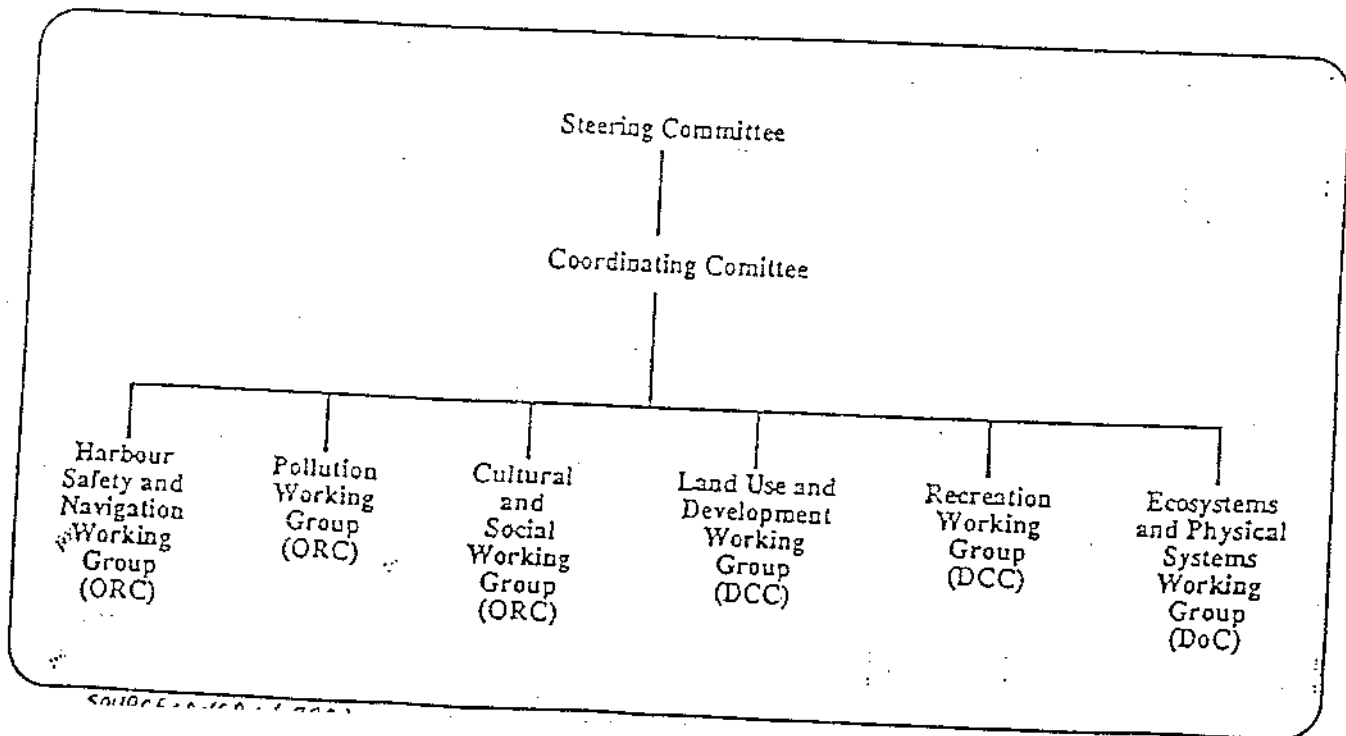
The Study was overseen by a Steering Committee of political leaders from the two councils, and a Technical Coordinating Committee, comprised of the convenors of the working groups. The Study was directed by a senior resource planner at the regional council.

The six working groups were established as conduits for specific information and to identify the most pressing harbour concerns. Each group had an average of six members, and was convened by either the ORC, the DCC or the Department of Conservation (see Figure 5). Membership of the groups was drawn from local governmental bodies (61% of members), individual experts and consultants (14%), academics and researchers (11%), with the remainder (14%) from private sector and nonprofit sector organisations. Interest groups were

Figure 4:   Otago Harbour Planning Study
            Study Process

Steering Committee

Coordinating Comittee

| Harbour Safety and Navigation Working Group (ORC) | Pollution Working Group (ORC) | Cultural and Social Working Group (ORC) | Land Use and Development Working Group (DCC) | Recreation Working Group (DCC) | Ecosystems and Physical Systems Working Group (DoC) |

specifically excluded to prevent the politicisation of the process. The Port Company, as the largest and most influential user of the harbour, was the exception; it had representation in two working groups.

The 170 public submissions received following the issuance of the draft Issues & Options Report was well above expectations. Individuals (75%) greatly outnumbered private/special interest organisations (18%) and governmental bodies (6%) (see Table 2a). Most of the 207 issues raised dealt with uses of the harbour (79%), as shown in Table 2b. Of those, a majority were from Port Chalmers residents opposed to the Port Company's development plans. Mapping the submissions onto the domains of the working groups resulted in 547 issues, and their distribution is shown in Table 2c.

a. Interest Group/Stakeholder Affiliation	167	
- Public/Governmental Organisations	10	6%
- Private/Special Interest Groups	28	18
- Individuals	126	75
b. Issue(s) Raised by Each Submission	207	
- Use of Harbour	164	79%
- Attitudes	10	5
- Technical	26	13
- Institutional	7	3
c. Submission's Applicability to Working Group	547	
- Steering/Technical Coordinating	39	7%
- Ecosystems & Physical Systems	81	15
- Cultural & Social	38	7
- Pollution	107	20
- Recreation	133	24
- Land Use & Development	112	21
- Safety & Navigation	37	7

Table 2. Distribution of Public Submissions to
Draft Issues & Options Report (Selected Items)

On account of its proximity to the container port, the Port Chalmers community is impacted most directly by the externalities generated by the Port Company. Not surprisingly, then, that Port Chalmers residents responded very vocally and hostilely to the draft report. There is some indication from our interviews that the Land Use & Development working group was "captured" by Port Company interests. Some interviewees perceived that a shift in the community's consciousness was occurring, and that it was symbolised in the Study process. They believed that the Port Company still held to the "old way" of thinking of the Harbour purely as a commercial resource, and consequently became the "odd man out" in the

Study process.

The final Study report did not make policy choices. It only highlighted the policy choices relating to the principal issues identified by the working groups — environmental quality, land use pressures, reclamations, access and resource limitations. Stage two of the process, namely implementing the Study findings, is the principal responsibility of the two councils. No time horizons have been set for the implementation of these findings. The Study's director noted that the timing of the release of the final report in July 1992 was unfortunate, for both councils' planning cycles are on a July-June schedule. Hence the final report was unable to be taken into account in their 1992-93 plans. Almost a full year has lapsed before the report's findings could be taken up. Yet already, the two bodies have taken steps to implement some of the findings, as discussed in the next section.

Other outputs of Harbour Study include the setting up of two joint committees by the ORC and the DCC. The first is a joint planning and coordinating committee for information sharing regarding the harbour and urban transportation. The second is a special joint consents committee for development projects that span the land-water boundary.(e.g. a boat shed built on the harbour's edge, with pilings and dock extending into the water).

S. DISCUSSION

In this section we identify themes that emerged from our investigation of the Harbour Study in three areas: its process, its outcomes to date, and prospects for the future. They are tentative conclusions, our first impressions from a preliminary review of the data gathered to date.

8.1. Process

The study was made possible only because of local government reforms in 1989 and the enactment of the Resource Management Act in 1991. The former has reduced the number of territorial local authorities in the Dunedin urban area from six to one, and has created a regional body with overarching responsibility for resource management and clearer responsibilities in other areas. It could be argued that without an organisation such as the ORC, such a study would not have been possible. The *DCC* is too close to the commercial interests of the city to stand back and take a broad and longer-term perspective, and the ORC served these functions. Yet, the DCC's participation in the Study was essential because many of its activities impinge directly on the harbour.

The anticipated enactment of a new integrated environmental planning statute was also instrumental in facilitating this initiative. The RMA demands a holistic approach to resource management. The RMA gives particular prominence to the coastal zone within an encompassing framework of sustainable resource management. But the proof is in the implementation, as discussed in the next section.

The Study provided an opportunity for the ORC to legitimise and consolidate its constituency. The Study was initiated within 18 months of the establishment of the regional council. The regional council's existence was under political pressure at that time, not only

from a new minister of local government, but also from the DCC. The DCC had been strengthened by a massive expansion of its geographic boundaries in the local government reforms. On the other hand, the public's growing concern over the lack or mis-management of the harbour was assuaged by the ORC taking this on as an issue. Local politicians in both councils have caught on to the growing green awareness in the city.

The Study was innovative in several ways and has attracted attention from other localities in New Zealand which are grappling v/ith the local government and resource management reforms. This was the first major joint project of the two councils and was initiated with considerable support by local political leaders and government officials.

The provision for and design of the working group process was innovative. The working groups were not constituted as representative. They included a large component from governmental bodies, some community opinion leaders, but little from other interests. All of the convenors were public officials. That private interest groups other than the Port Company were excluded from the formal Study process had positive and negative consequences. One may validly question whether this exclusion was justified, given that governmental bodies have a certain stake or interest. Environmental and recreational groups, and especially the Port Chalmers community groups felt excluded from the process, and their input was not made until the public consultation stage. The Port Chalmers community was aggrieved about this because it is the community most directly impacted by the port company.

The Land Use and Development working group was a responsibility of the DCC, convened by its development director. The group was widely seen as too close to the Port Company interests. It attempted to resurrect the 1983 harbour plan proposals, which were strongly development oriented. This provoked a strong reaction from other working groups, the steering committee, and the Port Chalmers community. Solidarity prevailed within that group however.

The Study's consultation process with local Maori community was undertaken in a different style, namely by means of a traditional *hui* at the Maori *marae*. The Maori concerns and values were given particular prominence in the final Study report. However the extent to which Maori values and concerns, come to be recognised in the management of the harbour remains to be seen.

8.2. Outcomes

The outcomes of this case study are difficult to judge at this point, because we can only take a snapshot here in the midst of a vague 'Stage Two of the Study. Its outcomes are still very much unfolding. The two Council's are independently elected and need to consider the recommendations of the study in the context of their wider priorities. It will entail balancing the competing and conflicting demands on the harbour resources.

Our preliminary assessment regarding the three change strategies is that there are differences in perceptions amongst interviewees. Most appear to believe that incremental changes in institutional arrangements will result from the Study, and will lead to an improvement in the environmental quality of the harbour. Some felt there was minimal cynicism in the process, but mostly not.

There are two avenues for implementing the recommendations of the Study; formal planning procedures of the two councils, and specific, non-statutory projects; Regarding the former, the two councils are required in the Resource Management Act to negotiate agreements amongst the stakeholders, including residents of the district, regarding desired environmental standards and means for achieving them. This is done by means of a Regional Policy Statement (ORC), a Regional Coastal Plan (ORC), and a District Plan (DCC). The scope of the ORC Regional Policy statement encompasses the harbour and its surrounding land catchment. Hence, it provides the appropriate platform to resolve conflicts. But the draft regional policy statement has not done this.

In fact, concern has been voiced by some interviewees that the Study has not resolved harbour conflicts, but only identified them. But it is important to keep in mind that the Harbour Study was a planning study. Through its innovative techniques for eliciting participation, it has provided a vision for the extended community of what the harbour could be. Yet steps to achieve that vision were not articulated in the Study reports, nor were they intended to do so. These steps will likely occur, in an incremental fashion, dependent on the political will of the two councils to commit resources to harbour projects as part of their annual planning processes. Harbour projects have to compete with other projects. Hence, it is important to note that such an approach has to be seen as part of a longer term planning process.

The two councils have already either initiated or committed themselves to a number of harbour improvement projects: a wastewater project (DCC), a waterfront development study (DCC), a recreational access study (DCC), rationalisation of the harbour's transportation corridor (DCC), and research on environmental processes (ORC). The fact that each council has initiated concrete steps to implement some of the findings of the Study has not prevented scepticism in the aftermath. Similarly the concrete joint projects between the two councils has not prevented each from remaining equivocal regarding the work and wary regarding the intentions of the other.

Thus we must conclude that the Study processes and initial outcomes were to a large extent a predictable response to a new institutional context. It was a useful approach for the ORC, given its relatively weak political_base,' underdeveloped technical capacity, and lack of resources. Perhaps the most important result of the study is that it has focused DCC and ORC attention on the key issues: water quality, recreational access, transportation, lack of scientific information.

8.3. Future prospects

The major issues appear to be:

1. Agreement on responsibilities of DCC and ORC for harbour management. The dividing line between land based and water based responsibilities is still there and recognised in legislation. The Regional Policy Statement is the appropriate vehicle through which to address these concerns in a holistic manner. But the proposed draft policy statement lacks the detail. The difficult decisions to resolve problems and conflicts highlighted in the Study have not yet been made. They are being addressed in an incremental "way by each of the two

councils. It is a very slow process, dependent on political will, with competing priorities and the pressure to keep rates low in both the organisations.

How effective can such an approach be in overcoming the inertia of the last 150 years? Radical institutional restructuring was needed and has occurred, but there is a great overhang of past practices and other institutional arrangements to overcome. "As noted above, implementation often differs from policy intent.

2. An incongruence between the new framework of local government and the structure of regional and district policies and plans in the Resource Management Act. Specifically, the local government reforms view the relationship between local and regional councils as a horizontal partnership. On the other hand the RMA views this relationship in a hierarchical manner. This incongruity is compounded by lack of strong commitment on the part of central government to regional councils (Memon 1993).

As an illustration of the problem, the DCC has demanded that the ORC delegate all responsibility for management of harbour water resources to overcome the long-standing problem of the ambiguous land-water interface. Hence, ORC would be left with residual functions of harbour safety and navigation. But the ORC is not willing at this stage to do this. The recently constituted joint committee for harbour and transportation issues between ORC and DCC is an attempt to cope with this situation.

3. The ORC's ownership of the port company. The DCC wants to share the ownership or receive a share of the profits which can then be invested in harbour projects (e.g the waterfront proposals). The ORC argues that the port company is a regional asset and should benefit the entire Otago region. Its stated position is that the Port Company is a "stand alone commercial enterprise," with its ownership being very hands-off. Others are sceptical about this. The central government's stated policy objective is to privatise the Port Company.

We believe, in conclusion, that many stakeholders are aware of these problems and. there is a strong desire to address them. It is difficult to isolate the precise contribution of the study to this awareness, but it appeared in our interviews, to have had some influence in generating this commitment. Most of the participants interviewed feel that they own the study and voice a commitment to implementing its findings.

9. CONCLUSION

This paper is part of a longer term institutional monitoring study. It has examined the implications of recent institutional reforms for harbour management and reviewed the local and regional response to these reforms in a complex CPR situation in Otago province, New Zealand. From a theoretical perspective, the recent reforms in New Zealand are structurally innovative. We are aware of no other examples of such wide ranging and idealistic environmental policy. But whether this translates into innovative practice, in the form of improved management of important natural resources, remains an open question.

In the Otago Harbour case we have an example of an unfolding issue in environmental policy and management in a new and complex institutional context. It illustrates what can

happen when two important pieces of legislation, with partially compatible policy intents, intersect in the "real world" of a local situation confronting local policy makers and planners, "street level bureaucrats," and entrenched corporate'inteiests. The ORC and to lesser extent DCC used the Study to leam about its uncertain institutional environment; this is consistent with notions of adaptive planning in uncertain environments (Mintzberg 1978). More broadly the two councils learned about each other's culture, operating norms, and strategic contingencies from the process of collaborating on this project. Analysing such cases, can yield important implications for policy development and natural resource planning.

In an important sense, the Otago harbour case is a microcosm of how New Zealand society is changing in its attitudes toward its natural environment. A growing "green consciousness" was noticed in our data collection. It is important to understand these broader cultural shifts in values, for they have implications for the management of other complex CPRs under institutional as well as physical stress.

Our understanding of complex institutional change is not well developed. It involves the (as yet) ill structured processes of (1) assessing individuals' opportunities to learn from the consequences of their actions; and (2) examining how existing institutional arrangements enhance or constrain the ability of individuals and organisations to adjust their patterns of decision and action (Thomson, Feeny & Oakerson 1992). These are the strategies which individuals and organisations use with regard to the resource(s) they share with others

We hope this paper contributes in a small way to a better understanding of these important processes.

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