

DISCUSSION DRAFT

Socio-economic considerations in oceans management: Current Practice and Prospects Circa 2006

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Preface

This note responds to a request for a review of current experience and available precedents that may serve as models in the task of bringing economic, social and cultural considerations more fully into processes of integrated oceans management at the scale of Fisheries and Oceans Canada's (DFO's) Large Ocean Management Areas (LOMAs). Terms of reference were set out in part as follows.

"The paper will, to the extent feasible, summarize briefly, with input from DFO, the current state of the incorporation of socio-economic factors into the implementation of the ecosystem-based management approach within the large oceans management areas (LOMAs). It will define and review (with examples) potential social, cultural and economic considerations in the context of the LOMAs and the IM approach.

The paper will identify with examples (if any exist) how the above procedures could be used in the context of IM approach to develop socioeconomic goals and objectives that could be integrated into the LOMA plans."

Thus, this survey should attempt to understand how the concepts of integrated, precautionary, ecosystem-based management for sustainable development can be implemented in applications at the scale of large ocean management areas, seen as aggregates of integrated coastal areas, in ways that incorporate cultural, social and economic considerations within the definition of the ecosystem—that is, in ways that view humans as part of the ecosystem, and the dynamics of human systems as part of the overall ecosystem dynamics, and provide a basis for integrating concerns for human use effectively within the overall integrated management process.

An independent but complementary review, prepared by Rundi Koppang and Towagh Behr, is being submitted by the Centre for Global Studies at the University of Victoria. That paper contains a scan of relevant literature and other materials, and a list of relevant on-line indicator sets and data sources. It also notes existing domestic (federal, provincial, territorial and regional) and, where relevant, international policies, procedures and materials that relate to the use of social, cultural and economic information as it pertains to integrated management within large marine ecosystems. This present review will rely on that report for documentation of the literature and data sources mentioned here. Bibliographic references will be to that document, referred to hereafter simply as KB.

This report makes no pretense to comprehensive coverage or definitive conclusion; it provides the review requested and sets out some suggestions and questions for further

discussion in moving integrated management structures or processes in present DFO pilot Large Ocean Management Areas toward more comprehensive and more widely-accepted practices, and toward the goal of inclusive and collaborative integrated management set out in Canada's Oceans Strategy.

In the executive summary of the 2002 Policy and Operational Framework for Integrated Management of Estuarine, Coastal and Marine Environments in Canada, the companion volume to Canada's Oceans Strategy, it is said that progress through the IM process is not necessarily linear, but "there is general movement towards a proactive management approach as the process matures." In effect, one might interpret the central question addressed in this present review as asking how planning for integrated management can indeed move toward a more proactive approach and, specifically, an approach that fully takes into account the social as well as the ecological dimensions of the management challenge.

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Part I. CONSIDERATIONS IN INTEGRATED MANAGEMENT—precedents and practice

Section I Introduction

This note responds to a request for a review of current experience and available precedents that may serve as models in the task of bringing economic, social and cultural considerations more fully into processes of integrated oceans management at the scale of Fisheries and Oceans Canada's (DFO's) Large Ocean Management Areas (LOMAs).

Following a brief comment on concepts and terminology, it begins in the subsequent section with a very brief sketch of work to date offering general guidance on the development of conceptual frameworks and formulation of relevant objectives, and identification of suites of indicators bearing on attainment of these objectives. The subsequent section reviews work already completed or in train within DFO with respect to this particular management challenge, and asks how that work might be pushed further toward development of the information base necessary for ongoing operational management. It does so first by addressing directly the data needs associated with the conceptual frameworks already developed to set out management concerns and considerations related to human use of oceans and human dimensions of the overall management task, and subsequently by identifying potential models developed in other settings.

Part II of this review suggests that the work to date has now reached a stage where further progress will hinge on initiating a broader discussion process, in which the formulation of management objectives and approaches, and development of relevant indicator sets, will be opened up to more inclusive review not just among federal agencies concerned, but with other governments, stakeholders and community groups participating fully. The model of the Land and Coastal Resource Management Planning Process (LCRMP) in British Columbia, particularly on the Central and North Coast, will be taken as an illustrative example for this purpose.

Important contextual background is set out in a series of appendices, emphasizing the diversity and evolving character of the perspectives brought to bear by the various actors participating in or concerned with these management processes.

Because perspectives on these topics do diverge substantially, it will be useful to pick up a few preliminary remarks before moving to the specific frameworks and approaches developed for integrated management of large marine ecosystems.

Shifting emphasis

Historically, for two or three decades leading up to the Earth Summit in Rio in 1992, government agencies regulating fisheries and oceans activities were urged to recognize the importance of the environmental setting in which such activities occur, and the risks to essential but vulnerable features of that setting from uncontrolled activities. The work of that conference and commitments in Agenda 21 set out serious undertakings by governments and other institutions with respect to the need for sustainable development

and different ways of doing things. Covenants entrenched summaries of prior work on concepts such as the precautionary approach, intergenerational equity, the importance of ecosystem integrity. The concept of strong sustainability, which identifies some forms of natural capital as essential and irreplaceable, led to articulation of a number of decision-making structures in which the need to protect vulnerable components of essential ecosystem gives rise to immutable constraints on some activities, and heavy weight to ecological impacts reshaping priorities in others.

At the same time, countervailing concerns have been articulated. For years, even prior to the passage of the Oceans Act in which these emphases on ecological integrity noted above are admirably captured, DFO has been advised, counseled, exhorted and harangued by industry stakeholders, academics, civil society organizations and community activists to do a better job of bringing socio-economic considerations into decisions on fisheries management and the regulation of the many other, often-conflicting activities taking place within oceans ecosystems. These concerns themselves do not reflect a consistent position. Voices of industry and associated economic theory press hard on the current economic benefits to be achieved from more active development of (usually) large-scale activities within conventional market frameworks and economic criteria. This is the economic side of the socio-economic lobby. Other academic voices, civil society and community participants focus on social and cultural concerns that are often at odds with the economic pressures, and indeed—being often small-scale and traditional in orientation—are more often seen as consistent with concerns for ecological integrity.

This latter flow of advice continues, particularly forcefully now in counsel from the Ocean Management Research Network conferences and workshops. (The emphasis on conventional economic objectives emphasizing payroll and profits is usually seen as more than adequately represented already in the wide range of opportunities—both formal and informal—for lobbying and consultation with industry on the promotion and development of the oceans economy.) So one version of the question for this paper is to suggest more clearly how it might be possible to respond positively and proactively to all this urging of greater attention to social, cultural, historical and traditional considerations, in the current context.

This review explores how frameworks for integrated management at the scale of Large Ocean Management Areas (LOMAs) might be amended or created in order to respond constructively to all this advice. Little evidence is identified to suggest that any practical response can be found within formal numerical frameworks or monitoring systems, however. So the review goes on to explore how experience with more general approaches to integrated management planning in other sectors might be brought to bear in support of DFO's efforts to facilitate ongoing and inclusive collaborative processes well adapted to the particular circumstances of particular ocean management areas.

The conclusion is that there will remain continuing fundamental tensions, ethical at root, that will not be resolved through better numbers or better science—though both will be of critical importance—but will remain as unresolved tensions to be accommodated through continuing deliberative processes of agonistic democracy, swinging from greater

attention to one fundamental value and back to another, but at no time ignoring any altogether, at all times aiming to maintain the commitment and loyalty of all to the underlying procedural assurances.

Against this general backdrop we have to confront some very practical challenges. One such challenge arises with respect to the very idea of objectives-based management, that is, the sense that any rational, evidence-based process should begin from some clear understanding of management objectives—that objectives-oriented management is essential. But it is important to remember that in the forty years over which the idea of objectives-oriented management has been pursued within the federal government, two fundamental problems have been pervasive. While it is clear that the ultimate objective of improved wellbeing (for Canadians, or for humanity) has to be worked back through a descending hierarchy of increasingly specific and operational objectives, it has rarely been possible to connect these ultimate objectives or long-term outcomes with observable and operational outputs relevant to the activities and inputs that management decisions may control. The first big problem is that complete suites of indicators for this purpose are rarely available. The second big problem is that where they are, the challenge of connecting observed changes in indicator values with prior (causal) management actions cannot be overcome. That is, there is rarely any plausible logic model by which a causal connection between management decisions and anticipated outcomes can be identified, so there is rarely an evidence base for outcomes-focused management decisions.

The recent survey of international experience by Walmsley for the ESSIM Secretariat (Walmsley, 2005) persuasively documents the absence of encouraging progress towards empirical foundations for objectives-oriented management in oceans areas.

In the face of this extended record, it is important to view the task of developing institutions for oceans management as one going beyond a search for analytical or conceptual frameworks and associated numbers, and moving into procedures for drawing on partial and limited information for use in more broadly based adaptive management structures taking fully into account the uncertainty inherent in the systems in which intervention is contemplated, and our substantial ignorance of the dynamics that drive them.

In a sense, then, the task of this paper is to review not just where work in DFO now stands and might be moved forward in terms of assembling relevant data and information, but also to consider how other groups in different but comparable settings have addressed this larger general problem just described above.

What is involved in integrated management?

For purposes of this paper, we will take it that the ongoing daily task of integrated management is to assess and decide upon proposals for new activities or facilities in the management area (as defined by ecosystem considerations), to approve requested new tenures, and to develop from time to time harvest plans for particular resources, on the basis of some adaptive management approach. The decisions on these questions have to be taken by some designated body to which authority has been delegated by agreement or

under existing jurisdictional arrangements. Such decisions will presumably be made by this body by referring to a chart or map to see what agreed rules apply in the specific area involved, and what guidelines or procedures manuals have been developed for making such decisions. (Such a guidebook might set out the procedure for a socio-economic impact assessment, for example, or some other optimization process for selecting among preferred alternative projects or forms of projects.) Or presumably such decisions could be made on an ongoing basis, even without complete or definitive quantitative analysis, simply through deliberation in some duly constituted multi-party board or consultative body.

So then one has to ask the next layer of questions. How is the map describing what rules apply in each region to be established? How are those rules developed; from where do the appropriate procedures manuals come? Presumably a plan (a map together with the different rules that apply for each activity in each region) will be established as a result of continuing deliberation in some appropriate multi-party table representing the various interests associated with all the potentially conflicting human uses of the ocean area or the marine resources it supports. Presumably such a plan would have to be a rolling plan, reflecting the need for adaptation to changing conditions as well as the information coming from the monitoring of current activities. Presumably therefore decisions on adaptation of the map or the rules would flow from some continuing process of deliberation within this multi-stakeholder table, supported by reporting on indicators of achievement of agreed objectives. Such continuing deliberation would lead to decisions in light of the estimated consequences (potential economic benefits and social or cultural impacts, as assessed by the participants around the table, associated with a modified map or modified decision rules (that is, associated with some proposed change in the plan). The operational manifestation of the plan would be the procedures manual setting out objectives, indicators and decision criteria or decision processes.

But this leads to the question as to who is to form the deliberative forum or consultative table that will decide on the map and the rules. Presumably this decision will flow from intergovernmental negotiations in light of respective responsibilities as well as goals of effective governance through subsidiarity and devolution of authority. The now-common dictum that governance of common pool resources and uncertain ecosystems should be achieved through institutions whose reach matches as closely as possible the scale of the ecosystem concerned might be definitive here. But still at this scale the consideration of adaptive design of the nested institutional structures appropriate to ecosystem governance and the regulation of human activities affecting common pool resource systems will argue for the goal of adaptive governance, with institutional designs themselves viewed as experiments and pilot projects open to modification and evolution in light of greater understanding or changing circumstances. Dietz, Ostrom and Stern (*Science*, December 2003) argue that “Devising ways to sustain the earth’s ability to support diverse life, including a reasonable quality of life for humans, involves making tough decisions under uncertainty, complexity and substantial biophysical constraints as well as conflicting human values and interests. Devising effective governance systems is akin to a coevolutionary race. A set of rules crafted to fit one set of socioecological conditions can erode as social, economic and technological developments increase the potential for

human damage to ecosystems and even to the biosphere itself. Furthermore, humans devise ways of evading governance rules. *Thus, successful commons governance requires that rules evolve.* (emphasis added)”

In the balance of this report we try to focus on the socio-economic objectives that might be considered at an intergovernmental level, and the indicators and criteria that might lead to practical operational use in the ongoing management context. But in the end we are forced back, in practice as well as in theory, to a more procedural orientation. A concluding section suggests that an effective process must be less numerical and more deliberative than much of the literature reviewed here suggests, and leaves with a few questions about possible governance structures.

Section II Ideas and Concepts

Integrated management is expected to span five or six different aspects of ecosystem function. (Appendix A develops some terminology and conceptual background in more detail.)

Ecological considerations have been extensively explored in the wide range of literature offering accounts of natural capital and the importance of ecological services. The Environment and Sustainable Development Initiative of the National Roundtable on Environment and Economy is an obvious starting point. The work of Tony Charles with GPI Atlantic offers an extensive review emphasizing fisheries. The Millennium Ecosystem Assessment initiative provides another massive example. Exploring this literature is beyond the scope of this review of social and economic dimensions, and in any case this aspect of the DFO work on integrated management is already very highly developed in the preparation of ecosystem overviews and ecosystem assessment reports.

Economic considerations as seen by the proponent of development projects or commercial activities involving oceans or marine resources are normally well developed as part of financial due diligence and corporate responsibilities to shareholders. But even at the level of conventional economic analysis, it is necessary also to examine costs and benefits as estimated from the perspective of a region, province, nation or globe as the appropriate accounting unit a cost-benefit analysis directed toward determining the net contribution of proposed human uses.

Other more general considerations can also be viewed as broadly economic. Concern with the distribution of income and wealth, with the sustainability of livelihoods or the sustained economic viability of communities are central in assessing whether decisions within integrated management plans meet the requirement of equitable outcomes flagged in the introduction to this report. In some cases data bearing on these considerations can be obtained, but of course they can not usually be brought within a coherent framework as monetary flow data can be. Questions of property rights, access rights or management rights, or out-migration from communities pose even greater difficulties. The special economic problems of the populations in remote communities who will make up the most significant human component of existing LOMAs must be noted.

Broader social considerations are increasingly under study. The importance of trust and social capital as community assets with significant economic significance in production is one facet. The functioning of social networks in management settings and as a force for compliance with agreed management plans or regulations has recently been emphasized. The crucial importance of social networks as a determinant of the degree of resilience communities may display in the face of natural or social shocks is an important current research issue and relevant consideration in integrated management. (See for example the reports on the resilient communities project at www.resilientcommunities.ca) Compliance as major issue, social impacts as key determinant (Jentoft).

Cultural considerations also enter into perceptions both of individual health and wellbeing and community health. Impacts of management decisions on opportunities to pursue a traditional way of life or earn incomes (money incomes or subsistence livings) are obviously significant. In some cases traditional use studies that have been undertaken by many First Nations may permit their representatives to bring into discussion of integrated management decisions data on possible impacts on traditional harvesting activities or areas of special cultural significance. Similar concerns may arise with heritage features or historical traditions in other small communities. Section 4 of the Koppang-Behr scan documents some of the detailed concerns introduced in land use planning in BC over the past decade.

Many attempts have been made in a variety of ways to bring these diverse considerations into some framework permitting orderly discussion if not fully comparable monetary tradeoffs. In circumstances where data permit, traditional cost benefit analysis or the extended procedures labeled social cost benefit analysis can be attempted. Where uncertainties are substantial, procedures for risk-benefit analysis can be found. And a wide range of guidebooks spelling out procedures for socio-economic impact assessments have tried to bring into the human use side of the work the settled approach of environmental assessment. But rarely are the data or the information sources adequate to the task of supporting consistent analytical or quasi-analytical methods for balancing all these considerations against each other in the assessment of proposals for changes in the portfolio of human uses of marine resources or human activities within the ecosystem. Even more rarely does the analysis of management decisions seem able to balance some of the ecological objectives expressed in probabilistic terms as reference points or limits against economic, social or cultural impacts.

One approach proposed for use in balancing contending objectives or values in this sort of situation is the development of a Multiple Accounts Framework, in which separate technical, economic, social and possibly cultural accounts are developed in order to array the full set of values relevant to a management decision. A brief outline of a Multiple Accounts Analysis directed toward sustainability concerns in mining applications can be found at http://www.robertsongeoconsultants.com/papers/MAA_SME_2004.pdf . The difficult step in this work, however, comes at the point where one attempts to move from looking at all the relevant considerations to weighing them against one another. The important distinction between a Multiple Accounts Framework as a display and Multiple Accounts Analysis as a computational procedure leading to a sense of a management

decision supported by analysis must be emphasized. The former may often be helpful; experience seems to suggest that the latter is probably an illusion except in the case of specific, concrete individual project proposals. An example in application to study of a proposed Marine Protected Area in the Beaufort Sea is noted in the Koppang-Behr scan, at pp 14,15.

A crucial consideration here is a simple-minded and well-known idea with a fancy label. The concept of EVPI (expected value of perfect information) drawn from the literature on decision theory points out that there is no point in intense work on extensive data that will not affect decisions (just as there is no point in precise refinement of exact numbers for one portion of an analysis in which the remainder is rough thumbnail guesses). Stafford Beer has said “Information is what changes us.”—no change, no info: just numbers. Kenneth Boulding reminds us that when your task is to move a large pile of earth, the instrument of choice is a backhoe, not a scalpel. The simple point is that as work is done to build up an information base for purposes of decision support, it is important to ensure that it is relevant to the decisions that actually will have to be faced, and responsive to the priorities of the parties or policy-makers concerned. Decisions on what information warrants the necessary investment—or what degree of analytical work and precision will be useful—probably have to be made in the circumstances of particular places.

So below we go on simply to some illustrative examples: what kinds of variables are proposed for notice, what data are brought to bear, what sources can be expanded?

In this respect, it is interesting to recall an encyclopedic volume on fisheries management reflecting experience within DFO (Parsons, L.S.. 1993. *Management of Marine Fisheries in Canada* (Canadian Bulletin of Fisheries and Aquatic Science, no. 225): Ottawa, National Research Council of Canada).

This work from 15 years ago sets out a starting point for much of the work on socio-economics, beginning with a quotation from Minister Romeo LeBlanc 20 years earlier than that (October 22, 1974): “When we think of optimum biological yield and optimum economic yield, we must consider also optimum social yield. That is, how can we best satisfy and serve the most people?...When fish are counted, it’s people that count.”

This quotation is useful in two respects (beyond its very interesting anticipation of the three-legged stool of sustainable development, or the triple bottom line). First, it expresses the need for integrated management. Second, it distinguishes the usual economic objectives from the social in a way that emphasizes the necessity to understand ‘socio-economic considerations’ as distinct from the conventional formal economic measures. Corporate production and sectoral employment numbers as they appear in the national accounts fall under the latter heading; incomes from inshore fishing as they appear in the poverty statistics are associated more closely with the former label. Social coherence is even more difficult to capture in debate over management priorities.

Section 2 of the Koppang-Behr companion report sets out an illustrative set of lists of objectives and indicators proposed in connection with the above social and cultural

considerations, and Section 3 of KB provides an illustrative example attempting to link such indicators (in general terms only) to possible data sources.

Section III Emerging Practice on Socio-Economic Indicators

In this section we trace the specific approaches to socio-economic indicators as developed in the LOMA and MPA work described in the previous section, including the conclusions flowing from a number of workshops on the subject. But it is perhaps useful first to go back to an earlier discussion, in the Parsons book mentioned above.

Background

Chapter 14 of that book talks about the social dimension, beginning with the LeBlanc quote above, and moving immediately to consider “community dependence”, noting “These fisheries communities were established because of the fisheries. They are part of the nation’s social and cultural heritage. It is understandable that their inhabitants and governments are concerned about the welfare and preservation of these communities.”

This language suggests some of the objectives that might be included under ‘socio-economic considerations’ and the indicators or measures of the shortfall below achievement of such objectives. Indicators suggested by a reading of the Parsons text include the populations of small fishing communities, and the number of fish plants (or other fisheries related activities), associated incomes (employment and transfer incomes, income distribution) and organizational features (corporate, union, community-based, cooperative...).

The important feature in starting with the Parsons description is to recognize that the tensions between concern for the economic (industrial, large, offshore, working for shareholder interest in formal market structures) fishery and the social (small, inshore, community-based, dependent on social networks) fishery is long standing. From a view of fisheries policy as concerned primarily with the economic use of an ‘inexhaustible’ or at least in practice renewable, resource, to a view concerned with the biology and survival of that resource was one wave; from the concern with these two facets to the objectives of the social fishery has obviously been a second wave, but also a continuing tension as well. The press for ‘socio-economic indicators’ is evidently not a new initiative for social sciences, but a continuation in new language of the old tensions.

The point of course is that to introduce the new terminology of integrated management and cast the discussion in terms of systems models and objectives-based management does little to erase these underlying tensions and historical associations rooted in the realities of community life.

Nevertheless, the continuing search for a stronger information base and evidentiary foundations for management discussions is crucial. The attempt to identify socio-economic objectives and develop associated operational indicators for use in ecosystem-based approaches to integrated management of human activities in large marine

ecosystems has been ongoing for some time, pursuing a number of paths in different settings.

Workshops on indicator development

In particular, a 2001 “Dunsmuir Workshop” (Jamieson, G.S. et al. 2001. Proceedings of the National Workshop on Objectives and Indicators for Ecosystem-based Management. Sidney, B.C. Proc. Ser. 2001/09) launched discussion of the development of objectives and indicators necessary to pursue the goals of integrated management implicit in the Oceans Act itself, and articulated in the Canadian Oceans Strategy. This workshop was closely followed by an Ottawa Workshop 29 April-1 May, 2002 on The Role of Indicators in Integrated Coastal and Oceans Management (as well as by similar sessions directed toward the Central Coast IMA in BC, and the ESSIM initiative on the Atlantic Coast, to which reference is noted in Appendix B.)

In the 2002 Ottawa workshop DFO partnered with the US National Ocean and Atmosphere Administration (NOAA), the Intergovernmental Oceanographic Commission (IOC) and the University of Delaware to launch a three year program to develop an appropriate indicators framework. Conclusions from that discussion were reported in a special issue of *Oceans and Coastal Management*, Volume 46, 2003.

A couple of the recommendations reported by Stefan Bellefiore at the end of the editorial leading off that issue are worth repeating here.

“It is important for ICM programs to adopt objective-based, measurable outcome evaluations, defining environmental and socioeconomic goals and establishing baselines against which to measure the impact of ICM initiatives...”

“Indicators should be user-led and coastal stakeholders should be involved in the process of selection and development of indicators from the beginning. In most cases, given the potential high cost associated with the development of complex indicators, it would be preferable to make the best use of existing information derived from different types of programs. On this basis, an enhanced report on the state of the environment and development of the coastal zone could provide an occasion for collaboration between sub national and national levels for the achievement of shared objectives.”

In 2003, this stream of work led to publication of IOC Manual and Guide 45, *The Reference Guide on the Use of Indicators for Integrated Coastal Management*.

The work was pursued in a joint IOC-UNESCO preparatory workshop held in Paris in mid-July, 2005, and a subsequent review of progress in a further workshop in Paris in late- January 2006. At the former meeting, a report on “Ecosystem and Human Use Objectives in the ESSIM Plan” was presented. This report noted the need to condense a long list of 63 indicators in order to develop a small package of core indicators. At the latter workshop, a report by Stefan Bellefiore on ‘lessons learned’ endorsed the ESSIM work and echoed the need to develop a small set of core indicators.

Progress was reviewed also in presentations by DFO participants at The Oceans Policy Summit (11-13 October 2005) in Lisbon and the Global Forum on Oceans, Coasts and Islands (23-27 January 2006) in Paris.

Ecosystem overviews and ecosystem assessments

Based in part on this continuing work, two initial ecosystem overviews and (partial) integrated assessments were prepared (ESSIM and GOSLIM) and reviewed in a meeting in Moncton (Jan 17-21, 2005). On the basis of that review, guidelines on evaluating ecosystem overviews and assessments were prepared and circulated as Canadian Science Advisory Secretariat Science Advisory Report 2005/026, dated August, 2005.

With respect to socio-economic considerations, this document notes “In addition to the information on the natural ecosystem, the Ecosystem Overview should report the current status, recent trends and expected developments in the near future for the major human activities which affect the ecosystem. These may include land-based activities which are the source of freshwater inputs, nutrients, or contaminants, as well as activities in the ocean....It should also convey the magnitude of inherent variability...what is not known about the ecosystem...to make clear ... the level of conclusion about trends and possible impacts that can be supported from the information which is available on the various ecosystem components.” (pp5, 6).

In respect of the ecosystem assessment, the document suggests that the assessment of the potential impacts of human activities on the ecosystem “is the starting point for integrated management and planning...should consider both the direct and indirect impacts...should make clear the types and magnitudes of the uncertainties associated with these potential impacts...should differentiate among lack of knowledge, need to infer local conditions and impacts from studies elsewhere, and inherent variation in the way human activities may affect the ecosystem components.”

One concluding observation from this report is worth noting in particular. “Technology is nearly ready, in fact, for at least the Ecosystem Overview to become a living electronic document, with the status and trends of various ecosystem components updated as rapidly as new information becomes available....The assessment step is particularly important to repeat periodically, in a comprehensive manner, and to report out in a new document.” Evidently, in a situation demanding adaptive management responsive to ongoing change in an uncertain ecosystem, structuring decisions within a rolling plan, an evergreen understanding, revisited periodically, is the only option.

Walmsley, in Oceans and Coastal Management Report 2005-09, dated November 2005, provides the fullest and most effective summary so far available of attempts to develop objective/indicator structures for socio-economic aspects of human use of marine resources. Table 2 sets out the present structure developed for ESSIM through an extensive consultation process. Table 11 sets out a structure developed by the international cooperative partnership in which NOAA and DFO worked with the Intergovernmental Oceanographic Commission to provide a set of guidelines. (Table 14

of the Walmsley report illustrates a different approach related to marine protected areas, and Table 16 provides a comparative summary.)

Unfortunately, as that report notes, there is nothing in international experience to take us beyond the general discussion of frameworks and indicators completed to date. The link to implementation through accessible and operational indicators has yet to be made.

At the OMRN 2005 National Conference in Ottawa, the challenge of developing socio-economic indicators was the subject of several workshop discussions, and subsequently at a 'brainstorming workshop' organized in Ottawa January 12-12, 2006. Philosophical, analytical and procedural questions were identified, along with promising directions for further work, but no concrete illustrations of appropriate suites of indicators were developed or discussed.

From the review of DFO thinking and guidance set out in Appendix B, some conclusions can be drawn in summary form here.

First, there are three general formats in which the search for socio-economic indicators has so far been brought down to concrete form. In the first general format, illustrated for example by the massive Millennium Ecosystem Assessment initiative, there are a few aspects of human wellbeing identified, and linked to ecosystem function. Of these, not all appear open to any practical measurement procedure. More concretely, four or five general pillars have been identified in some of the work undertaken to date in Canada.

In a different format, conventional practice has been to look at commercial sectors in which human use of ocean resources has occurred. Such an approach corresponds most directly with interest in the 'ocean economy' (see DFO Statistics Service publication, updated to 2000). This format has been used, for example, in the socio-economic evaluations undertaken in assessing alternative locations for a Marine Protected Area in the Beaufort Sea, as well as several of the other examples cited in the reference list.

Tony Charles (2002) has suggested a more ambitious agenda in the development of socio-economic indicators, arising out of the focus on resilience. "On the human side, the socioeconomic system and coastal communities must be able to 'bounce back' from dramatic changes in the natural resource base or in the overall economic system. Socioeconomic and community resilience may require attention to such indicators as debt levels, diversification of total fishery landings across multiple species, access of individual fishers to multiple fisheries, diverse age structure among fishers, economic diversification within the fishery, and community-level economic development initiatives that expand diversity and reduce reliance on a single industry."

It is important here, however, to maintain the emphasis on the development of indicators for management purposes, as distinct from either socio-economic research priority topics or social and environmental reporting. With the goal of reporting on the current state of the system, or measuring progress toward sustainability, the agenda outlined by Charles

is obviously appropriate. For management purposes, one needs a tighter logic model, a framework that more tightly links management action to the indicators that measure the consequences of that management action, and thus offers the possibility of discriminating among more or less desirable management actions.

Although this work represents considerable progress in the search for a usable set of indicators, there remains, obviously, considerable challenge in translating these general ideas into work on the ground that will be accepted by stakeholders and communities as a legitimate representation of the management concerns of most relevance and greatest priority for those participants.

And perhaps it is important to emphasize that when science meets politics—or perhaps better phrased, when science meets democracy—in this way, this is not a bad thing for either. Cast in those terms, we see the aspirations of those concerned with the characteristics of communities and the survival of ways of life as quite as fundamental as—perhaps more so than—the accounting reports of corporate entities. Introducing the language of human capital, social capital, natural capital, cultural capital, institutional capital, intellectual capital (as distinct from intellectual property) is perhaps one way to bring the older tensions into more commensurate form to achieve a more balanced discussion. But it does not provide magic solutions to those continuing tensions.

Two major conceptual questions therefore seem to emerge from this review.

1. Is it possible to maintain the ecological considerations and the human use considerations in two independent parallel streams of discussion until they come together in an integrated management process? Presumably not; the interdependence is too great. The level of acceptable risk to the achievement of any one objective cannot be established in isolation. So for practical purposes, how can the fully integrated discussion be structured?
2. Given the inability to develop comprehensive sets of indicators meaningful for management purposes, can the discussion of human use and the impacts of alternative plans on socio-cultural objectives be undertaken without full consideration of stakeholder perspectives and preferences through integral involvement of relevant stakeholders in an inclusive participatory process? If not, how is such a continuing program of participatory integrated assessment to be managed within existing resource and time constraints?

For some guidance with respect to this practical challenge, we might turn to the experience of others pursuing similar goals of sustainable development through more comprehensive management. Though the settings are different, and arguably considerably less challenging in the scope of the integrated management required, there may be useful lessons to be garnered, if not direct precedents from which to work. We turn to that question in Sections V and VI; before doing so it will be useful to review very briefly the present state of work in DFO on integrated management at LOMA scale (so far as this can be discerned by an outsider [this is a section on which further revision by DFO experts would be desirable]).

Section IV LOMAs, MPAs and related planning—current status—brief summary

For the local scale flow, much of the current body of ideas comes from experience with multi-stakeholder processes, joint harvest agreements, coastal zone management initiatives; some of these now need to extend out from near-shore. At the other scale, theoretically informed work on LOMAs may now need to move in toward more challenging tasks arising in denser settlements with more intensely developed activities experiencing increasing interaction.

So far as one can tell from the outside, work on integrated management at LOMA scale has proceeded in different ways and arrived at different stages in the five current management areas. In the differing circumstances of designated Large Ocean Management Areas, and with the different evolution of each, there are very different settings in which to consider the question of the next steps required to move toward integrated management in each. In particular, very different degrees of documentation of work on human dimensions are readily accessible from outside the federal government.

a) Placentia Bay and the Grand Banks

In the Oceans Action Plan, Placentia Bay and the Grand Banks is one of five priority areas marked out for development of integrated management. In the initial phase of the Plan, the focus was on Placentia Bay as the prime site for oceans technology projects, and the creation of a technology development platform, with formation of a new local planning committee and a technology advisory Council. On March 20, 2006, Oceans Action Plan participation in the SmartBay demonstration project was announced (with funding of \$2million), with the project engineering to be led by the Canadian Centre for Marine Communications at the Marine Institute at Memorial University. On the Grand Banks, phase I was to see development of a science and management framework for ecosystem-based management.

b) Beaufort Sea Integrated Management Planning Initiative

No specific initiative for Phase I of the Oceans Action Plan is spelled out for BSIMPI, but the major challenge in the area is likely to be the tension between oil and gas development and concerns for ocean health. Major emphasis in the work to date seems to have been placed on the study of a possible Marine Protected Area. Both a socio-economic impact study and a Multiple Accounts Analysis are accessible, in which the features of human use emphasized are the standard sectors for commercial or recreational use of ocean resources. See the attached tables drawn from the impact study and MAA respectively.

Because management of activities in the area is undertaken through existing co-management or joint harvesting agreements, consideration of social and cultural impacts is probably extensive, but not documented (at least in a manner easily accessible from outside). Henley (2000) and Berkes, Fast et al (2005) discuss the challenges of integrated management in this setting.

c) Gulf of St. Lawrence Integrated Management Area (GOSLIM)

A short draft management plan has recently been released for this area, with identification of a limited number of indicators of human use. An interesting feature of this area is the overlap with the Gulf of St. Lawrence-Saguenay Park

d) Pacific North Coast Integrated Management Area

In the Canadian Oceans Strategy, the Central Coast Integrated Management Area was highlighted, and considerable work was undertaken on the question of indicators for management purposes (including indicators related to economic, social and cultural considerations) as well on the science underlying the boundaries of the management area. By the time of the Oceans Action Plan, emphasis appears to have shifted toward a larger management area, the Pacific North Coast Integrated Management Area, defined in light of ecological considerations. This area includes the Central Coast area but extends the northern boundary to the international border with Alaska. It also embraces the coastal portion of the Central and North Coast areas in which British Columbia has been pursuing land and resource management consultations for over a decade, and in which a historic agreement has now been reached in what is now referred to as the Great Bear Rainforest. This example of attempts to deal comprehensively with human dimensions of ecosystem activity in an integrated framework will figure centrally later in this review.

e) Eastern Scotian Shelf Integrated Management Area

The ESSIM work was characterized in the OAP as the ‘most mature’ of the integrated management initiatives in Canada (and indeed it seems to be as fully developed as any of the few other comparable initiatives in the world). Emphasis in phase I of the OAP is to be on implementing new governance arrangements, concluding agreement on a draft plan, and implementing that plan.

To date the conceptual framework, structure of objectives and suite of indicators developed for the discussion draft of the ESSIM Plan for 2006-2011 is as explicit and concrete a management structure as can be found. The ESSIM initiative has moved as far as any application in oceans areas to develop a full set of measurable indicators that might be used as a basis for monitoring and managing human activities in marine areas, and reporting on consequences. With the full draft plan available for consultation purposes over the past year, and with the very full background and links accessible at the website at <http://www.mar.dfo-mpo.gc.ca/oceans/e/essim/essim-background-e.html> there is no purpose served by substantial repetition here.

The challenge remains to find ways to develop an information base from which the necessary indicators can be tracked and linked to management action in a sufficiently structured way as to provide a basis for resolution of conflicting priorities based on divergent perspectives.

Section V Practice in other sectors

As DFO attempts to work with communities, governments, stakeholders and civil society to establish inclusive and collaborative participatory processes for integrated oceans management, it is worthwhile to ask whether similar initiatives have developed in other spheres, and whether there is anything to be learned from that experience. Here we note

only a few, recognizing that there are many other histories both in Canada and outside that could be at least as meaningful for this purpose.

Mining and minerals (MMSD)

The first example may seem somewhat surprising, given the implausibility at first glance of attaching the sustainability label to the activities of the mining industry. It is, however, this very implausibility that forces attention to possible lessons from the experience. Recognizing the frequently repeated observation that ‘sustainability’ is not a destination or an endpoint, but a journey, not a state but a process, it is useful to consider how processes of evolution and transitions in technologies might develop in ways that could be characterized as ‘sustainable’. (The recent book by Mark Jaccard (Jaccard, 2006) on sustainable fossil fuels energy sources—actually sustainable paths of technological transitions achieving energy supplies able to meet anticipated demand while staying within specified emissions limits—illustrates ways in which the notion of sustainability may have to be broadened to be consistent with potential development paths.) But a fuller development can be found in the work of Tony Hodge and the IISD (Hodge, 2004a; 2004b) with the Mining Minerals and Sustainable Development initiative in North America, leading to the so-called 7QS (Seven Questions to Sustainability) framework. His short paper “Tracking Progress toward Sustainability: Linking the Power of Measurement and Story” (Hodge, 2004a) has a great deal to offer as a conceptual framework for thinking about the challenges of integrated ocean management. Follow-up work with INAC and with Nunavut is also worth review.

More directly relevant specifically in the ocean setting is the extensive program of work of the Minerals Management Service of the US Department of the Interior dealing with oil and gas development on the Outer Continental Shelf. The paper “Applied Social Science in MMS: A Framework for Decisionmaking” (Luton and Cluck, 2000) identifies (p.158) a list of social and economic effects of greatest concern to the public and government officials. A report on a later workshop, accessible at <http://www.gomr.mms.gov/homepg/regulate/environ/studies/2005/2005-016.pdf>, considers social science research issues arising in the Gulf of Mexico region.

Also arising in connection with offshore hydrocarbon development, knowledge gaps and socioeconomic concerns were identified in both the BC Offshore Science Panel and the Royal Society of Canada Panel commissioned by Natural Resources Canada, and some of the discussion in each offers pointers to steps that might be considered in planning processes in anticipation of social and cultural impacts of development.

Vodden, Pierce and House (2002) also address the issue of offshore oil and gas activity from a rural development perspective, again offering clues to social and cultural concerns with industry expansion affecting coastal communities.

Land Use Planning

There is far too vast a literature on land use planning to permit review here. However, the models offered by Ontario’s 1999 land use strategy accessible at the MNR website at <http://crownlanduseatlas.mnr.gov.on.ca/supportingdocs/alus/contents.htm> and by British

Columbia's extensive processes of participatory land and resource management should be mentioned for the lessons that may be drawn about the depth of commitment required to see through the extraordinarily lengthy processes demanded. In the BC context it is worth drawing attention to four specific reports or guides as well as the very extensive documentation on the CORE (Commission on Resources and Environment) and LRMP or LCRMP (Land and [Coastal] Resource Management Planning) processes. These four specific documents are *An Evaluation of DFO Involvement in Land and Resource Management Planning in British Columbia* (Dovetail Consulting, 1999); *Socio-Economic Impact Assessment of the Provincial Government's Strategic Land Use Plans on Key Sectors in British Columbia* (Pierce Lefebvre, Stuart Gale and Brimar Consultants, 2001); *Socio-Economic and Environmental Assessment for Land and Resource Management Planning in British Columbia: Guiding Principles* (BC MSRM, 2003); and *Guidelines for Socio-Economic and Environmental Assessment* (BC MAL, March 15, 2006 Draft).

The particular case of land and coastal resource management planning on the Central and North Coasts of BC—in what has come to be called the Great Bear Rainforest—will be discussed in more detail below.

Monitoring Progress toward Sustainability--Sustainable Development Indicators

Much of the work on monitoring, measuring and reporting on progress toward sustainability has been based on a framework along the lines of Figure 1 in Appendix A. The goal of the reporting system is taken to be capturing the state of all the stocks of wealth or capital at any one time, and the flows that they make possible at that time. Whether those flows are directed toward consumption or investment in the increase of those stocks is a decision taken, in effect, by the institutions and agents at that time, given the history to that time.

In the work on sustainable development, particular attention is paid to stocks of natural capital and the health of ecosystems, these being the determinants of potential levels of current and future ecological services. The work commissioned in the Martin federal budget of 2000, emerging as the Environment and Sustainable Development Indicators Program undertaken by the National Round Table on Economy and Environment in association with Statistics Canada and Environment Canada is of that kind. Earlier work by the NRTEE resulted in the Report to the Prime Minister, *Toward Reporting Progress on Sustainable Development in Canada* and the associated book *Pathways to Sustainability: Assessing our Progress* (Hodge et al, 1995).

Such reporting schemes aim, in effect, at integration of assessment across the full range of objectives—economic, social, cultural, ecological—and attempt to develop indicators that capture all these dimensions of social and ecological health. In the fisheries context, Art Hanson's summary in the 2003 special issue of *Oceans and Coastal Management* provides a helpful overview.

Canadian Council on Learning, Composite Learning Index

It is worth noting that another indicators exercise is grappling with the question of social and economic outcomes in the Canadian context. The first release of the Composite

Learning Index of the Canadian Council on Learning has just been announced for May 15, 2006 in Ottawa. Background on the CLI itself can be found at the CCL website at <http://www.ccl-cca.ca/cli/>, and the conceptual framework is described in detail on a subsidiary website at http://64.26.157.6/en/home/CLI_Framework.pdf. The development of the indicators list is interesting, and the attempt to find meaningful indicators of intangible features of community life has strong echoes of the challenges faced in integrated ocean management settings. In particular the criteria imposed in the selection of indicators may well be taken into account as the processes of monitoring in large ocean management areas are established on a continuing operational basis.

Section VI Integrated mgt in BC—the most extensive and broadly implemented example yet?

The election of the Harcourt NDP government in British Columbia in 1991 introduced substantial change into the dynamics of resource use and planning in the province with the development of a number of extensive consultative processes aimed at resolution of conflicts over land use and resource management. Even greater change came, of course, with the stream of court decisions and government policy initiatives relating to the negotiation of modern treaties and recognition of existing aboriginal title and rights. The full significance of these developments is by no means clear, but the necessity for consultation, accommodation and the negotiation of understandings with First Nations on a government-to-government basis as an essential and unquestioned fact of life in coastal and ocean resource management and planning as well as land use in British Columbia certainly is clear.

For this present review, the work on coastal resource management in particular is the most relevant, obviously. There is by now an extensive literature on this subject, and there is no point in rehearsing that here. Some of the background material dealing with land use in general has been set out in the previous section; here it is of interest to review specifically the experience in the Central Coast and North Coast regions of BC, the area that has come to be known as the Great Bear Rainforest—and the area now included within DFO's Pacific and North Coast Integrated Management Area (PNCIMA). (Another interesting note on language: many observers attribute significant influence on the character and outcome of the protracted consultation process to the power of that name in itself; the success of local and international ENGOs in introducing that loaded label and making it stick in common parlance undoubtedly contributed substantially to some of the external pressures brought to bear in the course of negotiations.)

Over the period up to 2001, Strategic Land Use Plans, Land and Resource Management Plans, and Coastal Land Use Plans were negotiated in most of the province, and ultimately approved by the provincial government, subject to satisfactory completion of government-to-government negotiations with the First Nations involved. (See the references in KB, pp 40-42.) In 2001, the outgoing government of Premier Dosanjh approved a framework agreement for coastal resource planning on the Central Coast, and developed a framework and protocol agreement with the Turning Point coalition of First

Nations involved. The text of these 2001 agreements and plans can be found at http://srmwww.gov.bc.ca/cr/resource_mgmt/lrmp/cencoast/docs/Framework%20Agreement.pdf and http://srmwww.gov.bc.ca/cr/resource_mgmt/lrmp/cencoast/docs/AIP%20Coastal%20Zone%20Plan.pdf and http://srmwww.gov.bc.ca/cr/resource_mgmt/lrmp/cencoast/processcomp.htm as well as at the further links available through this last site. (Work on similar strategic plans for the North Coast and Haida Gwaii had been initiated before 2001, but were not as far along as that on the Central Coast.) The incoming government of Premier Campbell undertook to continue to work within that framework agreement, with the imposition of more stringent deadlines for completion of proposed plans.

In accord with that agreement, a Coast Information Team was created to provide scientific analysis, background information and analytical support to technical and management committees pursuing negotiation of a full land and coastal resource management plan. (See www.citbc.org.) A centerpiece of the work was the development of a handbook and compendium on ecosystem-based management. Over three years of intense analytical work, including a full peer review structure comparable to the model adopted by the Millennium Ecosystem Assessment processes, agreement was reached on a plan for the Central Coast, and subsequently the North Coast. In February, 2006, the Premier, forest industry and other industry executives, representatives of ENGOS, conservation foundations and First Nations appeared together to announce the Great Bear Rainforest Agreement. Since then land use frameworks and protocol agreements have been signed with the two coalitions of First Nations governments directly concerned. (See Protocol Agreement Between the Coastal First Nations (Turning Point) and BC Dated March 23, 2006.) Legislation giving effect to the full land use agreement and resource management plan is expected to follow.

That agreement identifies those regions which are to be fully protected areas, those in which ecologically sustainable industrial use will be permitted provided it is consistent with principles of ecosystem-based management, and those in which human use may be less constrained.

The social and economic objectives agreed in this region are set out in Schedule C of the Protocol Agreement just mentioned, and attached as Appendix D to this review.

Importantly, however, and critical to the success of the initiative, is that the meaning of ecosystem-based management has not yet been agreed. A deadline of 2009 has been specified for development of an agreed understanding of these principles, and some voluntary undertakings to exercise restraint in human use of resources in the area have been made pending development of an agreed handbook.

A fascinating pointer to the extent of the diplomatic ambiguity yet to be resolved is contained in provision 1.2 of the section on Ecosystem-Based Management in Schedule A (EBM Implementation Framework), which says “For further clarity, within the Government to Government process, the Parties will discuss and attempt to reconcile the

precautionary principle, as set out in the [CIT] EBM Handbook and the Province's approach to precaution." These word games are of course simply a continuation of the fundamental process of attempting to reconcile the differing views as to the weight to be placed on current benefit flows relative to stewardship obligations as a vehicle for assuring potential for future use. The depth of this challenge for any process of integrated ecosystem-based management should not be underestimated.

Nevertheless, despite reservations on these critical questions of implementation, it has to be considered remarkable that with the degree of past conflict and disagreement over resource use in the region, and the persistent conflicting interests in future development, this multi-party consensus-seeking process reached the extent of agreement that it did. There are many particular features of the situation that would of course have to be taken into account in understanding both the dynamics of the process and the reasons for its outcomes. But the fact that it is agreement to a considerable extent binding in the coastal elements of PNCIMA, and the precedents that it suggests for the conduct of collaborative integrated management initiatives, make it of obvious relevance in the pursuit of integrated oceans management at LOMA scale and perhaps of paramount importance in the collaborative development of DFO work with the provincial government, First Nations, and all others interested in PNCIMA.

Part II: MOVING FROM ANALYTICAL TO PROCEDURAL CONSIDERATIONS

Section VII Adaptive governance as the key

Given the absence of any credible indicator framework that can support a computational approach to decisions within an integrated management planning framework, the only way that seems to offer any promise is to move toward inclusive, interactive, iterative processes—to begin to balance judgments and preferences through sustained deliberation supported by scientific evidence rather than through appeal to calculation premised on models that can be known with confidence. See the example of LRMP, SLUP.

From a theoretical perspective, we need to move beyond the economic model based on methodological individualism with interaction among economic agents constrained to formal market mechanisms towards the fuller interaction of human beings within the diverse mesh of institutions that make up communities nested within institutional structures of various scales. All the challenges associated with subsidiarity, devolution, cross-scale linkages and cross-jurisdictional cooperation must be confronted. The need to deal with particularities of place within the consistent policies essential to equitable treatment of individuals in different places has also to be recognized.

In this connection, the distinction between government and governance is important. A definition offered by George Francis is helpful. "Governance can be defined as the collective results from the exercise of authority and control through multiple governmental and other organizations, each following its own decision-making processes. The concept of governance extends beyond 'government' and the roles that government agencies play, to include corporate and other private sector, non-governmental organizations."

In his review of considerations in developing a functional approach to the governance of large marine ecosystems, Juda also emphasizes the broader connotations of governance with a definition that includes general norms and mores, defining governance to be “the formal and informal arrangements, institutions and mores which determine how resources or an environment are utilized; how problems and opportunities are evaluated and analyzed; what behaviour is deemed acceptable or forbidden; and what rules and sanctions are applied to affect the pattern of resource and environmental use” (Juda, 1999; pp90/91).

Within the networks of governance structures at play in particular settings, one can imagine moving from discussion of objectives and indicators as such to a more proactive stage of integrated management planning in which discussion around anticipation of possible changes in the ecosystem leads to discussion of possible responses. The exploration of possible development of hydrocarbon resources in PNCIMA, for example, might be expected to lead not just to anticipation of changes in indicators used for monitoring purposes, but discussion of anticipatory policy measures to avoid or offset such changes. Investment in skills development and formation of human capital in advance of demand might place coastal communities in a position to seize employment opportunities associated with such development. Strategies to diversify industrial activity might be developed to offset adverse impacts. Interesting debate might be anticipated around the question whether support for out-migration could be considered an appropriate response. Perhaps acceptable if it is offered as a choice, such a strategy might be unacceptable otherwise. Evidence might differ on the question whether a “stay option” really offers an improvement in individual wellbeing (indeed, whether it is a “stay in place” option, or a “stay in school” option, there could be debate). In some stages of economic swings, young people in coastal communities might find future circumstances improved by leaving school and accepting employment opportunities, rather than leaving their home community to stay in school.

The point, however, is that the relevant judgments can only emerge from some extended discussion and deliberation, not from any comprehensive array of indicators, or optimization model or multiple accounts analysis.

Nevertheless it is important to note the need for a coherent base of information and the potential value of computer-supported procedures to enable stakeholders and participants to refine beliefs about potential change, assess possible causal links, visualize possible consequences. Particular emphasis has to be placed on mapping as support to IM, not just for purposes of identifying ecologically and biologically significant areas or developing ecosystem objectives, but for construction of an overall management scheme including the human dimensions identified in the illustrative tables referred to above, including the important range of indicators identifying cultural concerns, for example, through access to TUS as noted in the Koppang-Behr bibliography.

It is important to note, however, that this continuing process of adaptive management and adaptive governance condemns all involved to a continuing, never-ending process of consultation, a continuing attempt to find reconciliation of conflicting perceptions and

interests and indeed a continuing attempt to find more acceptable sets of rules and frameworks commanding greater degrees of acceptance. There is no certainty promised at the end of this process; the best one can hope is to forge certainty (trust) that rules themselves will evolve in accord with agreed norms and procedures.

Experience with the CORE process in British Columbia, or indeed the West Coast Vancouver Island Aquatic Management Board seems to suggest that it takes two years or more to build the necessary trust in the consultation process and agreement on norms and guidelines as to how things are to be done.

As also noted in the Koppang-Behr bibliography, an emerging literature on boundary objects suggests that cooperative work among people participating in the networks and planning tables can not only yield a relevant information base to support continuing deliberation but can at the same time build an increasing degree of trust in the process, the participants and the outcomes of the exchange. The Regional Information System being built by the WCVI Aquatic Management Board in partnership with community groups and the Community Mapping Network might be considered one example of such a boundary object.

All these considerations open up the need to address interactive social science, inclusive participatory decision-making models, and concerns for legitimacy and credibility in the integrated management process. See Dobell (Walkerton, Toronto), Jentoft, Walker et al (2002) for extensive discussion.

Finally, it is interesting to note the emerging recent literature reporting on the results of extensive case studies and comparative analysis undertaken for the Global Environmental Assessment project initiated by Bill Clark at Harvard. This project was designed to address the questions why some very extensive scientific and analytical assessments proved to be influential in policy circles while others did not. The research led to the identification of three criteria that seem to be determinative. Assessments are likely to be influential to the extent that they are perceived to be salient, credible and legitimate. It seems likely that these criteria suggesting influence with policy-makers in the formation of policy might also be crucial for influence with citizens in implementation and compliance.

In this connection it has to be recognized that DFO (and the federal government more generally) starts with a substantial credibility deficit in these aspirations. Despite continuing dedicated work by sincere, capable individuals, DFO as an institution is not widely trusted or respected, and the building of lasting management procedures regarded as legitimate will not be easy.

It would be hard to improve on the language of Canada's Oceans Strategy and the companion Policy and Operational Framework as a statement of the aspirations shared by almost all concerned in respect of the goals of integrated, equitable, ecosystem-based, precautionary adaptive management of coasts and oceans for sustained ecosystem health and human wellbeing. But the resources committed to Phase II of the Oceans Action

Plan will have to be substantial enough to provide at least plausible foundation to a sustained commitment to the collaborative arrangements proposed and essential for integrated management in a profoundly uncertain and complex social-ecological system. There may be a window of opportunity to move into a period of collaborative work to address the deep apprehensions around the vulnerability of ocean resources and the risks to marine ecosystems and ocean spaces. If the opportunity to address these concerns with sustained commitment and the resources necessary to translate the intentions expressed in Canada's Oceans Strategy into ongoing and dedicated realization is not aggressively seized now, it is hard to see such an opportunity emerging again over any horizon that can avoid irreversible damage to important ecosystem functions.

It is hard to avoid the impression that those who are promoting the Oceans Strategy and Oceans Action Plan are facing a moment of serious truth, demanding that they put up the resources to back their words, or admit that those words are empty.

Section VIII Conclusions

There are some inevitable challenges to be considered in any approach to integrated management of human activities in Large Ocean Management Areas. Probably unresolvable tensions will remain along some general axes. We know, for example, that: Aspirations to pursue adaptive management will always run into problems of lumpy initiatives and fears of irreversible consequences as a result of management 'experiments';

Precautionary stance and adaptive management argues for opening up ecosystems to new interventions in as measured and incremental a way as is feasible but short term market incentives always push toward a derby-style exploitation;

The search for consensus must run into demands for timely decisions as well as the bargaining realities associated with the leverage sometimes enjoyed by 'holdouts';

Conflicting concepts of property rights will remain unreconciled: paper title vs traditional equity; legal claims vs adjacency and custom;

Inevitable balancing of ecological claims based on science will confront political or social realities as to feasible action (the controversy around the drafting of SARA as well as current controversies around its application with respect to particular salmon stocks are illustrative);

We base much of our rhetoric and reasoning on the search for 'win-win' solutions in a world where in the short-run, social and ecological constraints around allocation decisions make such outcomes impossible; only in the context of shared commitment to the long run benefits of cooperative action, and loyalty to processes viewed as legitimate even in the face of adverse short-run outcomes can one talk about 'win-win' solutions.

Legal alternatives in resolution of allocation conflicts may be worse, because of impacts on social and cultural capital, erosion of trust and commitment. In the end, all hinges on compliance and shared values, else implementation is not possible.

A repeated goal is the desire for certainty, the search for certainty. But one cannot have certainty about outcome or action in a profoundly uncertain world—that is the point of adaptive mgt. One can have greater certainty about fundamental roles, rules and rights, and can thus have greater confidence about continued trust, cohesion and commitment to

compliance. In a sense, LRMP offers interim measures in a joint management setting that can work toward more established agreement. It is often easier to identify and agree on action in mutual interest than to agree on ownership, title or jurisdiction. The former is essential; the latter is unnecessary.

The following more specific conclusions can be suggested.

1. No persuasive precedent in the oceans management sphere.

This paper has done what its terms of reference propose, namely to identify sources of information and find illustrations of ways in which economic, social and cultural considerations have been brought into integrated management processes for marine ecosystems. The purpose has been to explore ways in which ecosystem objectives and human use objectives, together with indicators of their achievement, can be balanced in integrated management plans at the scale of large ocean management areas.

This note has therefore reviewed a wide range of guidance offered to governments and stakeholders interested in formulating and implementing plans to achieve an integrated approach to the management and regulation of the vast array of complementary and competing human activities related to and influencing the evolution of oceans and marine ecosystems. The development of suitable suites of indicators has been a central part of such guidance, and this note has traced a number of international processes focused on that task, in many of which work in Canada has played a central role.

The review suggests, however, echoing an earlier Jaques Whitford study for the ESSIM Secretariat (Walmsley, 2005), that the task of putting together a concrete, usable suite of indicators operationally helpful in an objectives-based management setting has not been successfully completed anywhere.

The ultimate goal or objective of integrated ecosystem-based management of large ocean management areas is sustainable development of the region (and contribution to sustainable development globally): the sustained health of the ocean and marine ecosystems, supporting sustained human livelihoods, health and wellbeing is crucial to this goal.

Since there is already a vast literature proposing indicators of sustainable development, it seems therefore that there should be a simple answer to the question as to how social, economic and cultural considerations should be taken into account in the planning and evaluation of integrated management of LOMAs: one simply chooses a plan of action designed to deliver the most promising outcomes as measured by the chosen indicators of progress toward sustainable development, and evaluates the effectiveness of the plan and its implementation by reporting on the resulting outcomes as measured by that suite of indicators. It seems as though ecological, environmental, socioeconomic and governance considerations could all be encompassed within overall indicators measuring the achievement of sustainable development.

On the ground, in the ocean, or around the planning table, things are not quite so simple. The translation from the literature on indicators of sustainable development to an agreed

integrated management plan, has, as noted above, not been successfully accomplished or demonstrated in any experience identified in this review.

2. (a) Forget plans; seek planning

But perhaps the above approach is the wrong way to phrase the question, the wrong perspective from which to approach the issue. The task is not primarily to find a formal quantitative procedure to achieve integration across many streams of diverse data—it is to establish processes to achieve integration across many interests and perspectives driving many conflicting uses of oceans and marine ecosystems. Rather than searching for the definitive analytical method for balancing multiple individual claims in construction of a plan, we should be seeking participation and cooperation within an ongoing process of deliberation, planning and decision that is broadly accepted.

Ecosystem objectives are themselves inextricably linked to human use, and the other way around. Moreover there is no computational or analytical procedure that can determine the appropriate balance within an integrated plan; the task is one for continuing interaction and deliberation among all those concerned with the multitude of conflicting activities and uses within an ecosystem. The goal cannot be a plan; it must be recognition and acceptance of a continuing planning process. (This proposition was made famous by Henry Mintzberg in his book, *The Rise and Fall of Strategic Planning*). In that sense we have to end for practical purposes with appeal to adaptive (co)-management and adaptive governance, which is where the theoretical literature mentioned in Appendix A currently ends also.

This note has concluded that integrated management entails a strong commitment to building trust and coherence through inclusive participatory deliberative processes sustained over an indefinite period of cooperative adaptive management.

A straightforward process has identified relevant socioeconomic information and possible sources of such information to be brought into such multi-party deliberations. Some proposals for ordering such information into Multiple Accounts Frameworks or equivalent presentations have been noted. A further step of rating or ranking the various otherwise incommensurate bits of information is sometimes agreeable, as with the full Multiple Accounts Analysis models or more formal assessment procedures presented in some of the references mentioned earlier in this note. (The distinction between Multiple Accounts Frameworks and Multiple Accounts Analysis is therefore crucial here.)

Working from the top down, the ESSIM draft plan provides a leading example of the planning processes involved in that LOMA. On another coast, the work of the Coast Information Team supporting the multi-stakeholder Land and Coastal Resource Management Planning processes on British Columbia's Central and North Coasts (and Haida Gwaaii) illustrates the extent of the work necessary to try to build, from the bottom up, the information base on which integrated management decisions might be made. (It is important to note that in the end, however, even these processes too are consultative, not commitments to full consensus-seeking procedures: in the face of irreconcilable perspectives on the interpretation of the relevant scientific evidence or local knowledge,

the government of the day remains the accountable decision-making body, with authority to impose either a final-offer-selection-type outcome or a compromise plan of some kind.) On yet another coast, work on the development of plans for a Beaufort Sea MPA has led to the development of a further set of socio-economic indicators to be taken into account in pursuit of an appropriate integrated plan.

This note has taken these three examples as leading illustrations of the issues to be faced in the pursuit of the integrated, precautionary, ecosystem-based adaptive management that is prescribed in Canada's Oceans Act, Oceans Strategy and Oceans Plan, with the purpose of maintaining progress toward the sustainable ecological systems and ecological health on which sustained human health depends.

But in general no agreement on a formal computational procedure for balancing all the various considerations described by the disparate information flows should be expected. The best that can be hoped for is some fruitful exchange of views informed by the descriptive information base brought forward. In some cases, such an exchange may be informed by mapping capacities, in some cases by capable scenario generation, backcasting exercises or visualization capacity, in some cases perhaps other forms of computer support for facilitated interaction. The goal of frame reflection is there to be pursued, aiming at a clearer sense for all around the table of the diversity of perspectives and the varying attitudes toward risk and benefit brought to the discussion by the different parties.

In such a situation, the solutions to the question as to how appropriate weight can be given to socioeconomic considerations in integrated management processes are all procedural solutions, not computational approaches. They have to be addressed through institutional initiatives, negotiation of principles of governance, not (solely) through analytical investments. We need to be thinking in terms of multi-party deliberation, not in terms of a stable formula based on an agreed suite of indicators. We need to be thinking of rolling plans (and adaptive co-management within a period, but perhaps adaptive governance—with institutional innovation and evolving rules—between periods).

2. (b) The focus must be legitimacy

Contrary to much current comment, the central problem is not to devise schemes that will ensure win-win-win outcomes. The challenge is to devise processes and relationships that will assure allegiance to processes viewed as legitimate and commanding general support even for decisions leading to outcomes in which there are inevitable (short-run) losers. There is much loose talk about the fact that we do not need to see the tensions between environmental objectives and human uses as forcing a tradeoff between the two. In fact there is almost certainly a very difficult—agonizing—choice to be made. Objectives of ecological integrity are a surrogate or a proxy for future human wellbeing; they are almost inevitably in conflict with desires for current consumption. Moreover, even with the tradeoff between present and future settled somehow, there are a large number of conflicting uses at any one time. Any allocation decision will lead to outcomes in which some people (rightly) see themselves as losers on that round. Adverse outcomes can be swallowed in the interests of allegiance to a wider community (cf

literature on cooperation—e.g., Axelrod), but only on the basis of trust in longer run cohesion. Win-win solutions are perceived only when there is an overarching shared conviction about long-run enlightened self-interest, arising out of established trust and firmly-held expectations of generalized reciprocity.

The test of the integrated management process is therefore how well it provides institutions by which we can continue to live together when the constraints of the ecosystem mean that we can not all be winners all of the time. We may know in principle that we are all in the same boat, and that wise decisions now to restrain human activities in order to avoid significant damage to vulnerable ecosystems is one in which we are all, ultimately, winners. We may accept this as an abstract proposition. But in the particular regulatory decisions, the unanticipated closures or moratoria, the harvest allocation measures, the denial (or approval) of offshore exploration rights, we see concrete hardship, with adverse consequences unequally distributed on different users, demographic groups, interests and individuals. The challenge is to persuade all involved of the longer-term equity of the process that assures the sustained ecological integrity from which flow the ecological services that make up the life-support system for future generations. (But of course, “what did the future ever do for me?”)

In the rapidly growing new literature on global environmental assessment, one central conclusion has been emerging, as noted above: assessments are more likely to be influential and of practical value in policy processes to the extent that they are seen as credible, salient and legitimate. In the discussion above, one could view Conclusion 1 as dealing with the issue of credibility, and, in establishing credibility, confronting the tension between exclusive, expert-driven science-based development of data on the one hand, as against more inclusive processes embracing also traditional and local ecological knowledge and ‘other ways of knowing’ on the other. Conclusion 2(a) addresses the requirement for salience by formulating assessment tasks and norms in interactive planning processes. And Conclusion 2(b) can be seen as focusing on the overarching demand for participatory procedures viewed as legitimate.

Cooperative work on shared support mechanisms (what we have referred to as ‘boundary objects’) may help in building such procedures. We should take account of the potential dynamic contribution of such shared development work on computer support as outlined in the literature on boundary objects not just in building information, but in building commitment.

Note that this will force consideration of the need to focus the work—a need to think in terms of the ‘expected value of perfect information’ as in the literature on decision theory, so as to focus limited time and limited resources on the gathering of information that will be relevant to decisions. There is no point (for mgt purposes) in going to great effort to gather information that will be of no interest in ultimate decisions. Of course there is every reason to pursue information for the sake of science and curiosity, and great value in the information acquired by these efforts. But for integrated management purposes, efforts must be more focused, and the first filter is the test of relevance to the purpose of decision-making, not to the science for the purpose of richer description. This

is not to suggest that the knowledge that flows from curiosity-driven research is not ultimately policy relevant; but the issue is the timing—when can that knowledge make a difference?

In addition there is one further, fundamental, imperative:

3. Sustained commitment is crucial.

Toward the end of 2005, the Commissioner of Environment and Sustainable Development submitted her annual report to Parliament. In the closing section of the Commissioner's Perspective on the report, she says "The consistent message throughout this year's audits is that the federal government is chronically unable to sustain initiatives, once they are launched. Federal experience with the Canadian Biodiversity Strategy, Canada's Oceans Strategy, and guidance for sustainable development strategies are just the latest example of this failure to follow through on bold promises."

Interviews reported from a variety of reviews of DFO initiatives to reform decision processes confirms that this conclusion is widely shared. Frustration with the inability to bring the various groups within the department together in an agreed understanding of mandates and commitments, and to maintain the resources necessary to follow through on initiatives, is widespread.

More generally, the idea of continuity and follow-through could perhaps also be directed toward more committed attempts to build cooperatively and consistently on the wide range of isolated initiatives attempted by the various individual parties involved in the multi-party management processes.

There is general frustration with an apparent disconnect between declarations of intent to cooperate and institutional incapacity to do so. To develop the information base essential to integrated management in LOMAs there is no alternative to cooperative pooling of data and knowledge on a continuing basis.

4. Governance options

Dobell (around 1966) made the point that increasingly attention will turn to search for policies robust against shocks. Recent literatures flowing from the work of Holling emphasize resilient systems. Resilience for a community arises out of the opportunity for choice in response to change or catastrophe. Resilience for a system arises from the ability to adjust to unprecedented events in a manner that does not drive the system itself to extinction or qualitatively different structure. (See also RAND paper for comment on long range planning, and Peterson et al for further discussion of robust control.)

For the national government (Canadian people as a whole), robust policies and resilient systems may be achieved by establishing self-adjusting structures and self-organizing systems through devolution and subsidiarity within adaptive governance systems. In such structures one can develop continuing adaptive co-management at community and local scale, within continuing adaptive governance at national and international scale. In this setting, adaptive governance anticipates interventions involving institutional

evolution and change in response to changing knowledge and understandings of the operation of the system as a whole, while adaptive co-management works with agreed management interventions treated as management experiments with full continuing monitoring, feedback and appraisal of results utilizing all the assets and capacities of communities as well as the apparatus of larger scale government.

There is an obvious governance question as to how Canadian government remains responsible for general overarching framework, including agreements and commitments negotiated internationally, and ensures compliance with these overarching groundrules while respecting all the appropriate autonomy and authority of the sub-national regional authorities and tables as well as First Nations seeking to move toward self-government with appropriate discretion in resource management.

Such devolution and subsidiarity seem to fit within the general perspective of the new federal government, even at the cost of evident asymmetry. So a few closing speculative questions suggest themselves.

Would it be better for DFO to play really well the role as the voice for the future, for ecological integrity and ecosystem health, and leave the advocacy of industrial and mainstream economic interests as well as the socio-economic considerations arising out of human use to other departments specialized in these features of the human components of the ecosystem? In other words, should ‘horizontality’ realistically be interpreted to mean integration across the multiple voices represented by the various departments and agencies at the inter-agency table, not be voices all within DFO? This would mean, in effect, arguing for the conflict resolution to take place at the inter-agency table (or at Cabinet) rather than attempting to comprehend all the positions within DFO itself. It would mean contesting the argument that DFO needs to build up the capacity to handle all socio-economic considerations fully within the department itself.

With such an orientation, the approach suggested in the boundary object literature (see section 10 of Koppang-Behr) could apply to the computer support for the discussion process: Cooperative construction of a unique object perceived differently by different users for different purposes. (See, for example, the West Coast Vancouver Island regional information system at www.westcoastaquatic.ca/RIS.html, under development as a partnership with the Clayoquot Biosphere Trust, the Nuu-chah-nulth Tribal Council and other community partners.)

Such an approach might better reflect both institutional realities and the diversity of perspectives supporting the multiple conflicting uses of oceans and marine resources. It might lead to cooperative work around a single integrated database—for example with a Statistics Canada lead in such collaboration around the idea of a formal ‘boundary object’. (Recall Bellefiore comments about the need to tap multiple sources of information.)

With respect to the challenge of moving integrated management forward on the West Coast, it is interesting to speculate about the possibilities of a federal-provincial

agreement whereby BC would undertake the mirror legislation to provide authority to ensure that federal responsibilities could be met through decisions of some joint integrated management board spanning relevant actors and interests. The presentation of the Canadian case study at TOPS (October 2005) noted that “accountability rests with one federal lead” but that power to implement decisions and effect change is still fragmented among many independent actors. Might the model of the joint offshore boards on the East Coast not offer a way past this major operational barrier in integrated management?

Such institutional innovations are evidently very long term and speculative. But it is now 10 years since passage of the Oceans Act that assigned to DFO the responsibility to lead, facilitate and coordinate a cooperative effort by all federal agencies and other governments to address what is no longer in doubt as a crucial challenge of our age. Accountability for failure to respond sufficiently vigorously to this mandate is looming.

APPENDICES

APPENDIX A Theoretical Context

In the effort to build a continuing planning process that will be generally accepted as legitimate, it may be helpful to begin by thinking in terms of the long sweep of events in the development of an influential social movement. Starting around the time of Rachel Carson in 1962, and building through the 1972 UN Conference on the Human Environment in Stockholm, one can see a build-up of influence leading to the Earth Summit (UN Conference on Environment and Development) in Rio in 1992. This growing influence pushed in the direction of bringing environmental considerations into play in economic decisions with environmental impacts. It pressed for greater attention to ecological concerns as a counterweight to the engineering and financial analyses on which development decisions customarily were based, without much regard for environmental consequences.

At the Rio meeting, building on the work of the Brundtland Commission, the notion of ‘environment’ was brought more fully into the balance, and embraced within the notion of sustainable development. In the years following the Rio meeting, there seems to have been built up some sense that environmental concerns have become too much of a prior constraint, that the precautionary approach is in fact an anti-development approach. At the same time, there has been growing concern that in an increasingly globalizing world with decisions increasingly controlled by distant corporate and state entities, the environment-economy balance was failing to take adequately into account the social, historical and cultural considerations of principal concern to small or remote communities, particularly coastal communities dependent on maritime uses. Economic considerations were seen to be driven by analysis at the scale of the corporation as the accounting unit, without regard to the broader regional, national or global economic impacts, particularly in failing to recognize significant externalities and loss of valuable but unpriced natural capital. So the pressure to take fully into account what might be called the social economy considerations, or the socio-economic accounts, or sometimes socio-economics, has been increasingly articulated by academics, non-government organizations and community representatives.

It is presumably this broad pressure that is reflected in the concern to develop a more explicit framework to account for human use or human dimensions in the work to date on integrated management. Of course the goal of sustainable development is often expressed as the search for the balanced three-legged stool on which all three legs—economic, environmental, and social—are well developed and well represented in decisions taken within an integrated management framework. But of course the appropriate balance—or even the determinants of the appropriate balance—remain quite unclear.

The basic notion underlying all this work is the idea that ecological integrity, the protection of the environment, is a proxy for the sustained capacity to ensure the wellbeing of future generations, the ability to offer ecological services for future human benefit. In the presentation of the Canadian case study at The Ocean Policy Summit

(October, 2005) it was said that Canada's Ocean Strategy "reiterated that Sustainable Development requires that conservation must be the first priority in order for social and economic benefits to be sustainable". The extent to which ecological concerns (or ecosystem objectives) can legitimately be phrased as prior constraints around permitted human use remains a core unresolved issue.

For purposes of this paper, I will follow the lead of Berkes and Fast (2005) in adopting a characterization of sustainability drawn from the 2003 Millennium Ecosystem Assessment Report, *Ecosystems and Human Wellbeing: A Framework for Assessment*. In particular, there is an important nuance introduced into that characterization of sustainability, or sustainable development, viewed as development in which "the needs of the present and local population can be met without compromising the ability of future generations or populations in other locations to meet their own needs". Thus one cannot buy sustainability for one region or marine area at the expense of shifting the costs to other locations or populations.

There is a vast literature that is relevant here, of course, far beyond the bounds of this paper. It is important to recognize the very broad range of perspectives brought to bear in discussion of such issues. The problems do not lend themselves to definitive treatment, either theoretical or programmatic. Differences in terminology signal possibly significant differences in emphasis and priorities, perhaps particularly in attitudes toward risk.

Here we will adopt the notion of integrated management as set out in the COS, to which the present review is directed. This definition envisages "a continuous process through which decisions are made for the sustainable use, development and protection of areas and resources. IM acknowledges the interrelationships that exist among different uses and the environment they potentially affect. It is designed to overcome the fragmentation inherent in a sectoral management approach, analyze the implications of development and conflicting uses and promote linkages and harmonization among the various activities."

(It is interesting to compare this language with the definition of ecosystem-based management in the report of the 2004 US Oceans Commission, which suggested that "EBM looks at all the links among living and non-living resources, rather than considering single issues in isolation ... instead of developing a management plan for one issue...EBM focuses on the multiple activities occurring within specific areas that are defined by ecosystem, rather than political, boundaries". Here the significance of the 'ecosystem-based label seems to lie simply in its integrated character and its attention to ecosystem rather than administrative or political boundaries. By contrast, the definition of ecosystem-based management from the COS, discussed below, carries much more normative freight.)

Many definitions and principles for ecosystem-based management can be found in the literature, going back a couple of decades. See, for example, Moote et al, 1994, or the National Centre for Ecological Analysis and Synthesis, at the website address <http://ebm.nceas.ucsb.edu/faq/definition>. (This NCEAS work may be of further interest

to DFO work on integrated management, particularly with respect to a currently ongoing three-year program ‘involving the analysis and synthesis of existing data and development of new tools to address gaps in knowledge that are critical to successful implementation of ecosystem-based management.’)

Berkes and Fast go on to note that “Ecosystems are not biological constructs untouched by human influences but have humans as integral components.” The ecosystem approach is defined as a “strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use *in an equitable way* (emphasis added).

Ecosystem-based management, as defined in Canada’s Oceans Strategy (COS), then is “the management of human activities so that ecosystems, their structure, function and composition are maintained at appropriate temporal and spatial scales” (which of course is not the same thing as ‘maintained unchanged’).

This definition, as noted above, carries the implication of ethical obligations for stewardship, and reform of current institutions and systems to assure greater likelihood that ecological integrity and ecosystem health can be maintained.

But, as also noted, perspectives on the significance of the term do differ.

Regier and France (1990), for example, led off the proceedings of a 1988 workshop on “An Ecosystem Approach to the Integrity of the Great Lakes in Turbulent Times” with a look back at the range of perspectives on ecosystem integrity expressed in a 1975 workshop. They divided the spectrum of perspectives that they had identified into five classes of relevant reform (management) strategies: *deep reform* (deep comprehensive societal change with a broadly specified end-point); *partial reform* (pragmatic, sectoral, step-wise societal change within a specified general direction); *incremental advance* (cost-effective technical improvements applied within a society that is evolving gradually, progressively and appropriately); *holding the line* (permitting no further degradation, except where society explicitly decides otherwise); and *slowing the rate of retreat* (resistance to emergence of new forms of degradation and commitment to reduction in the rate of intensification and/or spread of current forms of degradation). They suggest that a workshop in 1990 would reveal the same wide range of perspectives persisting throughout the 15 years up to 1990, and would reveal the same limited consensus for deep reform. Their closing comment is perhaps worth quoting: “Most experts seem to be too busy—trying to make necessary incremental improvements or to limit further degradation—to devote any serious attention to the issue of what would be a sufficient program of reform.” Now after more than 30 years from that same starting point, the same observation would probably be valid.

(In this review we will follow the usage above in insisting on the expression ‘ecosystem-based management’, rather than the misleading term ‘ecosystem management’ which (like the label ‘resource management’) implies a capacity we do not have. We do not

manage ecosystems or ecosystem resources; the best we can hope for is to influence human activities (and that only to some extent, indirectly) within ecosystems. (A major point of this note and recent literature is to emphasize how indirect and limited and problematic that management influence on human activities is likely to be, at best. And of course a consequence may be that despite our best intentions, human activity may succeed in driving global ecosystems into catastrophic regime shifts.)

In the search for socio-economic indicators for this purpose it is important to recognize that the two distinct facets of human use of ecosystem resources referred to above (economic and social) are quite different. Conventional economic analysis, based on corporate and national accounting conventions, is familiar. This foundation can provide relevant information on a full range of commercial uses of ocean resources or human uses drawing on access to the ocean space. Socio-economic considerations are less familiar in analytical or accounting contexts, though probably more palpable in human settings. There are few developed frameworks for social accounts, and none that provide the operational foundation of the standard economic accounting framework.

Because it is less obvious, and central to the discussion here, the notion of socio-economics as I propose to use it for purposes of this paper, is set out here at some length. I follow the definition offered by the recently-formed Society for the Advancement of Socio-Economics (SASE) on their web page at www.sase.org.

What is Socio-Economics?

As an emerging meta-discipline, socio-economics begins with the assumption that economics is not a self-contained system, but is embedded in society, polity, and culture. Socio-economics regards competition as a subsystem encapsulated within a societal context that contains values, power relations, and social networks. The societal context both enables and constrains competition. Socio-economics assumes that interests are not necessarily or automatically complementary and harmonious, and that societal sources of order are necessary for markets to function efficiently.

Socio-economics further assumes that individual choices are shaped by values, emotions, social bonds, and moral judgments rather than by narrow self-interest. There is no a priori assumption that people act rationally or that they only pursue self-interest or pleasure.

Methodologically, socio-economics regards inductive studies as co-equal in standing with deductive ones. For example, a study of how firms actually behave has the same basic merit as treating the firm as an analytic concept in a mathematical model. Inductive inputs and deductive derivations are assumed to correct and thus balance each other. Socio-economics is both a positive and a normative science. That is, it openly recognizes its policy relevance and seeks to be self-aware of its normative implications rather than maintain the mantle of an exclusively positive science.

SASE has little interest in criticizing neoclassical economics per se, and seeks to develop alternative approaches that are predictive, exemplary, and morally sound. Socio-economics does not entail a commitment to any one ideological position, but is open to a range of positions that share a view of treating economic behavior as involving the

Thus we will distinguish carefully between the conventional economic concerns and the considerations usually emphasized by those arguing for greater attention to socio-economic objectives and indicators. Despite the label, those advocating this approach are generally concerned to counter excess weight given to conventional economic arguments and commercial measures of benefit from human uses. So for purposes of this paper, we will refer to social, cultural or historical concerns rather than use the label 'socio-economic' when the concern is with human dimensions beyond the conventional economic categories.

With these questions of terminology settled, it is useful to comment very quickly on the systems context or perspective underlying current work on ecosystem-based management.

Over the roughly twenty-year period since the work of the Brundtland Commission, there have been dramatic changes in the conceptual and theoretical frameworks or lenses brought to the work of oceans management and fisheries management in particular.

The mantra now on the theoretical side is something like "integrated, precautionary, ecosystem-based adaptive management and cross-scale adaptive governance in complex coupled social-ecological dynamic systems characterized by profound uncertainty and limited controllability". The SES (social-ecological systems) approach is becoming more frequently referenced in the world of research proposals

A good thumbnail extract from thinking on both the ecological and the social aspects is offered by the report of the Marine Sciences Panel appointed by the Canadian Global Change Program under the auspices of the Royal Society of Canada, titled *Canadian Marine Fisheries in a Changing and Uncertain World* (de Young, Peterman et al, National Research Council, 1999).

The summary of that volume says "Given the uncertainties and risks involved in human activities and the potential for irreversible impacts on interdependent marine resources, we were led to a broad ecosystem approach that includes not only the technical processes of fisheries [and oceans] management but also the political processes and social institutions within which the objectives and frameworks for such management are developed....The marine ecosystems discussed here include humans and their institutional structures. A complex web of dependency now exists as a result of the extensive and growing human exploitation of marine resources. Coastal communities in Canada, indeed worldwide, depend heavily on the marine environment. Our use of ocean resources is now so extensive that the viability of the natural components of the marine ecosystem hinges crucially on successful measures to limit [the impacts of] human harvesting and habitat destruction....The emphasis on this report has been on three fundamental characteristics of fisheries [oceans] systems, i.e., change, complexity and

uncertainty, and on three basic features of human response to them, i.e., conservation, cooperation and compliance.”

In developing this vision, the first, very general, shift, still far from completed, is to recognize the human system as a subset of the overall ecosystem, and the dynamics of human systems as embedded within (but coupled with) the dynamics of natural systems. Within this structure the social and cultural context serves as the overarching framework which determines the opportunity for and realized extent of wealth creation or conservation, and the economic structure, particularly market mechanisms, as the instrument for determining, within that general social context, resource allocation and consequent income distributions. (This means that we strive to see economic decisions as simply one part of ongoing social phenomena embedded in an ecological setting, rather than simply trying to build environmental concerns into all economic decisions, as some earlier slogans and propositions around ‘free market environmentalism’ have suggested.)

A second general shift in emphasis has been to take more explicitly into account the importance of institutional arrangements and social assets falling outside the strictly economic mechanisms. In particular, along with notions of natural capital associated with the dynamics of the ecological system, notions of social capital and cultural capital have been receiving increasing attention as a way to promote more balanced perspectives on overall social welfare. (Earlier attention to the value of human capital and intellectual capital has already broadened the prior emphasis on financial and physical capital alone when it comes to social reporting.)

Figure 1 illustrates this perspective on these system features, identifying both the nested feature of the overall system operating at various time scales, and with explicit concern not just for the forms of financial and produced wealth recorded in the books of firms or nations, but also for the social, institutional, cultural and natural capital. ...

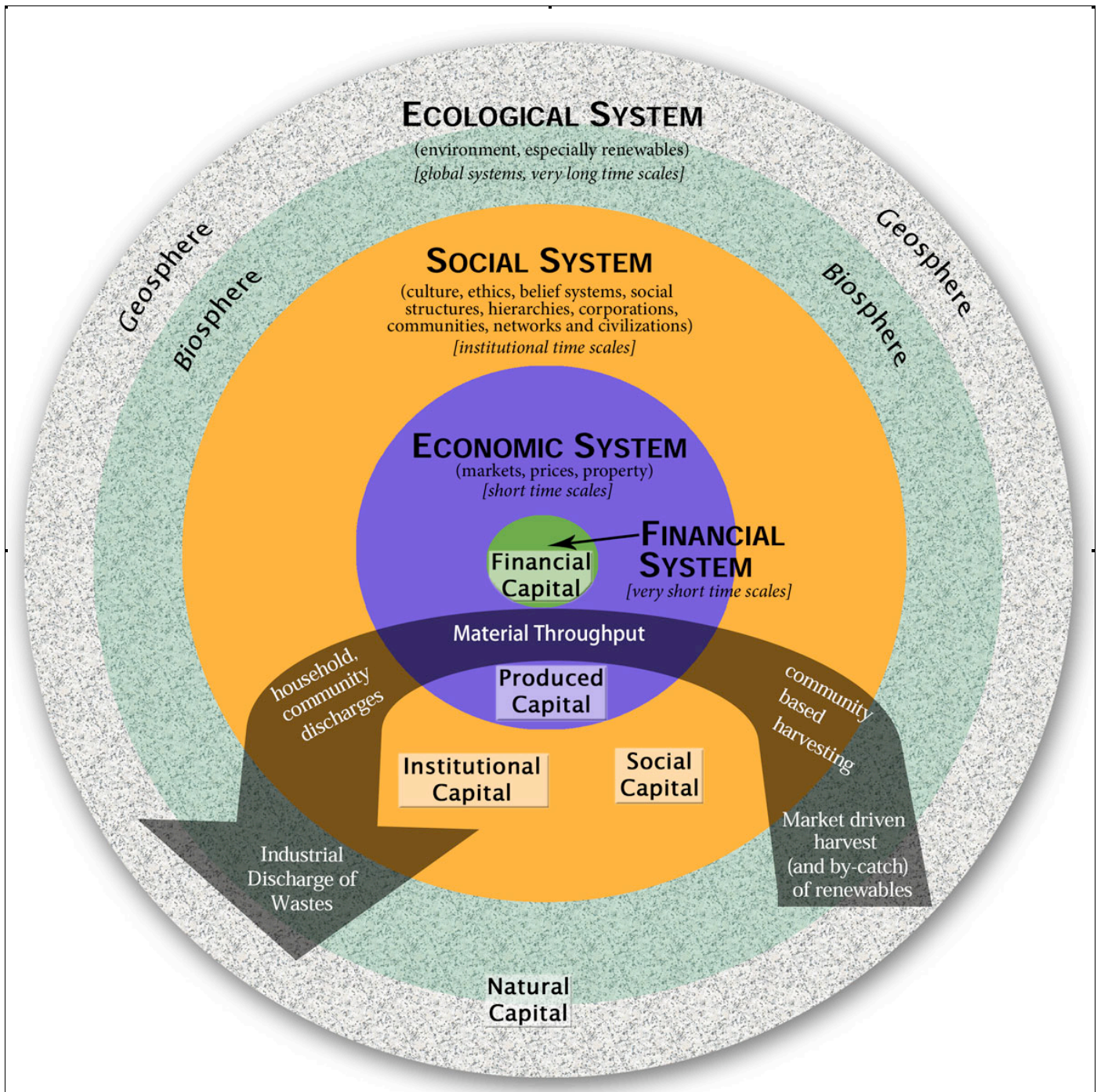


Figure 1

ECOFRAME

Dobell/Behr 2006; based on Dobell 1993

A third feature of recent theory is growing emphasis on the underlying dynamics of ocean systems (and fisheries systems within them) as an interweaving of complex systems characterized by profound uncertainty, indeterminacy and ignorance, within which humans exercise only limited influence and face problems of limited controllability. One can see the work of the Resilience Alliance, for example, at www.resalliance.org , or the continuing work on complex systems reported in the on-line journal Ecology and Society, at www.ecologyandsociety.org .

In figure 1 it should also be noted that the management institutions are themselves part of the structure, endogenous to the system. Management decisions are responses to developments and information flows at various scales and may or may not lead to realization of the intentions formulated at any scale.

Thus the centrality of the implementation problem has increasingly been recognized as both a theoretical interest and a continuing inter-jurisdictional, inter-agency and inter-personal operational challenge. (See the CGCP marine panel report just mentioned, or the insightful book of James C. Scott, *Seeing Like a State*.) Recognition of the cultural barriers limiting interpretation, translation and performance, from mindset or mental frame to commitment and accountability, has also transformed some current work in public management, and illuminated the problem of achieving compliance with harvest plans or regulations, but is beyond the bounds of the present review.

Obvious problems of divisions of responsibilities between federal and provincial agencies, but also of regional and cross-border initiatives, cross-boundary watershed management, territorial harvest agreements with First Nations and other similar concerns have given rise to a growing literature on multi-level (multi-jurisdictional) arrangements as well as cross (geographic) scale linkages in complex systems. In the end it is argued that in a poorly-understood system characterized by profound uncertainty, a functional, pragmatic approach is the only route to any effective adaptive management.

A major theme running through theoretical work on marine resources and oceans management has been the ‘management of the commons’. Newer work dealing with this topic has introduced the notion of adaptive governance, recognizing that it is not enough that operational decisions be adaptive: interventions in the ongoing system in the form of institutional change or policy innovation should also be viewed consciously as management action at a more general or abstract level, and treated therefore as an experiment from which social learning may emerge. The need to learn from pilot projects and from comparative analysis for purposes of future institutional design is evidently central here.

Within all this theoretical context, the practical challenge then has to be seen as the grounded implementation of generalized expressions of intention at global or national level, realized through coordinated action at regional and local level.

Continuing negotiations over the last half-century have resulted in the emergence of a substantial body of customary international law and formal treaties respecting the need

for management of multiple conflicting uses of ocean resources, and for attention to the protection (rights?) of living creatures and the integrity of marine ecosystems

A number of recent documents offer a chronology of the growing range of international agreements relating to oceans management. The Ocean Policy Summit 2005 Bulletin published by IISD (accessible at <http://www.iisd.ca/sd/tops2005>) provides a very compact summary of relevant commitments. Notable recent developments included the Johannesburg Plan of Implementation negotiated at the 2002 World Summit on Sustainable development, which adopted, among other things, a commitment to applying the ecosystem approach to marine areas by 2010. More recently the 2005 UN World Summit reaffirmed the Millennium Development Goals, which include the goal of ensuring environmental sustainability.

For present purposes, the key feature to be noted from this literature is the extent of the commitment to ecosystems integrity and biodiversity as necessary conditions for sustained human wellbeing. These existing covenants, conventions and commitments establish an obvious responsibility to be carried by DFO in any multi-jurisdictional and multi-party processes for negotiating and implementing integrated management plans for oceans areas. It is important to note, however, that this responsibility is, in effect, the responsibility to ensure appropriate consideration of the interests of future generations in management of current activities. While these concerns may be expressed through intermediary indicators of ecological integrity or ecosystem health, the priority attached to these indicators reflects the underlying concern with human wellbeing. (There is also, of course, the fundamental ethical concern with the interests of other living beings and the health of the planet as well. But the point is that in the deliberations going into integrated management, the basic tradeoff is not between the environment on one hand and people on the other; it is the classic dilemma of current desires versus provision for future wellbeing.) While DFO may find itself, in such negotiations, appearing to be speaking for the whales or the corals, it may be more appropriate to see DFO's responsibilities as including—given Canada's international commitments—giving voice to the interests of future generations—Canadians and other humans not yet here to vote—as well as to the claims of populations in other places.

So then how are those interests to be represented? Appendix B traces the evolution of thinking within the oceans sectors of DFO on this question, as represented by an unsystematic sampling of recent documentation.

Appendix B National Context—From Oceans Act to Action Plan

Here we trace the stream of DFO papers flowing from the Oceans Act in the attempt to develop a clear appreciation of the implementation tasks stemming from the responsibilities and principles it establishes under the heading of integrated management. An extensive stream of explanation attempts to provide a foundation for implementation through what is now coming up as Phase II of the Oceans Action Plan. Unfortunately there remains concern about the pace—or even the reality of implementation. The CESD 2005 report expresses that concern for implementation and follow-through very clearly;

the less charitable line in the conference halls is simply “Where’s the action in the action plan?”

Nevertheless, this stream of documentation over the past decade established the basic orientation for future work towards realizing the objectives of integrated coastal and oceans management.

Oceans issues have been part of Canadian government for a long time, going back before the protracted UNCLOS negotiations, but for purposes of this story, it is sufficient to begin with the preparation for and follow-up from the Earth Summit, the 1992 UNCED meeting in Rio. That meeting focused, of course, on the concept of sustainable development, and Chapter 17 of Agenda 21, as noted in the previous section, set out implications for oceans resources. In Canada, the major follow-up action was passage in 1996 of the Oceans Act, which came into force January 31, 1997.

A crucial feature of the Oceans Act was the primacy given to the goal of sustainable development, to be pursued through adherence to three fundamental principles of integrated, precautionary, ecosystem-based management of human activities with impacts on marine resources and oceans ecosystems.

The Act also established the responsibility of DFO to provide the lead in coordinating federal government action in relation to oceans issues.

A series of discussion papers (Towards Canada’s Oceans Strategy; The Role of the Federal Government in the Oceans Sector; The Role of Territorial and Provincial Governments in the Oceans Sector) published in 1997 began the elaboration of the meaning of the commitments in the Oceans Act. In 1998 CIDA published a brief discussion paper describing its role within the activities coordinated by DFO; in 1999 Environment Canada did so as well.

DFO Strategic Plan was published in March 2000

DFO’s first Sustainable Development Strategy for 2001-2003

In 2001, an Oceans Task Group was established in support of the work of the Canadian Council of Fisheries and Aquaculture Ministers, itself presumably created about the time that CCME replaced CCREM.

The House of Commons Standing Committee review of progress toward implementation of the Oceans Act in October 2001 suggested (with substantial dissents) that the Oceans Act is fundamentally sound but that more substantial progress was needed, and (Recommendation 12) that the Minister exercise his responsibilities ‘more proactively’. In its response, the Government asserted that progress was being made, and noted efforts both to create a *federal* policy framework to support Canada’s Oceans Strategy and a *federal* action plan for modern integrated oceans management as well as to consult with governments and stakeholders in the future in order to move toward a *national* strategy

(emphasis added). Shortcomings in this process of broader consultation on the strategy and the Ocean Action Plan appear to lie behind an absence of provincial or stakeholder commitment to the OAP thus far.

In November 2001, Canada hosted the first intergovernmental review of the Global Program of Action to Protect Marine Resources from Land-based Discharges. Canada's National Plan of Action (NPA), submitted to that gathering, made substantial commitments to action. (The 2nd Intergovernmental Review is to be held later in 2006; it is not clear what measures have been taken to prepare Canada's participation in that meeting—but it seems clear that Canada's NPA should play an important part in integrated management at LOMA scale.)

In 2002 DFO issued a discussion paper setting out Canada's Oceans Strategy, along with a Policy and Operational Framework. These documents spelled out more fully the intent and character of integrated management, including recognition of its inherently adaptive character, and identified a number of pilot projects for work on integrated management.

In the same year a Framework Agreement was signed with First Nations on procedures for implementation of the COS. [Can we get copy and any updates?]

And of course Canada participated in Rio + 10, the World Summit on Sustainable Development, at which the Prime Minister made some unexpected commitments (including establishment of 5 Oceans Act MPAs by 2012) and Canada participated in some other commitments on a timetable for global action. (And has since played an influential role in the continuing international Global Oceans Forum that emerged from that meeting.)

A presentation to the Oceans Task Group in May 2003 set out the approach to the COS as seen by DFO at that time.

Over the 2003/2004 period a series of workshops was launched to develop operational approaches to identification of objectives and indicators. These included:

- Jamieson, G.S. et al. 2003. Proceedings of the Central Coast Integrated Marine Environmental Quality Workshop, Parksville BC, 2002. CSAS Proc Ser 2002/013;
- Halifax, 2003. Multi-stakeholder working group to develop a framework for human use objectives and indicators for the ESSIM initiative.
- Jamieson, G.S. et al. 2004. Proceedings of the Central Coast Marine Environmental Quality Indicators Workshop, Parksville, B.C. March 10-12, 2004. CSAS Proc Ser)

In the October 2004 Speech from the Throne the formation of the Oceans Action Plan was announced.

In November 2004 a Canada-BC MOU established commitments to cooperative action in implementation of the Oceans Actions Plan in general and in five specific aspects of

particular interest to BC. About the same time an undated, unidentified powerpoint presentation titled “Oceans Planning on the North and Central Coasts” was released to outline work in the Pacific North Coast Integrated Management Area (thus defining the boundaries of the Large Ocean Management Area (LOMA) previously planned for the West Coast). The change in emphasis from a Central Coast IMA to PNCIMA is not well-documented, but presumably reflects the intent to have the boundaries coincide more fully with relevant ecosystem boundaries. As a result of this redefinition of the boundaries, the new integrated management area boundaries agree well with the boundaries of BC government work on the Central and North Coast areas, which perhaps facilitates greater intergovernmental collaboration in future work than appears to have occurred in the past decade of BC government consultation around the development of ecosystem-based management in what has come to be called the Great Bear Rainforest. In the meantime, the specific sub-agreements providing for cooperative action in implementation have yet to be completed.

In the February 2005 budget the commitment to the Oceans Action Plan laid out in the October 2004 Speech from the Throne was funded with an allocation of \$28 million over two years. The Oceans Action Plan itself was made public in May 2005, with one of the four pillars of the plan being integrated management (and another being the health of oceans).

In 2005, the DFO Sustainable Development Strategy for 2005-6 was published (following an interim progress report for 2004, in the midst of the ongoing DAAP review). This SDS responds to the broad criticism by the CESD of the previous round of almost all federal departmental SDS documents, and seems to convey a stronger and more explicit DFO emphasis on the economic and development aspects of integrated management relative to the emphasis on biological and ecological concerns.

Also in 2005, the department’s Strategic Plan for 2005-2010 was issued, again suggesting the need for more balanced emphasis on economic development concerns, but also taking into account two significant features of the changes flowing from DAAP, namely the integration of fisheries and aquaculture work to achieve more comprehensive management of the fishery, both capture and culture, and the integration of work on oceans and habitat.

A particular stream of work within an international partnership is worth separate comment here. A 2001 “Dunsmuir Workshop” (Jamieson, G.S. et al. 2001. Proceedings of the National Workshop on Objectives and Indicators for Ecosystem-based Management. Sidney, B.C. Proc. Ser. 2001/09) addressed the development of objectives and indicators necessary to pursue the goals of integrated management implicit in the Oceans Act itself, and articulated in the Canadian Oceans Strategy. This workshop was closely followed by an Ottawa Workshop 29 April-1 May, 2002 on The Role of Indicators in Integrated Coastal and Oceans Management (as well as by similar sessions directed toward the Central Coast IMA in BC, and the ESSIM initiative on the Atlantic Coast, as just noted above.)

In the 2002 Ottawa workshop DFO partnered with the US National Ocean and Atmosphere Administration (NOAA), the Intergovernmental Oceanographic Commission (IOC) and the University of Delaware to launch a three year program to develop an appropriate indicators framework. Conclusions from that discussion were reported in a special issue of *Oceans and Coastal Management*, Volume 46, 2003.

In 2003, this stream of work led to publication of IOC Manual and Guide 45, *The Reference Guide on the Use of Indicators for Integrated Coastal Management*.

The work was pursued in a joint IOC-UNESCO preparatory workshop held in Paris in mid-July, 2005, and a subsequent review of progress in a further workshop in Paris in late- January 2006. At the former meeting, a report on “Ecosystem and Human Use Objectives in the ESSIM Plan” was presented. This report noted the need to condense a long list of 63 indicators in order to develop a small package of core indicators. At the latter workshop, a report by Stefan Belefiore on ‘lessons learned’ endorsed the ESSIM work and echoed the need to develop a small set of core indicators.

Progress was reviewed also in presentations by DFO participants at The Oceans Policy Summit (11-13 October 2005) in Lisbon and the Global Forum on Oceans, Coasts and Islands (23-27 January 2006) in Paris.

A meeting of the CCFAM Oceans Task Group held in Victoria in February 2006 set out OAP National Priorities for Phase I of the Oceans Actions Plan (2006/7), and considered presentations by British Columbia on the future of the OAP, the urgency associated with preparation for Phase II and on differing perspectives on Ecosystem-based Management.

As of this date, therefore, there remain some crucial issues of principle around the approach to be taken to implement commitments to ecosystem-based management. In particular, a conclusion to which this document will return in closing, is that it is not possible to separate a stream of work on ecosystem objectives from a stream of work on socio-economic objectives when it comes to management judgments and decisions themselves. (It will of course be inevitable that much of the information flowing to a management table will be developed in distinct specialized settings, but the inferences to be drawn from those information bases will need to be taken within a context of interactive review and joint decision-making.) The standard proposition now in the literature on ecosystem-based management is that one must view ecosystems comprehensively, including humans and human activities as integral parts of the ecosystem to be understood, and hence with human dimensions taken into the balance along with ecological dimensions in management judgments.

In this understanding, the dynamics of natural systems are to be studied, described and understood (within the limits of ignorance and uncertainty); but the dynamics (laws of motion) of these systems are non-discretionary; the structure can be described, but it exists. It is given as a setting within which humans act. The dynamics of human systems, however, can be changed in a discretionary manner; humans can exercise agency

individually and collectively (up to the limits of ignorance and uncertainty in our understanding of behaviour).

Thus one can attempt to control populations of non-human entities and the dynamics of natural systems by intervention in those systems, by controlling human activities that influence those systems, but cannot change the laws of motion themselves. One can, by contrast, attempt to manage human conduct through direct use of instruments to influence human action or, more fundamentally, human attitudes, beliefs and objectives. Those attitudes, beliefs and objectives include perspectives on the state and dynamics of natural systems. Ecosystem-based management achieved through attempts to manage human activities with impacts on the ecosystem thus entails a continuing interaction among ecological objectives and social objectives. Integrated management demands such continuing interaction rather than separated streams of activity

APPENDIX C

LAND AND RESOURCE PROTOCOL AGREEMENT

Between:

Gitga'at First Nation
Haisla Nation
Heiltsuk Nation
Kitasoo/Xaixais First Nation
Metlakatla First Nation
Wuikinuxv First Nation

(collectively the "Coastal First Nations" or a "Party")

And:

Her Majesty the Queen in Right of the Province of British Columbia

(the "Province" or a "Party")

as represented by
the Minister of Agriculture and Lands ("the Minister")

(collectively the "Parties")

Schedule C

Social and Economic Objectives for the Plan Areas

1. General

- 1.1. Ecosystem Based Management (EBM) in the Central Coast and North Coast Plan Areas is intended to achieve ecosystem integrity and contribute to community viability and higher levels of human wellbeing.
- 1.2. The Parties, with the goal of enhancing community viability and human wellbeing in the Central Coast and North Coast Plan Areas, intend to rely upon the Economic Objectives in this Schedule C to guide:
 - a. implementation of the LRMPs, Strategic Land Use Planning Agreements, and EBM; and
 - b. development of SRMPS and other Detailed Strategic plans undertaken in accordance with this Agreement and any applicable Strategic Land Use Planning Agreements.
- 1.3. In this Schedule C, Economic Objective encompasses all text under the headings “objective”, “indicator”, “target” and “rationale”.
- 1.4. The Parties, to facilitate progress on the Economic Objectives in this Schedule C, will pursue economic initiatives, policies and strategies in accordance with sections 3.5 b) and 5.5 c) of the Protocol and section 4.0 of Schedule A.
- 1.5. Before March 31, 2009, pursuant to further Government to Government discussions, the Economic Objectives in this Schedule C will be re-considered by the Parties and may be re-affirmed, revised, replaced and/or expanded upon by the Parties, as is necessary, to monitor and guide implementation of the LRMPs, the Strategic Land Use Planning Agreements, and EBM, more effectively.

2. Application

- 2.1. The Parties will use indicator data and other relevant information to guide implementation of this Agreement and any applicable Strategic Land Use Planning Agreements as follows:
 - a. a baseline for the indicators will be established;
 - b. indicator data will be collected annually (except for indicators where data is available less frequently) and indicator trends will be compared to the indicator targets;
 - c. if the targets are not met, the Parties will consider available economic data and information related to the Central Coast and North Coast Plan Areas

to assess why the targets have not been met and make recommendations to the Forum;

d. the analysis will use the best information available and may include input from First Nations, LRMP Plan Implementation Committees (“PICs”) and the EBM Working Group.

2.2. Failure to meet any Economic Objective is not a breach of this Agreement and will not necessarily trigger re-assessment of the implementation of the LRMPs, Strategic Land Use Planning Agreements and EBM.

2.3. If monitoring indicates a likelihood that aspects of the implementation of the LRMPs, the Strategic Land Use Planning Agreements and/or EBM are impeding progress toward achieving the Economic Objectives in this Schedule C, the Parties will, through Government to Government discussions, work to develop other economic initiatives and policy measures to increase the likelihood of achieving the targets, including if necessary application of flexibility in accordance with section 2.0 of Schedule B.

2.4 In striving to achieve the Management Objectives in section 3, the Parties understand that:

- a. the indicator data will come from regularly published, credible sources;
- b. the indicator data will be considered annually (although some select sources may produce data more or less frequently);
- c. the indicator data will be considered at a sub-regional or community level, if available, reflecting existing administrative boundaries, and at the provincial level (to facilitate relative comparisons);
- d. data from an individual First Nation or local community that does not come from regularly published sources may be collected by the respective First Nation or local community;
- e. relatively few indicators have been chosen by the Parties, since too many indicators result in difficulties in drawing conclusions about important trends; and
- f. the indicators chosen by the Parties are related to the local socio-economic conditions and may have an impact on implementation of the LRMPs, the Strategic Land Use Planning Agreements and EBM.

3. Social and Economic Objectives

* Data collected and/or compiled by First Nations and communities (requires First Nation and community resources for data collection and compilation).

** BC Ministry specific data (requires Provincial resources for data collection and compilation).

3.1 Class of Objective: First Nations cultural/traditional sustenance resources (plants and animals).

Objective	Indicator	Rationale	Data Source	Target
Sustain cultural /traditional resources (cedar, foods, medicines and other plants and animals) for First Nations' domestic use.	Identification of First Nations' cultural/ traditional resources.	Access to cultural /traditional resources, as required pursuant to s. 35 of the <i>Constitution Act, 1982</i> .	First Nation data.*	Maintain access to cultural /traditional resources, subject to measures for conservation and public health and safety.
	First Nations' harvest levels of cultural/ traditional resources.	Access to cultural /traditional resources, as required pursuant to s. 35 of the <i>Constitution Act, 1982</i> .	First Nation data.*	Maintain access to cultural /traditional resources, subject to measures for conservation and public health and safety.

3.2 Class of Objective: Community Viability.

Objective	Indicator	Rationale	Data Source	Target
Promote stable or growing population levels in Central Coast and North Coast Plan Areas ("Plan Area(s)") and Plan Area(s) communities.	Population Changes: in Plan Area(s) and local Plan Area(s) communities.	Decreasing population will erode community viability over time, as fewer are left to pay local taxes, purchase local goods/services, and use local infrastructure.	BC Stats Socio-Economic Profiles for Local Health Areas (LHAs) and municipalities. First Nation and local community data for smaller communities.*	Upward trend in population of Local Health Areas (LHAs) and Plan Area(s) communities.

3.3 Class of Objective: Economic Contribution of Plan Area Resources to Local Communities

Objective	Indicator	Rationale	Data Source	Target
Promote Plan Area(s) resource development by local individuals and communities, to contribute to local and provincial economies	# and % of tenures held by: Plan Area(s) communities, First Nations and individuals who live and work the Plan Area(s).	Interest in increased local participation in the development of Plan Area(s) resources.	First Nation and community data for smaller communities.* BC Government Ministry-specific data for total number of tenures**	Upward trend in economic contribution of Plan Area(s) resources to local individuals and communities.
	Annual resource revenues to First Nations.	Interest in increased benefit to First Nations from Plan Area(s) resources.	First Nation data*	Upward trend in resource revenue to First Nations.
	Annual resource (stumpage, etc.) revenues to BC.	Increasing revenues indicate benefit to province as a whole.	BC Government Ministry-specific data**	For monitoring purposes only.

3.4 Class of Objective: Economic Diversification

Objective	Indicator (measured in the Plan Areas)	Rationale	Data Source	Target
Diversify the economies of First Nations' and other communities in the Plan Area(s)	Economic Diversity Index.	Desire for local economic resilience and greater range of economic opportunities in the Plan Area(s).	BC Stats – local area economic dependency analysis based on Census data available every 5 years. First Nation and local community data for smaller communities.*	Increase in Plan Area(s) diversity index score. Upward trend in index score within First Nation and Plan Area(s) communities.
	Tourism room revenue. First Nation and local community tourism revenues and employment.	Interest in expanding and diversifying the tourism sector.	BC Stats - Tourism Sector Monitor. First Nation and local community data for smaller communities.*	Upward trend in room revenue. Upward trend in tourism revenues and employment in First Nation and Plan Area(s) communities.
	Mineral exploration expenditures.	Interest in increasing mineral sector exploration and development activity.	BC Ministry of Energy, Mines and Petroleum Resources - ARIS database.	Upward trend in mineral exploration and development expenditures.
	Timber Harvest by species and grade First Nation and local community forest sector revenues and employment.	Interest in a more diverse and financially viable forest sector.	BC (MOFR) harvest billing system First Nation and local community data for smaller communities.*	Timber harvest stable or increasing (as bounded by AAC) Upward trend in forest sector revenues and employment in First Nation and Plan Area(s) communities.
	Shell fish aquaculture expenditures and/or number of tenures. First Nation and local community shellfish revenues and employment.	Interest in developing a viable shell fish aquaculture industry in the Plan Areas.	BC Government Ministry-specific data for total number of tenures. First Nation and local community data for smaller communities.*	Upward trend in expenditure and/or number of shell fish aquaculture tenures. Upward trend in shellfish aquaculture revenues and employment in First Nation and Plan Area(s) communities
	Assessed property values for Plan Area(s) and by municipality.	Desire for greater municipal and Plan Area(s) property tax base.	Ministry of Community Services - BC Assessment Authority data.	Upward trend in assessed property values.

3.5 Class of Objective: Employment.

Objective	Indicator	Rationale	Data Source	Target
Improve prospects for employment in the Plan Area(s).	Employment levels & unemployment rates in the Plan Area(s) and communities in the Plan Area(s).	Avoid pressure for out-migration by reducing high unemployment rates in the Plan Area(s) and communities in the Plan Area(s).	BC Stats – from Census data available every 5 years. First Nation and local community data for smaller communities.*	No net job loss in LHAs and a lower unemployment rate in LHAs (in 2011 vs. 2006 census year). Upward trend in employment levels in First Nation and Plan Area(s) communities.
	EI claimants as % of Pop. Aged 19-64 vs. BC overall rates.	Avoid pressure for out-migration by reducing high unemployment rates in the Plan Area(s) and communities in the Plan Area(s).	BC Stats - LHA profiles. First Nation and local community data for smaller communities.*	Downward trend in EI claim rates in LHAs. Downward trend in unemployment levels in First Nation and Plan Area(s) communities.
	"Long-Term" EI Claimants as a % of Pop. Aged 19-64 vs. BC overall rates.	Avoid pressure for out-migration by reducing high unemployment rates in the Plan Area(s) and communities in the Plan Area(s).	BC Stats - LHA profiles. First Nation and local community data for smaller communities.*	Downward trend in claim rates in LHAs.

3.6 Class of Objective: Wages and incomes.

Objective	Indicator	Rationale	Data Source	Target
Promote growth in annual Incomes	Average income per tax filer and average family income.	Higher incomes lead to a greater purchasing power and ability to consume local goods and services and reduces risk of out-migration.	BC Stats – from annual <i>Canada Customs and Revenue Agency</i> data, but 3 year lag in publication; Census data on family income available every 5 years.	Upward trend in personal income in LHAs.