Ecosystem Planning for Canadian Urban Regions

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ICURR Publications
Toronto

November 1994

Published by ICURR PRESS
Suite 301, 150 Eglinton Avenue East,
Toronto, Ontario
Canada M4P 1E8
Telephone: (416) 973-5629
Fax: (416) 973-1375

First Edition: November 1994

ISBN 1-895469-45-7

Canadian Cataloguing in Publication Data

Ecosystem Planning for Canadian Urban Regions

Includes bibliographical references.
ISBN 1-895469-45-7

1. Regional planning—Environmental aspects—
Canada. 2. Urban Ecology—Canada.
I. Tomalty, Ray. II. Intergovernmental Committee
on Urban and Regional Research (Canada).

HT395.C3E36 1994 307.1'2'0971 C94-932405-1

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Foreword

On behalf of the Intergovernmental Committee on Urban and Regional Research (ICURR), we are pleased to present this survey and analysis of ecosystem planning in Canada. The study, written by Ray Tomalty, Robert Gibson, Donald Alexander and John Fisher, is comprehensive in scope and includes a review of the literature and an examination of related approaches, such as green cities and healthy communities. An assessment of 15 Canadian and American case studies brings the concept to life. The monograph concludes with a five step ecosystem planning model for urban regions.

ICURR, in cooperation with its sponsors, the provincial ministries of Municipal Affairs and the Canada Mortgage and Housing Corporation, identified the issue of sustainable urban development as one of the key challenges of urban research and provincial and municipal planning. It is also an issue which transcends sectoral boundaries, be they academic or administrative. ICURR would like to acknowledge the significant contribution of the State of the Environment Directorate, Environmental Conservation Service, Environment Canada, in bringing this report to publication. Equal thanks go to the Ontario Ministry of Environment and Energy, Environmental Planning and Analysis Branch and French Services, for its significant and valued support.

It is obvious that a project of this scope, involving several researchers across Canada, is a large undertaking that could not have been developed without the cooperation of different branches of the federal and provincial governments. This report is a complement to studies in the field of the municipal environmental planning published previously by ICURR: *Sustainable Urban Development in Canada: From Concept to Practice* by Virginia Maclaren and *Environmental Policy Review of 15 Canadian Municipalities* by Paule Ouellet.

ICURR hopes to pursue this challenging area of research as it will undoubtedly play an increasingly important role in the planning process. Other areas of research at ICURR include local governance, local finance and local economic development. We wish to acknowledge the assistance of the federal, and the various municipal and provincial governments, which enabled us to successfully complete this innovative study.

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Acknowledgments

The authors would like to acknowledge the valuable assistance of ICURR staff in creating this report. ICURR's director of research, Claude Marchand, provided crucial guidance and support throughout the project. Comments on an earlier draft provided by Dr. Marchand and ICURR executive director Michel Gauvin, along with suggestions from nine federal, provincial and territorial reviewers, helped improve and finalize the document. Library assistance was provided by John Slatcher and database searching was performed by Michael Afar and Vicky Gregor.

We would also like to express our gratitude to the large number of officials in government and non-government organizations who furnished much of the information contained in this report. The research assistance of Paule Ouellet of Environment Canada is gratefully acknowledged. Carolyn Guillet and Don Irvine also provided valuable research support.

Author Biographies

Ray Tomalty has a Master's of Public Administration degree from Queen's University and is currently completing a doctoral program in the School of Urban and Regional Planning at the University of Waterloo. His dissertation is on the political economy of sustainable urban development, especially regarding the choice of urban form. Mr. Tomalty has broad research experience in urban intensification, green cities, ecosystem planning, and environmental health standards, and has authored many publications in these areas. He is now based in Toronto.

Robert B. Gibson is an associate professor in the Department of Environment and Resource Studies at the University of Waterloo. He has a doctorate in political science from the University of Toronto and has spent most of his professional and academic career in the field of environmental policy. His professional experience, teaching, research and publications have centred on environmental planning, assessment and regulation in various Canadian jurisdictions. He is now completing work on a major SSHRC-funded research project on interrelations between environmental assessment and planning in Ontario. From 1985 to 1993, Dr. Gibson was a member of the Ontario Minister of the Environment and Energy's Environmental Assessment Advisory Committee, which has held public reviews on several major planning and environment cases in Ontario.

Donald H.M. Alexander recently completed his Ph.D. at the School of Urban and Regional Planning, University of Waterloo. His dissertation was on the role of citizens' groups in the land-use planning process, with particular reference to environmental citizenship. He has a master's degree from the Canadian Heritage and Development Studies program at Trent University and an extensive background of participation, research and publication on ecosystem and bioregional planning, sustainable community development, and citizen involvement, based on Ontario and BC experience. He was a founder and co-chair of an influential citizens' group focused on stewardship of the Oak Ridges Moraine, a prominent ecological feature in Ontario. He now lives in Vancouver.

John Fisher is a Master's graduate from Trent University, Peterborough, where he studied watershed and natural area planning. He currently serves a provincial cabinet appointment to the Otonabee Region Conservation Authority and is Vice-Chair of the Otonabee Region Conservation Foundation. John was one of the founders of the Save The Oak Ridges Moraine (STORM) Coalition, serving as its Co-chair in 1991. He is now one of STORM's representatives on the Oak Ridges Moraine Technical Working Committee and remains actively involved with this issue. John is now acting as a local facilitator in federal-provincial discussions relating to the

potential nomination of the Trent-Severn Waterway to the Canadian Heritage River System.

Executive Summary

Ecosystem planning holds out the promise of enhancing the legitimacy, efficiency, and effectiveness of the planning process. However, most applications of this planning approach so far have been in rural, wilderness, or resource contexts. This report shows how the ecosystem planning concept can be used to develop a planning framework for managing growth in urbanized regions.

The research findings reported here approach the application of ecosystem planning for Canadian urban regions in four steps:

- examination of the meaning of ecosystem planning, particularly in comparison to the prevailing character of conventional planning practices (Chapter I)
- provision of a representative survey of ecosystem planning across Canada and elsewhere, along with identification of the main constraints and barriers encountered by those seeking to apply the ecosystem planning approach (Chapter II)
- exploration of other movements and methods that are in important ways similar to the ecosystem approach to planning and may offer insights for the application of ecosystem planning in Canadian urban regions (Chapter III)
- delineation of how an ecosystem planning approach could be encouraged in Canada, either by adapting the approach to existing institutional conditions or by changing such conditions to incorporate ecosystem planning principles (Chapter IV).

Information on these matters was obtained through a review of existing planning and policy documents in order to establish a definition of ecosystem planning; through a national and international scan of literature on ecosystem planning and related initiatives; and through telephone interviews with selected participants in ecosystem planning and related initiatives.

Defining ecosystem planning

In the last few years the concept of ecosystem planning has been explored in considerable detail by planning inquiries and related initiatives in Ontario. A review of key documents from this work points to seven planning principles that are central to the ecosystem approach and that distinguish this approach from conventional planning practices:

Principle 1: Base planning units on natural boundaries
Conventional planning uses a hierarchy of smaller-to-larger planning units with boundaries that rarely recognize ecological factors. An ecosystem approach replaces the politically-oriented hierarchy of planning units with nested units that are established at least in part to respect ecological functions and are assigned natural boundaries.

Principle 2: Design with nature
Traditionally, planners have seen "raw" land as a blank slate ready for human manipulation and use, and have replaced complex ecological processes with engineered, often linear systems. New planning and design approaches based on ecological principles favour more creative solutions based on the biological productivity of natural systems, cycling of resources, or reduced need for services through demand management.

Principle 3: Consider global and cumulative effects
An ecosystem approach involves a much longer and broader planning horizon than conventional approaches, which have tended to favour short-term and local considerations at the expense of long-term, global concerns. Consideration of off-site, cross-boundary and cumulative effects is included in the ecosystem planning process.

Principle 4: Encourage interjurisdictional decision-making
Conventional land-use planning is commonly carried out by many separate authorities largely in isolation from each other and from other significant planning and management activities. The ecosystem approach attempts to overcome jurisdictional fragmentation by encouraging new planning units, agencies and methods that promote interjurisdictional decision-making.

Principle 5: Ensure consultation and facilitate cooperation and partnering
Unlike conventional planning, in which land-use decisions are often made in a technocratic manner after discharging the legal obligation for some perfunctory public involvement, the ecosystem approach actively seeks to involve the widest range of stakeholders effectively and openly in the planning process.

Principle 6: Initiate long-term monitoring, feedback and adaptation of plans
Monitoring mechanisms are included in the ecosystem approach to allow communities to assess progress in implementing a plan, to track the response of ecosystem elements when plans are implemented, and to provide a reliable basis for adapting plans to changing conditions. In conventional land-use and environmental planning, few resources are expended to assess what happens to ecosystems as plan implementation unfolds.

Principle 7: Adopt an interdisciplinary approach to information
Social, demographic, and economic information has been emphasized in traditional planning, with few attempts to assess ecological capacity or to assess how efforts to satisfy anticipated socio-economic demands may affect ecological functions. The ecosystem approach implies a greater scale of information gathering, more integration of information and greater co-operation among information providers, both amateur and expert. It also recognizes that information will not eliminate uncertainty in planning and that relevant information may only become available as the plan unfolds.

Lessons from ecosystem planning case studies

Chapter II describes 15 ecosystem planning initiatives—thirteen in Canada and two in the United States—which provide a good indication of the present scope of ecosystem approach applications. They also reveal the initial lessons from experience with the ecosystem approach gained under various social and economic conditions and in a variety of political jurisdictions.

The cases are: the Fraser River Estuary Management Program (British Columbia), the Fraser Basin Management Board (British Columbia), the Georgia Basin Initiative (British Columbia), Alberta's Integrated Regional Planning System (Alberta), the Meewasin Valley Authority (Saskatchewan), Cumulative Effects Monitoring on the Niagara Escarpment (Ontario), Oak Ridges Moraine (Ontario), Laurel Creek Watershed (Ontario), Regional Municipality of Ottawa-Carleton (Ontario), the Waterfront Regeneration Trust (Ontario), the Hamilton Harbour Remedial Action Plan (Ontario), the St. Lawrence Action Plan (Quebec), the St. Croix Estuary Project (New Brunswick/United States), the New Jersey Pinelands Commission (United States), and the Chesapeake Bay Program (United States).

Each case study discussion includes a description of the initiative, comments on strengths and weaknesses of the initiative, followed by an outline of the main lessons for designing and implementing a more successful ecosystem planning model.

Taken together, the lessons from the case studies suggest that the seven ecosystem planning principles are valid, but need to be supplemented in a variety of ways. In particular:

- More attention needs to be paid to ensuring that ecosystem planning bodies have, or are supported by, sufficient authority to ensure implementation.
- Insights from beyond ecosystem planning experience are needed to enrich understanding of cumulative and global implications and to guide practical application of the design with nature principle.

- Ecosystem planning initiatives also have much to learn from each other about interjurisdictional co-operation and public involvement—while the cases offer many exemplary successes and important innovations in both areas, the record here is still uneven.

- As ecosystem planning initiatives expand, there will be increasing pressure to recognize and address many entrenched attitudes and practices, including those concerning private property and proper relations between private rights and public goods.

Lessons from related approaches and techniques

Many other movements and methods share features with an ecosystem approach but are carried out in different contexts or for different purposes. Several are sufficiently similar that they offer valuable insights for addressing the weaknesses of current ecosystem planning initiatives and for designing more effective ways to apply the ecosystem planning concept in Canadian urban regions.

Chapter III identifies and describes eleven other movements and methods that share features with an ecosystem approach. These are: Sustainable Urban and Regional Development, Green Cities, Ecosystem Planning in the Private Sector, Eco-Cities, Eco-Towns, Eco-Villages, Conservation Strategies, Round Tables, Environmental Assessment, Healthy Communities, Bioregionalism, Growth Management, and State of the Environment Reporting. As with the case studies in Chapter II, each of these related initiatives is described and its main strengths, weaknesses and lessons for ecosystem planning are identified.

The overall findings both confirm and help enrich understanding of the seven basic principles of ecosystem planning. In addition, experience with these approaches has revealed at least some of the main barriers likely to be faced in attempts to apply the ecosystem planning approach, and has pointed to the most promising strategies for dealing with these problems. The main insights for those interested in designing a generic model for implementing the ecosystem planning approach in Canadian urban regions are as follows:

- Initiatives that intend to integrate ecological, social and economic concerns in planning seek changes in attitudes, structures and behaviour that cannot be imposed, or even effectively fostered through consultation; these changes must be sought through the collaborative efforts of those whose attitudes, structures and behaviour are involved.

- These collaborative efforts will be easier where people have retained or developed a sense of community and commitment to a place; in turn these

efforts may themselves be expected to enhance and strengthen the sense of community and commitment to a place.

- Acceptance of change will also be easier where people have practical, direct involvement in designing and applying new approaches.

- The integration of ecological, social and economic concerns is not about finding a balance among these as competing priorities. While there will be conflicts, the essential relation is mutual interdependence and the best economic activities are those that restore and enhance communities and ecosystems.

- Far-sighted planning requires the mutual setting of goals for a desired future. Participants will approach this task with different immediate interests and associated concerns. It is best to begin positively, by focusing on what people want to achieve and retain, rather than what they fear might happen.

- Even in pursuing innovative goals, there is a strong temptation to rely on minor adjustments to old assumptions and solutions. Mandatory elaboration and assessment of alternative plans is therefore crucial.

- There are too many uncertainties in understanding and prediction to justify initiatives that endanger valued aspects of community and place; the precautionary principle should prevail.

- Ecosystem planning and similar approaches are exercises in social learning. There can be no final answers. The process must be cyclical and iterative, always under review and dedicated to learning from experience.

In our final chapter, we will take these lessons, along with the seven principles and the insights from the case studies, and apply them in the development of a basic model for implementing the ecosystem planning approach in Canadian urban regions.

A basic framework for ecosystem planning model and principles for further links

In Chapter IV, the insights gained in previous chapters are used as the basis for outlining a generic five-step planning framework for implementing the ecosystem approach:

Step 1: Scoping the planning process

Identify current problems and issues, identify all relevant stakeholders, and involve them along with members of the general public in drawing up an initial list of goals and priorities.

Step 2: Defining and surveying the planning region
Settle on the various parameters to be measured, gather the relevant data, and resolve the issue of the region's boundaries.

Step 3: Modeling and analyzing the region
Delineate the three main systems (biophysical, infrastructural, and urban form) and their interrelationships; identify needs and trends, starting with demography; and begin to determine the optimal location for different types of land-uses, based on criteria of suitability, efficiency and compatibility.

Step 4: Developing a structure plan
Formulate detailed goals and objectives in relation to the three systems; formulate rival scenarios, with assessments of their effects on the agreed-upon goals and objectives; reduce the scenarios to two or three structure plan options through negotiation; and submit them to careful environmental assessment, public debate and a selection process.

Step 5: Refining and implementing the chosen option, monitoring the regional environment, and revising the plan
Develop detailed plans and zoning designations through consultation and negotiation; establish requirements and procedures for planning, reviewing and approving individual projects under the plan, and for interim plan amendments; monitor effects and overall changes; and, after a specified period of implementation, undertake a comprehensive plan review.

To facilitate implementation, this framework is intentionally structured in a way that retains as much as possible from the general outlines of conventional land-use planning. The framework is nonetheless meant to reflect and facilitate application of the seven principles of the ecosystem approach to planning, which contrast sharply with conventional practice. It is unreasonable to expect that full implementation anywhere will be instant or easy.

Further complications are posed by the need in every case to approach application in the context of larger areas and broader problems. To recognize some of the most significant of these links, we propose three additional ecosystem planning principles to complement the seven extracted from the ecosystem planning literature surveyed in Chapter I:

Recognize the demands on ecological carrying capacities beyond as well as within the planning area
No ecosystem and no ecosystem-based planning area is separate from the regional or planetary whole. We need to think rigorously about regional (and appropriated) carrying capacity and self-sufficiency to avoid the danger of a simply ameliorative

approach to growth management, and to help achieve the global conditions for ecological sustainability.

Link ecosystem planning to other aspects of democratic change
Even the most enlightened planning, by itself, is never enough. Advances in planning must be linked to concurrent, broader changes in social attitudes and values that are both democratic and environmentally responsible. Like ecosystem planning, these broader changes require the involvement of people in various forms of social learning.

Ensure land-use planning integrates environmental and economic objectives
Reform of land-use planning should be seen as part of the larger task of fully integrating environmental and economic planning, so that any economic activity not only "sustains" the environment, but helps to restore it.

Finally, in light of the research findings and the proposed ecosystem planning model, it is evident that further work is needed in the ecosystem planning field. Themes for further research include the distinction between ecosystem health and integrity in urban areas, the concept of the urban ecosystem, and strategies for planning under conditions of scientific uncertainty.

Chapter I

Applying the Ecosystem Planning Concept to Canadian Urban Regions: Initial Objectives and Definitions

Introduction

Land-use planning in many Canadian jurisdictions seems to be in a state of crisis. The existing planning processes are denounced by their critics as too fragmented, too expensive and time consuming, and too slow, reactive and arbitrary. Moreover, there is increasing public and professional recognition that the existing processes are insufficiently sensitive to environmental and social factors, and typically leave us with ugly, unsustainable settlement patterns.

One potential response to these identified weaknesses centres on the concept of ecosystem planning. The ecosystem approach to planning is founded on a simple premise: human activity is part of the environment, in that it shapes the environment and is in turn limited by environmental factors of resource availability and system resilience. The ecosystem approach acknowledges that development takes place in the context of a highly complex matrix of interrelated elements, including other living species and non-living elements.

Because of its emphasis on and appreciation of ecological complexity and vulnerability, ecosystem planning can avoid expensive environmental mistakes and the need for remediation. By encouraging greater public participation, ecosystem planning may increase acceptance and support for plans and their implementation, and by reducing conflict, it should reduce the money and time costs associated with the planning process. Finally, as an integrative approach, ecosystem planning can cut down on the duplication of services, the fragmentation of planning mandates, and the frustration of developers and other stakeholders while increasing the accountability of planning and elected officials. In short, ecosystem planning holds out the promise of enhancing the legitimacy, efficiency, and effectiveness of the planning process.

So far, most applications of this planning approach have been in rural, wilderness and resource contexts, such as water quality management in the Great Lakes or national park management in South Africa (International Joint Commission, 1978; van Riet, 1990). Few attempts have been made to translate the ecosystem planning concept into a systematic approach to land-use planning in urban areas.

In this report, we respond to this deficiency by exploring how the ecosystem planning concept can be applied in urbanized and urbanizing regions.

The Objectives and Focus of this Report

Our goal has been to develop a framework for applying the ecosystem planning approach to urbanized and urbanizing regions in Canada. We have approached this in four steps, reported successively in the four chapters of this document.

The first step—set out in this chapter—is an examination of what "ecosystem planning" means, and how it contrasts with the prevailing character of conventional planning practices in this country. We anchor our search for a definition in Ontario where over the past few years the concept of ecosystem planning has been explored in considerable detail by two major planning inquiries and in several related initiatives. A review of key documents from this work points to seven planning principles that are central to the ecosystem approach and that distinguish this approach from conventional planning practices.

Chapter II then turns to the lessons of experience. It examines 15 recent ecosystem planning initiatives, twelve in Canada and two in the United States. These cases provide a good indication of the present scope of attempts to apply the ecosystem approach. They also reveal the initial lessons about the ecosystem approach gained under various social and economic conditions and in a variety of political jurisdictions. In each case we describe the initiative, report the strengths and weaknesses of the initiative, and identify the apparent lessons for more successful design and implementation of an ecosystem planning model.

In Chapter III we expand the scope a little to explore eleven other planning-related movements and methods that share features with an ecosystem approach but are carried out in different contexts or for different purposes. These are sustainable urban and regional development, green cities, ecosystem planning in the private sector, eco-cities/towns/villages, conservation strategies, round tables, environmental assessment, healthy communities, bioregionalism, growth management, and state of the environment reporting. Our purpose in reviewing these initiatives is to see to what extent the basic principles of the ecosystem planning approach are reflected in related efforts. As well, we wish to identify common difficulties and lessons relevant to applications of the ecosystem planning concept.

Finally, in Chapter IV we take the seven principles, along with the lessons from ecosystem planning experience and the related initiatives, and apply them to the development of a generic five-step planning framework for implementing the ecosystem approach in Canadian urban regions. We also identify some of the larger

issues needing further attention as urban regions move to apply the ecosystem approach.

Throughout this report, our focus is on Canada, on the use of ecosystem planning principles in the management of human settlements, and on lessons for application to urban and urbanizing areas facing growth management challenges. Urban land-use planning in Canada is usually the responsibility of local or regional governments. However, successful application of the ecosystem approach to planning will also involve—and have implications for—provincial authorities, and in many cases federal authorities as well. Because of this, the unique characteristics of established Canadian constitutional and institutional arrangements must be respected in the design of any practical approach to applying the ecosystem planning concept here. We have therefore concentrated on Canadian sources and situations in this work, although we have drawn some insights from elsewhere, especially the United States.

The decision to focus on urbanizing regions where growth management is an important issue is based on our judgment that the need to incorporate an ecosystem approach into planning reform is greatest in and around growing urban areas where environmental demands, stresses and abuses threaten to proliferate. Certainly the regions experiencing economic and population growth have been the main sites for environmentally-centred conflicts brought on by conventional land-use planning in Canadian urban regions. However, there have also been environmental planning problems in economically stable and declining urban areas and the ecosystem approach to planning should be applicable to urban areas of all kinds.

Defining Ecosystem Planning

From its origins in the scientific disciplines and its first application in resource management and parks planning, the ecosystem concept has slowly begun to permeate urban planning in Canada and elsewhere. So far, however, it has not solidified as a recognized specific type of planning regime or set of planning practices conducted by a particular agency or level of government. There is not yet even a clearly-stated and well-accepted definition of what ecosystem planning is. And in practice, while planning initiatives that focus on ecosystem concerns are evident in many places, they have appeared under several names in a variety of planning activities conducted by different authorities with diverse purposes.

Nevertheless, the existing literature and various applications do point to the rise of a reasonably coherent new set of ideas about how to approach land-use planning in a manner that respects ecosystems. This new set of ideas may not yet be presentable as an entirely tidy and well-bounded package. But it is certainly possible to identify the common set of central ideas or principles underlying the ecosystem

approach clearly enough to serve as the working definition needed for the purposes of this report.

One way of identifying these principles—without labouring through the whole of the accumulated literature and experience—is to examine the debates and experience in a single jurisdiction, treated as a microcosm of the overall evolution of the concept. For this, the best choice is probably southern Ontario, where various agencies and two major inquiries have wrestled with the meaning and potential applications of the ecosystem planning concept, and where the approach has been explicitly adopted in a number of plans. In the following sections we trace the recent Ontario efforts to define or refine the concept, and we distill seven basic principles as the defining characteristics of ecosystem planning.

The Ecosystem Concept in Ontario

When the Commission on the Future of the Toronto Waterfront (also known as the Crombie Commission after its chair, David Crombie), published its interim report, *Watershed,* in August 1990, it marked a new stage in the history of ecosystem planning in Canada. Until that time, the notion of ecosystem planning was little known outside professional and citizen planning circles and, in comparison to concepts like sustainable development, did not seem likely to play a major role in guiding attempts at a rapprochement between economic and environmental interests.

The strength of Crombie's report was that it seemed to gather up all the positive ideas for change under one relatively simple concept—the ecosystem approach—and then delivered it to a receptive public.

Although Crombie's inquiry was originally focused on solving the environmental and other problems of the Toronto waterfront, the interim report recognized that what was happening there reflected what was happening upstream in the watersheds emptying into the area. The interim report therefore explained the decision to expand the commission's purview to include the Oak Ridges Moraine, the Niagara Escarpment and the many streams and rivers flowing from these land features into Lake Ontario through the Toronto region. In this way, all the pressing environmental, social and political issues of the region could be tackled using the ecosystem approach (RCFTW, 1990). At the same time, the Commission's background papers on various aspects of the Toronto waterfront showed that the approach could also be applied fruitfully to site-specific land development issues (Barrett, 1991a).

The report presented ecosystem planning as the answer to a host of problems including a degraded physical environment, the blight of urban sprawl, overlapping

and ineffectual political and administrative jurisdictions, and fiscal inefficiency. An ecosystem approach to studying, planning, and managing urban problems seemed to provide all the positive features that had come to be associated with the notion of sustainable development (environmental improvement while showing concern for equity and economy), while avoiding its nebulousness by being anchored in a scientific understanding: i.e., the concept of the ecosystem.

Of course, the concept of ecosystem planning did not begin with the publication of *Watershed*. Indeed, while Crombie was working on his report, two other ecosystem planning reports were being prepared in the region. The Metro Toronto and Region Conservation Authority (MTRCA) had held a series of five workshops to explore the concept with reference to the proposal to develop the new community of Seaton on the eastern side of the Greater Toronto Area. A report on this initiative was issued in September 1990, and has since been widely circulated (MTRCA, 1990).

Meanwhile, Liberal MPP Ron Kanter had been commissioned by the Ontario government to develop a strategy to preserve and enhance the system of greenlands in the Greater Toronto Area. His report recommended that the greenlands "should be managed within an ecosystem context." He called for changes in land-use and the land-planning process in order to protect the region's greenlands, many of which are associated with streams and river corridors (Kanter, 1990: 83).

Prior to the report, an influential citizen's group in the Greater Toronto Area called the Save the Oak Ridges Moraine (STORM) Coalition, had advocated an ecosystem approach to preserving the region's most important landscape feature, the Oak Ridges Moraine (Alexander, 1990). The group had made strong presentations to the Crombie Commission arguing that the waterfront could be rehabilitated only if the Oak Ridges Moraine were protected, since the moraine served as the headwaters of the Toronto area's streams and rivers.

In 1989, the Rawson Academy of Aquatic Science adopted its Ecosystem Charter in order to promote ecosystem values in the Great Lakes Basin. The charter called on public and private agencies to accept responsibility for maintaining or restoring ecological processes in the Great Lakes Basin.

By the time Crombie struck on the notion of ecosystem planning, it had already been used in Ontario by several Remedial Action Programs (RAPs) around the Great Lakes, including the Metro Toronto and the Hamilton Harbour RAPs. These, in turn, owed their approach to the 1978 declaration by the International Joint Commission (IJC) that it would be adopting an ecosystem approach to the study and management of water quality in the Great Lakes Basin.

On the Toronto waterfront itself, there had already been an ecological planning study carried out by the celebrated urban ecologist Ian McHarg (Wallace, McHarg,

Roberts, Todd, 1976). The study detailed the various ecological and social processes involved in structuring the Toronto waterfront and made recommendations for improving the management of the area.[1] Robert Dorney and Michael Hough had also advocated an ecological approach to land-use planning/site design and had completed several planning studies in the Toronto region.

In the more distant past, Ontario's conservation authorities had been set up with a mandate to do something very much like ecosystem planning, at that time called "river valley development." Although not specifically designed for use in urban areas, river valley development introduced the notion of an integrated approach to resource management on a watershed basis. By the time Crombie wrote his interim report, conservation authorities in the Toronto area had begun to rediscover this early mandate and were conducting ecosystem-based management studies.

But the publication of Crombie's interim report brought the notion of ecosystem planning to the attention of a wider public and into the mainstream of planning discourse. Virtually every document dealing with ecosystem planning published in Ontario after 1990—and suddenly there were many—makes reference to or draws upon Crombie's report. This includes the report of the Ontario Premier's Council on Health, Well-being and Social Justice (1993) and the Conservation Authorities of Ontario's *A Conservation Strategy for the Conservation Authorities of Ontario*. (1992).

While many documents made use of or referred to the Crombie and MTRCA reports (e.g., Ontario, 1993), few made any attempt to further refine the concept of ecosystem planning. The announcement by the Commission on Planning and Development Reform (popularly known as the Sewell Commission) that it would recommend the adoption of the ecosystem approach in a reformed Ontario *Planning Act* stimulated other provincial agencies to flesh out the meaning of the concept.

At the provincial level in Ontario there have been two such attempts. In 1992 the Ontario Ministry of the Environment (OMOE) published a report, entitled "Toward an Ecosystem Approach to Land-use Planning: A Biophysical Environment Perspective." In 1993, the Ministry of Natural Resources (OMNR), working jointly with the Ministry of the Environment and Energy (OMEE)[2] released a three part report on the relationship between the principles of watershed planning and the existing institutions of land planning in Ontario.

The concept has also come into vogue at the local level in Ontario where some municipal authorities have found it a useful theme around which to structure official

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[1] McHarg himself drew upon the long tradition of ecologically-oriented regional planners which included Lewis Mumford, Benton MacKaye, Patrick Geddes and others.

[2] In 1993, the Ontario Ministry of the Environment was renamed the Ministry of the Environment and Energy.

plan reviews. In its review of its official plan, the Regional Municipality of Ottawa-Carleton adopts an ecosystem approach and, in related documents, makes some attempt to analyze and refine the concept. Its publication *Information and the Ecosystem Approach* (Miller, 1993) focuses on the special information needs and problems associated with implementing the ecosystem approach.

Taken together, the documents produced by these various Ontario initiatives point to the central elements of a definition of "ecosystem planning" at least as it has evolved so far. In the following discussion we identify these elements. To avoid imposing a definition on the material and to provide a sense of the tone and content of the present literature, we quote extensively from the Ontario documents.

Human/Non-human Relations and the Essence of Ecosystem Planning

The essential contribution of the ecosystem approach to planning is its recasting of relations between humans and the rest of nature. Conventional planning tends to treat human society, economy and built form as separable from nature, ignoring the dependence of human systems on ecological support systems. In contrast, the ecosystem approach to planning casts the human-built world as part of the natural world and recognizes its dependence on and responsibility towards nature. As Aldo Leopold put it, the new land ethic embodied in the ecosystem approach "changes the role of Homo sapiens from conqueror of the land-community to plain member and citizen of it."

Those who have elaborated the ecosystem planning idea see this new attitude as necessary as well as reasonable because it reflects the reality of human-environment relations. For example, Crombie (quoted in Solway, 1992: 14) says the ecosystem approach can be distilled down to four basic observations:

- everything is connected to everything else
- human beings are part of nature and not separate from it
- humans are responsible for the impact of their actions, as they affect other creatures, other people, and other generations
- economic health and environmental health are not mutually exclusive, but mutually dependent.

Similar observations about the need to respect the interrelatedness of humans and nature are commonly found in the literature on ecosystem planning and in the documents reviewed here. For instance, the MTRCA (1990) explains,

> Key to the definition of ecosystem is the recognition of humans and the man-made environment as an integral part of the ecosystem. People generally view themselves as separate from the ecosystem.

STORM further elaborated on the significance of recognizing the links and interdependencies:

> An ecosystem approach is not reducible to a repertoire of techniques; more fundamentally, it is an attitude and a sensibility.... Whereas standard approaches are mitigative—that is, they assume development as a given, and seek to mitigate its impacts, an ecosystem approach means fitting our activities into the web of nature—letting nature tell us what is and is not appropriate. Ecosystem planning is about reviving the visionary tradition in regional planning—pioneered by Patrick Geddes, Benton MacKaye, Lewis Mumford and others—in which conservation, land-use, and economic planning are seen as being indissolubly connected (Alexander, 1990: 3).

Not surprisingly, as an approach that rests on a new willingness to accept an interconnected reality, ecosystem planning is inclined to pursue a new and different set of planning goals and objectives.

The Goals of Ecosystem Planning

Ecosystem planning is often said to be "goal directed" (Gardner, 1989), if only because it seeks to correct the problems spawned by traditional planning practices that have given little attention to nature as an interconnected complex of functions, and a foundation for life.

Traditional planning practice has not emphasized goal setting. Because it has generally accepted expansion as inherently good, and the environment as a collection of resources, it can be satisfied with merely facilitating or adapting to existing economic and social trends (and the demands they give rise to) rather than setting community and ecological goals to be achieved through the planning process. Where environmental goals are established under the traditional approach, they are likely to be limited to utilitarian anthropocentric concerns such as flood control, slope stabilization, and the preservation of green spaces for recreation and leisure.

In contrast, most depictions of ecosystem planning emphasize dedicated, sometimes very ambitious, efforts to formulate and achieve planning objectives centred on the rehabilitation and maintenance of ecosystems. But typically these efforts are to be linked with work to improve and sustain the health of communities. Accordingly, ecosystem planning entails design and pursuit of a new set of development goals.

Ecological goals

The ecosystem planning documents we reviewed universally advocate the development of ecological goals, and most attempt—at least generally—to provide an indicative list. The most complete statement of ecological goals is found in the Ottawa-Carleton official plan review background document (Miller, 1993: 4-6). The document advocates efforts to

- maintain natural processes that support life
- maintain ecological diversity of the region
- conserve the resource base
- increase the efficient use and conservation of resources
- limit the scale of human activity to a level which respects life support systems and the capability of the ecosystem to supply supporting material
- explore opportunities to enhance the quality of ecosystems and their ability to adapt and adjust.

Addressing the same concerns from a somewhat different angle, the already mentioned MTRCA (1990: 10) report calls for a strategy to

- minimize waste production, minimize energy/raw material use
- develop self sufficient communities minimize/balance inputs and outputs
- minimize future environmental costs.

Achieving ecosystem health and integrity, especially in heavily degraded urban environments, may mean restoring damaged ecological processes and features. For Example, the MTRCA (1990: 8) report states,

> The real challenge in applying the ecosystem approach is to establish management targets based, not on the current state of the ecosystem, but on the potential for what the ecosystem could be. The objective of ecosystem management is enhancement, not status quo or minimizing impacts.

The MTRCA (1990) document also helps identify variables that reflect ecosystem well-being and therefore may serve as intermediate goals:

> ...species richness and evenness; maximum interaction or connectedness; dynamic equilibrium (self regulation [harmony], resilience, persistence, resistance, variability, robustness); self-sustaining basis; stable, self regulating, productive.

Social goals

Most ecosystem planning documents recognize, at least implicitly, that without healthy communities, enhancement and protection of ecosystems will not be achievable. Where the community is not socially inclusive, economically viable and politically empowered, no planning system would be stable enough to ensure the

long-term protection of supporting ecosystems, legitimate enough to call forward the local knowledge and care for ecological process, or flexible enough to respond rationally to ecosystem changes.

Although social objectives are not addressed directly in all documents reviewed, some do set out specific social goals, usually expressed as pre-conditions for achieving ecological sustainability. For instance, the Ottawa-Carleton document (Miller, 1993: 4) suggests the following as an objective of ecosystem planning:

- provide for processes and interactions necessary for individuals to lead productive, meaningful lives and, provide healthy living environments
- provide opportunities to meet goals and aspirations
- increase self-reliance and self-sufficiency and the control over daily lives.

Some documents recognize that social goals are crucial and need to be integrated with ecosystem goals, but suggest that these are not adequately expressed within the ecosystem planning concept itself. For example, Barrett (1991: A8) offers a strong statement of the need for social goals, but looks outside the ecosystem planning concept for guidance:

> The goals should define needs to be met and problems to be solved and could be developed using concepts such as healthy cities and environmentally sustainable economic development; as well as existing policies, goals, and objectives, such as provincial policy statements or the Metro Toronto Remedial Action Plan.

In Chapter III, we will review some of these outside sources and assess their potential for enriching the often more biophysical emphasis of ecosystem planning.

Development goals

In the Ontario ecosystem planning documents we reviewed, the essential theme of integration, including integration of social and ecological objectives, is most clearly illustrated in discussions of the desired character of future development. Most documents reject uni-dimensional biophysical and economic perspectives, and the conventional compromise of balancing or trading off ecosystem and development objectives. Instead the authors insist that socio-economic and biophysical requirements are interdependent and the relevant objectives must be defined and sought together. For instance, Barrett (1991: A4) writes that:

> ...because ecosystems include humans, their needs and activities—the matters we think of as community and economic concerns—are just as much a part of the ecosystem as the natural and physical environments. The ecosystem approach helps us to recognize the dependence of human communities and economic systems on a healthy environment.... In turn, the health of the

> biophysical environment is affected by the choices humans make about their activities—not simply between "development" and "no development", but about where development can occur, and how it should be undertaken.

In its report, the MTRCA (1990: 9-10) also advocates the integration of objectives for economic and population growth with those for enhancement of the natural environment. This is necessary in order to avoid shifting environmental costs to future generations:

> A sustainable approach strives to achieve a balance between economic growth and ecological health that optimizes human and ecological benefits. This can be achieved by assessing the ecological potential of an area at the same time that an area's development or economic potential is assessed. This can be accomplished by introducing more innovative approaches to economic development such as...
> - budget for the full environmental cost of development up front to avoid costly remedial works in the future
> - incorporate the short and long term costs of development (e.g., the cost of resource renewal).

The OMEE/OMNR (1993: 3-4) report similarly points to the mutual dependence of economic and environmental objectives:

> Formerly, economic and environmental factors have been pitted against each other and "trade-offs" made.... Increasingly, water managers and citizens alike are acknowledging the environmental importance and economic benefit of long-term sustainability, and anticipation and prevention of environmental problems or conflicts.

STORM provides the strongest statement of the need to subordinate economic objectives to ecological realities:

> Ecosystem planning involves integrating development into ecosystems: humans adapting to nature rather than expecting nature to adapt to "development", albeit with "mitigative" measures in place... [A]n ecosystem approach asks, as a condition for approving development: why is this needed, and how it will improve the environment? (Alexander, 1990: 2)

The Seven Central Principles of Ecosystem Planning

The recasting of ecological, social and development goals in the Ontario documents reviewed reflects the generally ecological and integrative orientation of the underlying thinking. This orientation is similarly reflected in the planning principles

set out in the ecosystem planning documents. Seven principles are broadly represented in the literature and appear to be central to ecosystem planning. Because of this and because—individually and as a package—they clearly distinguish the ecosystem approach from conventional planning practices, these seven principles may be considered the defining elements of ecosystem planning.

Principle 1: Base planning units on natural boundaries

Conventional planning uses a hierarchy of smaller-to-larger planning units (municipalities, regions, provinces), few of which have been assigned boundaries that recognize ecological factors. An ecosystem approach replaces the politically-oriented hierarchy of planning units with sets of nested units that are established at least in part to respect ecological functions, and are assigned natural boundaries.

While the size and character of the units chosen may depend on the planning purpose to which they are put, the overall unit boundaries usually extend beyond existing planning units so that both urban and rural elements can be considered in a regional perspective. Crombie's *Regeneration* (1993: 80) provides the following description of the principle:

> In ecosystem planning, the limits of areas being studied are decided on the basis of natural features and processes, rather than merely on political jurisdictions—which often means they are larger. It may also mean that there are different boundaries for different ecological processes. For example, understanding water and rivers may require a watershed perspective, while soil contamination may be confined to a relatively small area, depending on the local migration of groundwater.

As the above quote implies, units may be based on terrestrial or hydrological features, although the latter is the most common. The OMEE/OMNR (1993: 4) document states:

> An ecosystem approach to land-use planning requires that boundaries for land-use planning be based on biophysical boundaries as the context for examining the relationships between the natural environment and human activities. The primary boundary for an ecosystem approach to land-use planning should be the watershed. This is based on using the hydrological cycle as the pathway that integrates physical, chemical, and biological processes of the ecosystem.

Echoing Crombie, the OMEE/OMNR (1993: 1) document sheds more light on the scale issue:

> The scale of what is considered an ecosystem can be varied; there is a hierarchy of scales that are nested within each other and which overlap.... Three different scales of a water ecosystem, for example, include the bioregion, the watershed, and the watershed sub-basin or subwatershed.

The document goes on to elaborate on the usefulness of this approach from a planning point of view:

> A watershed plan provides a view of the landscape as a nested hierarchy of drainage basins. As such, it can narrow the set of variables or directives needed for effective decision-making at lower levels. This can assist decision-makers as to the appropriate level of resolution required, or to identify comparable situations elsewhere in the watershed. For example, a plan can indicate how small systems develop and operate within the large-scale systems of which they are a part (13).

Although very common, it should not be assumed that the use of natural features is universal among advocates of the ecosystem approach. At least in the short term, the entrenched character of current non-ecological planning unit boundaries must be recognized. For example, the Ottawa-Carleton official plan review (Miller, 1993: 8) was necessarily based on the established political boundaries of the region, but saw this as a problem to be overcome:

> ...political boundaries remain as a significant challenge. Much of the information available was collected and structured to examine a problem within an area such as a municipality. Information on areas beyond the municipality but within, for example, a watershed, may be lacking or in a much different format.

Until political jurisdictions and planning boundaries are revised to reflect natural boundaries, the ecosystem planning principle favouring natural boundaries can still be respected—especially through co-operative, interjurisdictional efforts. Indeed, mechanisms that push current authorities to co-ordinate their activities in light of the needs of the ecological unit may be useful first steps in the redefinition of jurisdictional and planning boundaries.

Principle 2: Design with nature

Traditionally, planners have tended to think of the built environment as separate from the natural environment. They were not trained to perceive the interaction between human activities and ecological effects or to consider the ecological conditions that made human activities possible. As a result, they have neglected the potential for using biological process to resolve servicing and environmental problems. Instead, they have typically seen "raw" land as a blank slate ready for human manipulation and use, and have replaced complex ecological processes with simpler engineered systems.

In contrast, ecosystem planning is expressly intended to recognize, respect and make use of the myriad links between human activity and ecological process. It suggests planning techniques such as carrying capacity analysis and design approaches based on ecological principles—in infrastructure development as well as

in landscaping. An ecosystem approach requires more sophisticated understanding of, for example, the biological productivity of natural systems and the cycling of resources. But it also opens the door to more creative, and often more efficient solutions that work with—rather then eliminate—natural processes, and that reduce needs for more services (demand management) rather than continually expand supply facilities.

Several of the documents reviewed here refer explicitly to the "design with nature" principle initially popularized by McHarg (1969). For instance, STORM advocates "letting areas such as headwaters, wetlands, and floodplains do what nature intended them to do: recharge aquifers, purify water, and provide wildlife corridors" (Alexander, 1990: 4).

The Ottawa-Carleton document (Miller, 1993: 6) calls for a planning process that respects "natural processes when altering the structure of ecosystems." By way of example, it suggests that we "[d]esign developments that continue to permit wildlife movement and other natural processes," and that we try "[u]sing natural species and working with natural processes during land management along roadsides and on other public lands."

The Crombie Commission's final report, *Regeneration* (1993: 78), refers to the notion of "green infrastructure" that would be accepted as a part of the public realm no less important and effective than the street system:

> The traditional way to organize a community is by the system of services and streets—the infrastructure.... In many land-use plans, natural areas and other open spaces are often cynically described as SLOAP: Space Left Over After Planning.... But what if we were to start with the demand for natural systems?... This would lead to a different way of structuring urban form, using a fully linked, continuous "green infrastructure," based on natural systems, and recognizing open space—not as an absence of buildings but as a land-use in its own right.

Principle 3: Consider global and cumulative effects

An ecosystem approach involves a much longer and broader planning horizon than conventional approaches—which have tended to favour short-term and local considerations at the expense of long-term, global concerns.

Where conventional planning approaches have addressed environmental concerns they have tended to focus only on site-specific matters such as noise, drainage alteration, destruction of habitat and pollution of receiving waters. In ecosystem planning, off-site, cross-boundary and cumulative effects are considered

as well. That means planners giving attention to such matters as the global warming contributions of car-centred suburban developments, and the overall loss of wetlands through incremental drainage and filling activities.

In *Regeneration* (1993: 81), the Crombie Commission summarized the importance of considering the cumulative effects of urban activities:

> Another fundamental aspect of ecosystem planning is that it includes assessment of the likely environmental, social, and economic effects of possible scenarios for the future, and enables planners, at an early stage, to consider the potential cumulative effects of many activities and projects.

This principle was explored by Kate Davies in a background report to the Commission entitled *Towards Ecosystem-Based Planning: A Perspective on Cumulative Environmental Effects* (Davies, 1991: 29). In that report, Davies describes an ecosystem planning system as one that would "[r]ecognize that incremental decision-making is a major contributor to cumulative environmental effects, and that multiple decisions about small projects are very important."

In this connection, we find the following statement in the OMOE (1992: 23) document mentioned above:

> Cumulative environmental effects assessment must be undertaken as part of a strategic planning process based on an ecosystem approach that involves the identification of ecosystem objectives, boundaries, information and monitoring.

Because the ecosystem approach rests on a conception of ecosystems not as separate entities but as interdependent nested units, ecosystem planning recognizes cumulative effects up to the global scale. This perspective is stressed, for example, by the MTRCA (1990: 9), which notes that the "hierarchy of ecosystems also places local initiatives in a global context... promoting a sense of place for the community in the global village."

The STORM document (Alexander, 1990: 4) provides a clear rationale for a global perspective:

> ...an ecosystem approach requires that we "think globally, and act locally." This means not only considering the impacts that our actions might have locally, but considering their potential global impacts—in terms of export of pollution, or loss of precious water or foodland resources. It means considering the impacts our importation of food and energy, and other products, have on other ecosystems and regions. It requires "internalizing" environmental costs and externalities, and developing greater self-reliance.

Principle 4: Encourage interjurisdictional decision-making

Planning issues involve many agencies at all levels of government, and mandates unavoidably overlap and conflict. Mechanisms for conflict resolution have proliferated, but these have tended to be located in one agency or jurisdiction, and most have been designed to respond to problems once they have arisen. Anticipatory conflict avoidance through interjurisdictional cooperation—especially at the planning stage—has been rare.

Conventional land-use planning is commonly carried out by many separate authorities largely in isolation both from each other, and from other significant planning and management activities such as sectoral planning for regional economic development, transportation, energy, waste management, foodlands and housing. This fragmented approach has led to confusion among those involved in activities affecting land-use, and has not allowed the emergence of clear regional visions of desirable community development.

The ecosystem approach attempts to overcome jurisdictional fragmentation by encouraging new planning units, agencies and methods that promote interjurisdictional decision-making. In essence the ecosystem approach calls for redesign of institutional systems to mirror the connectedness of natural systems.

Certainly, the need for interjurisdictional decision-making is a common theme in the documents reviewed. Barrett (1991: A4) provides the following example:

> ...water pollution along Toronto's waterfront represents the combination of many influences, from development in the head waters of the rivers, to storm water management in the suburbs, to sewage treatment on the lakefront itself. Understanding these relationships leads to the realization that human activities should be viewed not as isolated events in space and time, but as interacting with pre-existing conditions and contributing to changes in ecosystem health.

Accordingly, the OMEE/OMNR (1993c: 11-13) document stresses inclusion of all affected agencies in planning as an exercise in joint planning and decision-making:

> Plans are also drafted for co-ownership, for partnerships. Water management and land-use planning issues in an entire watershed necessarily affect a range of jurisdictions and stakeholders: municipalities, conservation authorities, the Ministries of the Environment, Natural Resources, Municipal Affairs, Agriculture and Food and other local stakeholder agencies. Plan recommendations address "big picture" issues and the needs of the entire watershed, and provide a mechanism for auditing their success across the geographical extent of the watershed as well as the range of agencies involved. These agencies should work together in developing watershed plans.

Partnerships of this kind are not the only mechanisms suggested in the documents reviewed. The Crombie Commission's background report, *Planning for Sustainability* (Doering *et al*., 1991: A5) says a "range of approaches could be used to implement the framework: using existing legislation without modifying it, making minor changes to existing laws, or fundamentally changing legislation."

The substantial difficulties involved in making these changes are well recognized in the Ontario documents. Even the basic list of requirements set out in the OMOE (1992: 24) report, underlines the challenges involved in integrating ecosystem planning with existing land-use planning:

> Provincially-mandated groundrules for adopting an ecosystem approach need to be clearly spelled out to provide guidance and direction to municipalities. For example, agreement is required on criteria and methods for implementation, roles and responsibilities for defining ecosystem objectives for ecological units and translating them into the land-use planning process, for defining information requirements, establishing information management systems, and monitoring ecosystem health over time.

A particular conundrum for advocates of ecosystem planning is that, at least for an interim transition period, the new mechanisms might have to operate alongside the old ones, adding to the multiplicity of agencies and to the potential for further confusion. For instance, the MTRCA (1990) report proposes a natural ecosystem hierarchy that would exist parallel to the traditional planning hierarchy of provincial, regional and local authorities. However, it is a defining principle of ecosystem planning that it consistently aims to encourage interjurisdictional linkages.

Principle 5: Ensure consultation and facilitate cooperation and partnering

Unlike conventional planning, in which land-use decisions may often be made in a technocratic manner—perhaps after discharging a legal obligation for public involvement—the ecosystem approach actively seeks to involve the widest range of stakeholders effectively and openly in the planning process.

Where conventional planning decisions stir up dissatisfaction, the resulting conflicts tend to be expressed in destructive ways: disenfranchised groups attempt to undermine the planning process through appeals, and community co-operation in implementing the plan is unavailable. In the ecosystem approach, more positive problem solving is possible in large part because the stakeholders are valued and included from the outset of planning. The quality of plan decision-making also benefits from the contributions of the new participants—some of whom are amateur experts on ecosystem process, while others are influential within their communities

and can help build support for plan implementation, and still others may control resources—such as property—essential to the realization of the plan.

The MTRCA (1990: 12) report provides a lengthy discussion of the need for the widest possible involvement of stakeholders in the ecosystem planning process. The document calls for:

> ...informed decision-making by stakeholders through an open process that strengthens stakeholder commitment, builds partnerships, and promotes stewardship.
>
> Decisions that affect the ecosystem need to be made in an open process that encourages participation by all stakeholders.... To achieve this more open process, it is also necessary to change the attitudes of stakeholders to be more open to the points of view of their peers in the decision-making exercise. The goal of all participants must be one of finding a solution, not protecting individual interests.
>
> Cooperative decision-making is only effective if it leads to change and implementable actions. Part of reaching a solution is building support and commitment to put theory into practice, and for each stakeholder to take responsibility for implementing the solution.
>
> In order to increase the probabilities of implementation of the management plan for the ecosystem, it is essential to involve stakeholders in all stages of the planning process.

In *Regeneration* (1993: 81), Crombie identifies "involvement" as a key aspect of ecosystem planning:

> ...ecosystem planning involves all key stakeholders working together in an open, public, fair, and efficient process. Relationships have to be worked out among many interests—the public, different levels and agencies of government, the private sector, special-interest groups, and others.... This should result in more timely and efficient decision-making, with fewer antagonistic procedures than often occur in traditional planning and environmental assessment processes.

Principle 6: Initiate long-term monitoring, feedback and adaptation of plans

Monitoring mechanisms are included in the ecosystem approach to allow communities to assess progress in implementing a plan, to track the response of ecosystem elements when plans are implemented, and to provide a reliable basis for adapting plans to changing conditions. In conventional land-use and environmental planning, few resources are expended to assess what happens to ecosystems as plan implementation unfolds. Plans are adapted to changing economic and social conditions, but are frequently insensitive to changing ecological conditions.

According to the Ontario documents, the essential framework for monitoring in ecosystem planning has three components:

- develop indicators based on objectives for ecological and community well-being
- develop suitable targets and measures for these indicators
- report regularly on the state of the environment.

In addition, to ensure appropriate response to monitoring findings, the Ottawa-Carleton approach (Miller, 1993: 6) includes steps to "establish review procedures that account for targets and define actions in the event that a target is not met."

The emphasis on monitoring in ecosystem planning rests on a commitment to a more distant future than is commonly accepted in conventional planning. It also reflects a willingness to respect uncertainties and to be prepared to adapt to identified ecosystem changes. This contrasts with the conventional focus on short term planning, which relies on the assumption that we will always be able to design and afford technological fixes for future problems as they arise.

The Ottawa-Carleton official plan approach to ecosystem planning (Miller, 1993: 6), for example, rests on the following observations about ecosystem change, uncertainty and adaptation:

> Ecosystems adapt and change over time frames which are much longer than the time frames typically incorporated into official plans or land-use decision-making. It is important to recognize the way that things change over time....Uncertainty and the importance of being right—or wrong—in our assumptions about change is also a significant consideration. Adapting to change over time involves assessing the effects of actions and learn[ing] from mistakes and adjusting quickly.

In its approach to this principle, the MTRCA (1990: 7) extends the ecosystem health metaphor:

> Another parallel drawn is between an ecosystem and an organism (Lynn Margulis), in which the components and processes in an ecosystem are like the critical (life-dependent) organs and biological processes within an organism. Just as an organism has certain vital signs that provide an indication or synopsis of the organism's health, ecosystem health can be monitored based on its vital signs.[3]

The report suggests examples of two types of indicators. Ecological indicators might include brook trout, aquatic mammals, ruffed grouse, white-tailed deer, species diversity, and a balanced food web. Vital signs may also take the form of

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[3] There are limitations to application of the human health metaphor to ecosystems. See James J. Kay and Eric Schneider (1994).

healthy human components of ecosystems. These may include swimmable, fishable and drinkable water, sustainable agriculture, natural open spaces, adequate employment, and accessible housing.

The MTRCA (1990: 11) report also deals with the issue of uncertainty in long-term planning. It suggests an "implement, test, revise" cycle that

> encourages the acceptance and use of more innovative technologies when they are most beneficial. It also builds in a feedback mechanism that ensures that the implementation measure is effective and that the basis upon which it was proposed is still appropriate. Finally, this process recognizes that there is an element of learning inherent in the implementation of any measure which instills the need to support continued monitoring and research.

Principle 7: Adopt an interdisciplinary approach to information

Social, demographic, and economic information has been emphasized in traditional planning, with information gathering efforts centred on predicting future demand for such things as housing, transportation facilities, and social services. Little attempt has been made to determine ecological capacity or to assess how efforts to satisfy the anticipated socio-economic demands may affect ecological functions.

By recognizing needs for ecological information and for understanding the ecological implications of other information and options, the ecosystem approach implies a greater scale of information gathering. It also requires more integration of information and greater co-operation among information providers, both amateur and expert. At the same time, advocates of the ecosystem approach accept that the limitations of resources and methodologies mean that information will never eliminate uncertainty in planning and that relevant information may only become available as the plan unfolds.

Information gathering and management are central concerns in most of the documents reviewed. The OMOE (1992: 7) report, for instance, contains the following recommendation:

> An ecosystem approach to land-use planning should be based on a synthesis of information of the structural and functional relationships among air, land, water and organisms of a particular ecosystem over time.... The type of information generated must be ecosystem-wide, be supplemented with site-specific information where and when necessary, include historical data produced through the re-working of existing data or through comparison of similar ecosystems with differing amounts of development contained within each, and be linked to ecosystem function.

The Ottawa-Carleton (Miller, 1993: 11-12) document, which focuses on information, surveys the issues and challenges involved in an ecosystem approach, and suggests three principles to guide information generation:

- actively create semi-formal models or frameworks to identify relationships
- encourage learning and incremental development of knowledge
- look for opportunities for co-operative efforts.

In a conference presentation, Jack Imhof, one of the staff scientists involved in preparing the OMEE/OMNR (1993) document, had this to say about the need for an interdisciplinary approach to information:

> Ecosystem planning is a holistic, integrative approach to the management of land and water. It strives to identify the functional attributes of each area of the ecosystem or watershed and recognize the interdependencies of components. Thus, the basic challenge of the scientific framework is presented by the need for co-operation among several scientific disciplines. Disciplines that may be involved include hydrogeology, hydrology, engineering, environmental and municipal planning, water quality and toxicology and data management, climatology, geology, plant biology, aquatic biology (Imhof, 1992:11).

According to Imhof, this requires that the

> ...study process incorporates an interdisciplinary and data integration mechanism so that pathway and process modeling of the watershed or sub-basin can be developed, tested and used to develop and assess various target scenarios for the watershed. Only once these targets have been set can the various land-use/resource management options be considered in order to regulate development or resource extraction.

Summary: What Ecosystem Planning Means

In this chapter, we have distilled several Ontario documents in order to arrive at a definition of ecosystem planning, especially as it contrasts with conventional land-use planning. The foundation of the ecosystem approach is an acceptance of human dependence on and responsibility toward nature. This entails respect for ecological complexities, limits and uncertainties, which in turn requires an emphasis on setting long term goals, attention to the future effects of planning decisions, and a favouring of planning mechanisms that are flexible enough to respond to unanticipated problems and opportunities.

While ecological protection and enhancement obligations are accepted as reasons for controlling and redirecting planning initiatives, they are not seen as detrimental to social and economic interests. Because ecological well-being is considered an essential basis for community well-being, the biophysical aspects of ecosystem planning are regarded as necessary components of efforts to achieve social and economic gains. The development goals of ecosystem planning therefore include ecosystem health and integrity along with objectives for social, economic and political improvement, recognizing that these are mutually interdependent.

The recasting of human/non-human relations and the recognition that social and ecological goals are interdependent has some particular implications for land-use planning. These can be expressed as seven planning principles, which represent the defining elements of ecosystem planning:

- base planning units on natural boundaries
- design with nature
- consider global and cumulative effects
- encourage interjurisdictional decision-making
- ensure consultation and facilitate cooperation and partnering
- initiate long-term monitoring, feedback and adaptation of plans
- adopt an interdisciplinary approach to information.

This understanding of the meaning of ecosystem planning will serve as a basis for identifying the range of planning initiatives and activities that incorporate features of the ecosystem approach. In the next chapter we turn to the application of ecosystem planning in 15 planning initiatives that indicate the present scope and initial lessons from experience with the ecosystem approach.

Figure I-1: Ecosystem Planning Principles

Goals and Objectives	
Conventional Planning	Ecosystem Planning
Traditional planning is oriented toward adapting to existing economic and social trends (and the demands they give rise to) rather than setting community goals to be achieved through the planning process.	In ecosystem planning the formulation and achievement of goals is understood to be of fundamental importance to the planning process. The goals of ecosystem planning generally relate to ecosystem health, although there is some consideration of social and economic goals.

Planning Principles	
Planning Unit Based on Natural Boundaries	
Conventional Planning—Traditional planning uses a hierarchy of politically defined planning units, which, from an environmental perspective, arbitrarily defined.	*Ecosystem Planning*—An ecosystem approach replaces the politically oriented hierarchy of planning units with nested units based on natural boundaries.

Design with Nature	
Conventional Planning—Traditionally, planners have relied on engineered "linear" systems that replace ecological process and thought of land as a blank slate ready for human uses.	*Ecosystem Planning*—New planning and design approaches based on ecological principles favour more creative solutions based on biological productivity of natural systems, cycling of resources, or reduced need for services through demand management.

Consideration of Global and Cumulative Effects	
Conventional Planning—Traditional approaches to planning tend to favour short-term and local considerations at the expense of long-term, global concerns.	*Ecosystem Planning*—An ecosystem approach involves a much longer and broader planning horizon. Consideration of off-site effects and cumulative effects are included in the planning process.

Figure I-1 (continued)

Interjurisdictional Decision-making	
Conventional Planning—Conventional land-use planning is commonly carried out in isolation from other significant planning and management activities.	*Ecosystem Planning*—The ecosystem approach attempts to overcome jurisdictional fragmentation by encouraging new planning units, agencies and methods that promote interjurisdictional decision-making.

Extensive Consultation, Co-operation and Partnering	
Conventional Planning—Land-use planning decisions are often made in a technocratic manner after discharging the legal obligation for some perfunctory public involvement.	*Ecosystem Planning*—The ecosystem involves the widest range of stakeholders in the planning process.

Long-Term Monitoring and a Feedback Mechanism for Adapting the Plan	
Conventional Planning—In conventional land-use and environmental planning, few resources are expended to assess ecosystem health and changes to the baseline as plan implementation unfolds.	*Ecosystem Approach*—The monitoring mechanisms suggested by the ecosystem approach would allow communities to assess progress in implementing a plan, track the response of ecosystem elements to plan implementation, and provide an objective basis for adapting plans to changing conditions.

Interdisciplinary Approach to Information	
Conventional Planning—Social, demographic, and economic information has dominated traditional planning methods. Little attempt has been made to connect these variables to ecological capacity or to predict effects of meeting demands on ecological functions.	*Ecosystem Planning*—The ecosystem approach implies a greater scale of information gathering, more integration of information and greater co-operation among information providers, both amateur and expert. It is recognized that information will not eliminate uncertainty in planning and that relevant information may only become available as the plan unfolds.

Chapter II

Applying the Ecosystem Approach: Case Studies from Canada and the United States

Introduction

Especially in urban areas, what we have described as conventional land-use planning—planning that sees the environment almost exclusively as a resource to be used in the service of social and economic gains—still prevails. Nevertheless, the ecosystem approach is not untried. Indeed it is possible to identify many initiatives, in a variety of fields and jurisdictions, that have attempted to apply the ecosystem approach to planning, or at least to make use of important components of this approach.

In this chapter, we present our findings from a survey of 15 case studies of ecosystem planning initiatives, twelve in Canada and two in the United States. The purpose of the chapter is to identify the range of approaches to ecosystem planning being undertaken in Canada and elsewhere and to gain insights into how the planning principles presented in the previous chapter are translated in actual planning situations. Insight gained from this survey will be used to help build a model of ecosystem planning that can be applied in urbanized and urbanizing regions. That model is presented in Chapter IV of this report.

The 15 cases discussed here were selected from a much larger list of candidate cases which in some ways reflected adoption and application of the ecosystem approach. In the first step of the selection process, information on possibly relevant cases was compiled by the research team from sources across Canada and internationally. Several information sources were used:

- Individual contact persons in government departments within Canada were identified through referrals provided by the Intergovernmental Committee on Urban and Regional Research (ICURR) or through source references such as the *Corpus Almanac and Canadian Sourcebook* (1992) and the *Canadian Almanac and Directory* (1993).

- In each province, the ministry dealing with municipal affairs; the ministry dealing with environmental protection; and where applicable, major regional planning authorities, were contacted by phone. Once the appropriate individuals were contacted, a brief telephone interview was conducted to identify past or ongoing initiatives which met the objectives of

this research, and relevant documentation to support the case study was requested.

- A catalogue search of ICURR's extensive library holdings was conducted by ICURR staff in order to identify documents related to ecosystem planning.
- An electronic search was conducted by ICURR staff of the US data base LOGIN, using keywords associated with the research topic.
- An electronic search was conducted through *Dialogue* for articles, dissertations and other documents relating to ecosystem planning.

The collected information was then analyzed and incorporated into an electronic database. Of the 114 cases initially identified, there was sufficient information on 67 cases to assess whether they involved the use of the seven principles of an ecosystem approach to planning as outlined in Chapter I. A further selection of cases was made in order to reflect regional diversity, to eliminate overlap between similar types of planning initiatives, and to ensure that the profiled cases would hold important insights for application to urban situations. The result was the final selection of 15 case studies for detailed examination.

The 15 selected cases, listed in Figure II-1, cover a variety of different kinds and sizes of planning initiatives involving various combinations of municipal, provincial, federal and even international authorities. They include basin strategies (Georgia Basin, Chesapeake Bay, Fraser River Estuary, St. Croix Estuary), watershed planning (Laurel Creek), and landform-based conservation strategies (Oak Ridges Moraine, Niagara Escarpment, New Jersey Pinelands). They range from the small and municipally-centred Laurel Creek case to much larger provincially or federally-led efforts involving a broad diversity of stakeholders (Alberta IRPS, Meewasin Valley, St. Croix Estuary). In some cases the focus is on facilitating the recovery of degraded ecosystems (Hamilton Harbour RAP, Toronto Waterfront Regeneration Trust, St. Lawrence Action Plan), while in others the main objectives centre on preservation of relatively undamaged areas (Oak Ridges Moraine, Niagara Escarpment). Finally, most involve urban centres and address urban planning issues (Fraser River Estuary, Toronto Waterfront Regeneration Trust, Meewasin Valley).

In all of the cases, at least five of the seven defining principles of ecosystem planning have been applied and in several cases all seven principles have been adopted (see Figure II-2). This, along with the diversity of the experiences and contexts involved, makes the 15 cases particularly well suited as illustrative tests of the ecosystem planning concept in practice.

The case descriptions and analyses that follow are designed in each case to provide the necessary background information, to identify the strengths of the

approach as well as the weaknesses and barriers faced, and to report on the lessons learned and opportunities uncovered for future improvements. In 14 of these cases, personnel associated with the initiatives were contacted for a more extensive interview. For one initiative (Meewasin), the case study is based only on printed materials.[1] A list of the interviewees is shown in Figure II-1.[2] Although the results presented here draw heavily from material raised during interviews, the interpretation given to this material is that of the report authors.

[1] Interviews were conducted over the phone, and employed a small number of open questions (see Appendix B) to which the interviewees were invited to respond in detail.

[2] Contact information for each of the interviewees is provided in Appendix A.

Figure II-1: The 15 Ecosystem Planning Cases and Interviewees

Fraser River Estuary Management Program (British Columbia)
Dianna Colnett, Public Relations

Fraser Basin Management Board (British Columbia)
Prad Khare, Staff Member

Georgia Basin Initiative (British Columbia)
David Hill, Public Relations Officer for the BC Round Table

Alberta Integrated Regional Planning System (Alberta)
John Browning, Branch Head

Meewasin Valley Authority (Saskatchewan)

Cumulative Effects Monitoring on the Niagara Escarpment (Ontario)
Graham Whitelaw, Planner, Ontario Ministry of the Environment and Energy

Oak Ridges Moraine (Ontario)
Fred Johnson, Secretary to the Oak Ridges Moraine Technical Working Committee, Ontario Ministry of Natural Resources

Laurel Creek Watershed (Ontario)
Mark Dorfmann, Consulting Planner

Regional Municipality of Ottawa-Carleton (Ontario)
Pamela Sweet, Planner

Waterfront Regeneration Trust (Ontario)
Charity Landon, Staff Member

Hamilton Harbour Remedial Action Plan (Ontario)
Ken Hall, Executive Director of the Bay Area Restoration Council

St. Lawrence Action Plan (Quebec)
Jean Burton, Assistant to the Executive Director, St. Lawrence Centre, Environment Canada

St. Croix Estuary Project (New Brunswick/United States)
Doug Bliss, Senior Water Conservation Engineer, Environment Canada

Chesapeake Bay Program (United States)
Cathy Rowland, Planner

New Jersey Pinelands Commission (United States)
Dr. Robert Zampella, Science Coordinator

The 15 Ecosystem Planning Cases: Detailed Findings

1. Fraser River Estuary Management Program (British Columbia)

Background

The Fraser River Estuary Management Program (FREMP) was established in 1985 with the signing of a five-year agreement by five major parties: Environment Canada, the BC Ministry of the Environment, Fisheries and Oceans Canada, the Fraser River Harbour Commission and the North Fraser Harbour Commission. The goal of the program is to co-ordinate and build consensus on how to serve both environmental and economic considerations along the Fraser Estuary. Effectively managing the Fraser is an immense task involving a long-standing tension between the river's natural environment and the ever-expanding industrial, commercial, recreational and residential development taking place along its shores. The challenge is to ensure that urbanization and industrialization are considered on a watershed basis and do not take place at the expense of the ecological values of the estuary.

The four dimensions to FREMP are public education and involvement, water quality, waste management, and water and land-use planning.

FREMP's most direct vehicle for managing the estuary is its project review mechanism. This process co-ordinates the activities of participating agencies in examining development and company projects planned for the Fraser River, collects the recommendations, and offers environmentally sound development guidelines. The main advantage of this review mechanism is that it offers a "one window" process—developers no longer need to produce separate applications for each of the environmental agencies concerned with a given project. Occasionally, however, a proposed project will require a third level of review involving a formal environmental impact assessment and public hearings.

One of the detailed ecological studies completed as part of this program is the ecological study of Surrey Bend. This study examines the floodplain to guide future planning and policy development related to this area. The entire area has been highlighted as a priority area for conservation programs and incentives.

FREMP includes a three-year environmental monitoring program, which is about to enter its final year. Future funding for this program is currently under examination. A water quality plan will be under review in the upcoming 12 to 18 month period. In addition, a status of water quality report for the lower estuary is scheduled to be completed this summer. In terms of water and land-use planning, a

draft estuary management plan is currently under review for "endorsement" in March/April of 1994.

Over the next three years, FREMP will be revisiting their area designations for shore zoning. These designations function as a type of municipal zoning mechanism and represent an agreement between the FREMP program and the municipal government in the identification of the best use of the foreshore in terms of land-use and habitat. An interpretative plan, currently being finalized, will be used to implement a strategy to promote public appreciation and awareness of the estuary.

Strengths of the approach

One of FREMP's important strengths is that planning is considered on the basis of natural boundaries. Given that the focus of the program is on the water-related issues of the estuary and that the prime stakeholders involved in this process also have their mandates focused on the estuary, it is convenient and sensible that the program has been scoped to the boundaries of the estuary.

FREMP has focused more on outreach to other agencies than to the public. Its emphasis has been on a linked-management approach, which encourages participating agencies to become more familiar with each other's programs and practices. This approach has helped build trust among the players and encourages them to work more closely together.

Weaknesses and barriers

As already mentioned, FREMP has been relatively weak in terms of public involvement in the program. This can be partially attributed to the lack of a significant public lobby on issues related to the program's mandate. Groups that are active in this regard—such as the Fraser River Coalition and the Boundary Bay Conservation Committee—tend to focus on project-specific issues and do not take a regional perspective. Another factor is the public's tendency to underestimate water quality problems in the Fraser River. Presumably, if the public had a better appreciation of the issues at hand, there would be stronger involvement in FREMP's activities.

Another weakness concerns FREMP's mandate, which is confined to water-related issues. Although it is clearly recognized that the linkages between water and land are critical to the estuary's ecological health, these linkages are not being directly addressed by FREMP. Instead, FREMP relies on the weaker route of coordination with the Greater Vancouver Regional District, which is responsible for co-ordinating land-use planning in the region.

There is considerable overlap between FREMP and the Fraser Basin Management Board (see below). Although both these agencies are funded by Environment

Canada, there has been no effort to develop linkages between their programs. The programs have also been criticized for not orienting their activities within an overall ecological planning context for the area, and for a tendency to react to politically sensitive issues by "throwing money at them."

Finally, FREMP has placed considerable emphasis on mitigative measures that involve engineered solutions to the problems facing the estuary. Ecological planning principles would suggest a more anticipatory and design-with-nature approach.

Lessons for the future

The linked management approach is a viable option for ecosystem management and planning. This should be pursued as an alternative to the creation of a "super agency" or another level of governance. Working through existing staff within the partner agencies is also a successful strategy; it encourages a higher level of confidence amongst participating agencies because their own staff conduct field work and participate in the program's decision-making as committee members.
Although FREMP and the Fraser Basin Management Board share many of the same participating agencies, FREMP has been more successful. A key difference between these two programs is that the Management Board is viewed as a more esoteric planning exercise involving few, if any, lower level management staff. In contrast, FREMP employs both senior and junior management staff on its committees, ensuring vertical continuity and integration within a single participating agency. This structure also encourages an interdisciplinary focus and helps the organization to overcome jurisdictional roadblocks.

2. Fraser Basin Management Board (British Columbia)

Background

For a number of years, faculty at the University of British Columbia had conducted studies on the Fraser River Basin, and in the past decade mayors from around the Fraser region lobbied Ottawa for money to clean up the river. When funding became available through the Green Plan, the Fraser Basin Management Board (FBMB) was created. Although there are some similarities with the Fraser River Estuary Management Program and with programs concerning the St. Lawrence River and Great Lakes, the FBMB is a unique institution in North America: it is the only one that has an explicit sustainability orientation encompassing social, ecological and economic dimensions.

Announced in the summer of 1992, the Board consists of a unique combination of stakeholders: three members each from federal, provincial, municipal and First Nations bodies, and six members from non-government organizations or the public at large. The board was chaired until recently by Dr. Tony Dorcey from the University of British Columbia. It is two years into its five-year mandate.

In May 1993, the Board released its strategic plan, which outlines five activities. The first is looking at current institutional arrangements to identify gaps and duplications. The second is the establishment of four multi-party steering committees focusing on water management (use, quality, flood plains), pollution prevention and waste minimization, fisheries and aquatic habitat, and community economic development. Once the committees have elaborated strategies, they will be integrated into an overall strategy for the basin.

The Board's third activity is promotion of six demonstration projects, which were selected out of 33 entries for their potential in promoting sustainability. No new money is being put into them, but their profile is being enhanced, and it is hoped that they will encourage similar efforts by other communities. The fourth activity is auditing existing government programs to see if they are promoting sustainability or not, and the fifth activity is conducting education and fostering communication—making people better informed, bringing them together, and facilitating partnerships.

Strengths of the approach

As mentioned, FBMB is sustainability-oriented, stressing the need to balance and integrate ecological, social and economic values, rather than allowing them to remain antagonistic to each other. Persons devoted to one are expected to recognize the importance and value of the others. Long-term sustainability is the overall goal.

The Board takes a basin-wide perspective. One advantage is that the Fraser is wholly within BC territory, eliminating the need for cross-provincial planning. The Fraser is arguably the largest salmon river in the world, and the basin, which covers a quarter of the province, is responsible for 80 percent of the province's Gross Provincial Product. Therefore, if success is achieved, the program has the potential to be a model for the rest of the province to follow.

Weaknesses and barriers

The structure of FBMB requires that other agencies "buy-in", and some may resist doing so out of a fear of losing some of their control. The Board has no authority of its own; it cannot force any agency to do anything, and there is a danger that its

recommendations could be ignored. Its function is largely in facilitation or liaison, and it has a staff of only four or five people. Moreover, it is a new program, and it may not fulfill people's expectations of producing concrete results.

Lessons for the future

FBMB's original mandate was too broad and vague. Consequently, even members of the same agencies or non-government organizations have vastly different expectations of the Board. To avoid future disappointment, the Board needs to have a more concrete focus. Its multi-jurisdictional, multi-stakeholder board and committees hold considerable potential in terms of creating consensus for long-term change, but it is a slow process and will not yield quick results.

3. Georgia Basin Initiative (British Columbia)

Background

The Georgia Basin initiative is under the direction of the BC Round Table on the Environment and Economy [now defunct]. The mandate of the Round Table is to advise the BC government on how to manage the Georgia Basin as a whole while encouraging interjurisdictional coordination. The problems that are being addressed in this area are strongly associated with growth pressures from urban expansion and population increase. The results of the Round Table discussion will be a series of recommendations addressed to the provincial government.

Participants in this initiative have called for a regional growth strategy to encourage the development of compact communities, to integrate planning, and to conserve environmental resources. The containment of the urban envelope was identified as one of the priorities for achieving a sustainable future for the Georgia Basin. In addition, the BC government is being advised that it should develop new models of planning and governance that would encompass and provide consistent management for the entire area. Suggested models would involve development of a regional council or regional government, creation of a new ministry or commission, the development of a sustainability act, or initiation of a comprehensive management program for the area. Proposed interim measures include planning controls to limit urban sprawl, provincial guidelines for urban settlement, and the development of model communities as examples of appropriate forms of development.

Strengths of the approach

The Georgia Basin initiative is integrative in that it takes a sustainability approach, using the environment as its organizing framework. One of the greatest strengths of the initiative is its emphasis on consultation and in providing a forum for people to come together to discuss ideas. It is a consensus-based process which has been largely successful in keeping a diverse constituency working together without each

group feeling that it is compromising itself. The BC Round Table has published two very successful consensus-building papers known as "Reaching Agreement".

Apparently there has been tremendous support from interests outside of the jurisdiction. In the United States, for example, the Round Table is being viewed as a model by the President's Council for Sustainable Development for changing its decision-making processes. This initiative met the requirements of all of the ecological planning principles, except that it lacked a monitoring and feedback mechanism for adapting the process over the longer-term.

Weaknesses and barriers

One of the major barriers the Round Table had to overcome at the outset was a general feeling of distrust amongst its stakeholders. In addition, public perception was not initially positive, due to a general feeling that this body was "just another government ivory tower exercise." This was largely attributed to a lack of public awareness about the Round Table process. Also, the lack of financial resources for the Round Table has severely restricted its public education program. In one case, it was found that there was a complete lack of aboriginal representation in its workshops.

Since the BC Round Table is not empowered legislatively, the BC government does not have to respond to its recommendations and often does not. The Round Table has no elected representatives on its Board and recommendations are forwarded to the provincial Cabinet, which may or may not respond. The Round Table recognizes that there are both strengths and weaknesses associated with not having legislative clout: on one hand, it has considerable flexibility in the way it manages itself; on the other hand, there is no way of enforcing change.

Lessons for the future

The members of the Round Table appear to enjoy their "arms length" advisory role. They have discovered that it is possible to make government pay attention to their recommendations by influencing public opinion. It is important to be seen by the public as a public forum whose constituency is the general public. This can be an important statement to the participants that the Round Table is not subject to the political currents of the time. Nonetheless, the Round Table would also find it advantageous to have some implementation powers.

4. Alberta Integrated Resource Planning System (Alberta)

Background

In the early 1970s, the Alberta government conducted a series of hearings into resource conflicts along the eastern slopes of the Rockies. The Alberta Eastern Slopes Hearings gathered 30 volumes of input from citizens and the subsequent reports identified the need for better decision-making. As a result, the government committed itself to the notion of integrated resource management in 1975. In 1977 the government issued its Eastern Slopes Policy, which set out a range of acceptable uses on crown lands: protection of resources, management or wise-use of the resources, or full scale development on smaller sites.

The Alberta Integrated Resource Planning System (IRPS) is based on four key principles:

- Team work—individual strength is always less than the combination of the group's strengths. This represents a move away from approaches that rely on a single profession, individual or agency.
- Consultation—those affected by decisions should be involved in making them, even if they don't have formal authority over the decision.
- Self-identification—government does not identify the players; essentially it just identifies the process and allows the players to identify themselves as they so choose. It is fundamental to a consensus-based decision-making process that the players be at the table willingly.
- Commitment—those at the table should be representing some interest. Those claiming to represent an interest will be held accountable for how they represent that group.

IRPS is a relatively complex process. The system has four levels of operation including policy direction and final plan approval, policy interpretation and advice, interdepartmental coordination, plan reviews, program direction, initiation, and supervision of planning operations, plan acceptance, and finally plan preparation. The plans are prepared at regional, sub-regional and local levels. Public involvement is obtained through a permanent advisory committee to the Minister; through consultation between the planning team and interest groups; and through public meetings, newsletters, and other means of communication.

The process includes well defined procedures and responsibilities for plan implementation, for regular reviews of plans, and for plan revision if necessary.

Strengths of the approach

Some of the apparent strengths of Alberta's IRPS include a systematic but flexible approach; active participation by all key actors; a clear chain of command from the political to the working level, providing for policy direction, coordination and decision-making; provision for public involvement at all stages; and involvement of field staff in plan preparation, which, in turn, ensures awareness of the realities of plan implementation.

In addition, the system emphasizes construction of a technical-political bridge. This bridge is built in several ways, but centres on having the approvals process start with a technical team that is multi-agency/multi-party along with public input. The team recommendations go to a Cabinet committee and everyone in between (e.g. program heads, assistant deputy ministers and deputy ministers) gets a chance to review the recommendations.

Weaknesses and barriers

One of the problems with undertaking this type of program is that it takes a lot of time and money, and requires a particular kind of staff to be successful. The consensus approach used in the IRPS may also be problematic in that some stakeholders take the position that since there is no vote, they cannot be held accountable for organizational decisions. As a result, the decisions made may not favour the most responsible options.

Lessons for the future

It is important to develop and maintain a clear and efficient communication and decision-making chain of command from the political to the operational levels. In this way decisions and policy directions are assimilated throughout the planning network and at all levels within the participating agencies. Inter-agency linkages should be made at all levels of their internal hierarchical structures. This would allow the set of agencies focused on a particular issue to have their top, middle, and lower level managers exchanging ideas and information through working committees. Without this chain of command in place, the rigidity and formality of bureaucracy could end up undermining innovation and effective ecosystem planning and management.

For long-term viability, it is important for the agency responsible for managing the integrative resource planning initiative to adopt a team approach and promote interdisciplinarity among its members. A significant investment of time and money will be required to ensure the right mix and adequate training for the planning team.

Without this in place, it is unlikely that the planning team would be able to meet the rigorous standards required by the ecological approach to planning.
Finally, one should not expect instant solutions to age-old problems. Many ecological problems have taken a number of human generations to attain their prominence. Regardless of how well thought out an ecological planning model may be, or how many resources are marshaled to implement the model, it will likely fail if the timeline is not sufficiently long. This can be demoralizing to the participants and could lead to the premature dismantling of an otherwise excellent planning system. It is better to spend the time and firmly establish a planning system that is open, effective, and firmly grounded in the trust of its participants.

5. Meewasin Valley Authority (Saskatchewan)

Background

The 1974 Annual Report to Council by the City of Saskatoon's Environmental Advisory Committee recommended that a riverbank study be undertaken and a comprehensive plan be prepared for the South Saskatchewan River corridor. The city, the adjacent Rural Municipality of Corman Park, the provincial government, and the University of Saskatchewan (as the largest landowner) commissioned the studies.

In 1976 the South Saskatchewan River Corridor Study was completed. Its authors recommended the creation of an autonomous agency to plan and develop the valley's natural and heritage resources along the river edges. The area was defined by the natural system and appropriate political boundaries where the river flows for 80 kilometres through the Rural Municipality of Corman Park and the City of Saskatoon.

Two years later the province and the city sponsored a "100 Year Concept Plan" for the river valley. This conceptual plan recommended a comprehensive strategy based upon a major restructuring of recreational uses, proposed a corridor plan characterized by linked nodes of development, and recommended that a special purpose authority be established to oversee the conservation and development of the river corridor using the conceptual plan as a guide. Creation of this new authority was justified as a necessary response to the history of fragmented jurisdiction and competing development interests in the area.

The Province of Saskatchewan enacted legislation establishing the Meewasin Valley Authority (MVA) in 1979 and gave it jurisdiction over the 80 kms of river and extensive adjacent lands. MVA received far-reaching powers to plan the river corridor; to regulate land and water use; to acquire land through purchase,

expropriation and right of first refusal; and to develop, maintain, and regulate the area within its jurisdiction. The implications of the vast powers transferred to the MVA by the provincial government produced a backlash of opposition from agricultural groups, property owners, the real estate industry, and mortgage lending institutions. The MVA received little support from the City Council and the Rural Municipality of Corman Park, but was supported by the provincial government and conservation advocacy groups. In the end, the *MVA Act* was amended to remove private lands in the Rural Municipality and in 1981 the Rural Municipality withdrew as a participating party (see Bolstad *et al*., 1983).

MVA now has jurisdiction only over the river channel in Saskatoon and Corman Park. This jurisdiction is primarily restricted to publicly owned lands but includes a small amount of private land in the City.

The operational emphasis of Meewasin has also changed over time. During the period from 1979 to 1982, Meewasin's role, mandate and jurisdiction were defined, and a program of demonstration projects was undertaken to provide the public with examples of Meewasin's role in the valley. During the period of the first development plan, 1982-87, Meewasin undertook an extensive research program to define the natural and heritage resources in the valley, started site development projects, and began a public education and resource interpretation program.

Meewasin has adopted five principles as fundamental to the planning of the valley:

- The valley's resources and amenities should be accessible.
- The need for development and recreation should be balanced with the need for natural and heritage resource conservation.
- A diversity of activities should be provided in different settings to serve a variety of interests and needs.
- Significant natural and heritage resources should be preserved.
- Opportunities should be provided for individuals, groups and participating parties to take part in the preparation of plans and the making of decisions on matters which directly affect them.

Strengths of the approach

The 100-year conceptual plan proposes a "links and nodes" approach. The plan identifies six nodes, one major link and two potential nodes beyond the planning boundary. Each of the nodes is focused upon one or more interpretive centres and

development features, and the nodes are all linked by a river valley drive and a trail system.

Throughout each development plan and set of implementation steps, the 100-year conceptual plan will remain the primary source of direction. It will help ensure that the original intent and principles underlying the creation of the MVA are remembered and maintained during the preparation and implementation of each development plan. This type of long-term planning horizon is unique in Canada and has been instrumental in keeping the Authority's activities focused on the long term benefits of the river corridor.

The MVA has an important role in the management of the river corridor. It has undertaken the restoration and revegetation of publicly owned land which have been abused in the past. In addition, it has developed new riverbank parks, facilitated the preparation of plans for future waterfront development, and carried out an extensive program of environmental education which involved the Saskatoon School Division and all of its schools.

On lands belonging to its participating parties, MVA has played a complementary role and has respected other's priorities. MVA has also built strong interjurisdictional links and has established effective communication with city officials responsible for managing the river's resources. Although it has no specific powers of co-ordination, it has brought together agencies and groups to solve conflicts. In addition, it has been able to influence the design aspects of proposed developments by promoting technical and aesthetic criteria into its review process and by persuading the city to alter its land-use policies (Mathur, 1989).

Weaknesses and barriers

One of the most significant weaknesses of the MVA is related to the poor public perception of the agency. There was inadequate public consultation during its set-up, and the MVA lost a considerable amount of legitimacy as a result of the backlash from development interests and private landowners immediately after its establishment. At some points, the opposition was so intense that there was some doubt whether the MVA would survive the onslaught. The loss of the Rural Municipality of Corman Park from the agency's purview was a severe blow and significantly restricted the jurisdictional area of the Authority.

Part of the original vision in the late 70s when the MVA was conceptualized, was a bold attempt to restructure recreational activities and shift these away from the sensitive areas along the river to more resilient areas north of the City. As most of the fragile lands along the river are in private hands, and thus beyond the regulatory powers of the Authority, the MVA has little power to affect the uses and abuses of

these lands. In addition, the MVA has no means to acquire land for shifting the recreational activities away from the river and has failed to convince either the city or the rural municipality to do so.

The MVA has run into some major difficulties in exercising its remaining regulatory powers over land and water. The Authority has given up its right to approve improvements on residential land. In addition, as a result of a recent legal action involving a developer, the MVA found itself at odds with the position of the city over whether the development proposal met regulatory requirements. In this case the MVA compromised with the applicant in order to remain consistent with the city's position. Thus, although the MVA could theoretically exercise legal jurisdiction, it could not do so in practice (Mathur, 1989).

Lessons for the future

Several important lessons emerge from the MVA case. Firstly, although the MVA has failed as an effective regulator, it has apparently succeeded as a steward. The MVA has been able to develop significant public education programs around the river and has influenced development standards in a positive way through the development review process. Other important activities which the MVA has initiated, and with which municipal governments often have difficulty, include acting as an effective facilitator, stimulating strong public participation and debate, fundraising, co-ordination, and restoration of natural areas.

The MVA experience suggests that, given the long-established provincial and municipal regulatory powers over land and water use, it is difficult for a special purpose agency to exercise independent or superior jurisdiction in these matters even when it has statutory powers to do so. This situation arises in part because special purpose bodies are the product of local and provincial governments and are under the control of these creators. Mathur (1989) concluded from this situation that the protection of urban river corridors through regulation is best achieved through the powers of elected municipal and provincial governments.

The need for an effective implementation mechanism is strongly suggested by this case study. In many ways, the failure of the MVA to exercise its regulatory authority stemmed from the lack of support from participating parties. This support might have been secured by having an implementation strategy, endorsed by all government units. This would have ensured their commitment to this special agency through the exercise of local and provincial government powers.

Finally, the value of basing conservation efforts on long-term holistic and visionary plans should never be underestimated. In the case of the MVA, its 100-year plan was a constant source of inspiration and helped maintain the continuity of the

Authority's decisions over a long period of time, ensuring that they did not lose their original intent.

6. Oak Ridges Moraine Planning Strategy (Ontario)

Background

The Oak Ridges Moraine (ORM) is a 160 kilometre glacial deposit that forms a height of land across much of southern Ontario and provides the headwaters for many rivers and streams. While it serves a variety of valued ecological, recreational and other purposes that can be threatened by inappropriate development, the greatest worries have centred on the moraine's headwaters hydrological functions. Impairment of these functions has in the past and could again have serious negative effects for entire watersheds.

The most recent effort to introduce effective development planning for the moraine area is a process, initiated in 1991, under the direction of the ORM Technical Working Committee (TWC). This Committee was established after the province issued a formal "expression of provincial interest" in the moraine area under Ontario's *Planning Act* . It has overseen $600,000 worth of studies to support development of an ORM Conservation Strategy and has released a draft report for public discussion (ORM-TWC, 1994). Interim implementation guidelines have been put in place to check development while the strategy is being prepared. However, discussions continue regarding what form of implementation and enforcement the ORM strategy itself will enjoy.

The Working Committee is headed by the Ontario Ministry of Natural Resources but it is effectively a round table with representatives from the environmentalist and naturalist communities, aggregates and urban development industries, regional governments, provincial agencies, and conservation authorities. One of the primary concerns of this initiative is to protect the headwater hydrological functions of the moraine. Interim implementation guidelines have been put in place to check development while the strategy is being prepared.

The overall goal of the ORM Technical Working Committee is to develop a strategy to protect and enhance the ecological integrity of the moraine while providing an opportunity to pursue appropriate socio-economic opportunities in this area. A Citizen's Advisory Committee has also been appointed by the provincial government to communicate with the public about the overall direction of the TWC and to provide feedback.

In its draft report (ORM-TWC, 1994), the Committee identifies three systems—natural heritage (plants, animals, habitat), water resource management (quantity and quality), and landform conservation (protecting landscape form). The Committee's expectation is that if these three, interconnected and mutually complementary

systems are taken care of, the ecosystem as a whole will be preserved. The core and corridor areas of these three systems overlap and will be mapped.

The TWC identifies three elements in the ecosystem approach:

- developing a plan to maintain and enhance ecological integrity
- identifying (and mapping) the three systems
- assessing impacts and setting goals and targets.

The latter targets are concrete and involve looking at interconnected and cumulative effects, though the actual process by which that will be done is not yet clear. There will likely be an impact evaluation system at the subwatershed and/or landscape unit scale. The study will probably identify specific exclusion zones where no development is allowed.

The ORM Technical Working Committee is currently developing an implementation strategy to ensure that the objectives of the strategy will be pursued. Models now being proposed vary considerably and include, at one extreme, the creation of an Oak Ridges Moraine Commission not unlike that which exists for the Niagara Escarpment. At the other extreme is a proposal to direct the future development and conservation of ORM through a series of provincial guidelines.

The Oak Ridges Moraine case demonstrates all the principles of an ecosystem-approach to planning and may well become an internationally important regional planning model for consideration in areas experiencing the pressures of rapid urbanization.

Strengths of the approach

In contrast with traditional planning, the ecosystem approach undertaken here identifies discrete ecological systems—landforms, species, and habitats. It involves targets and baseline data, both quantitative and qualitative, and a monitoring system—albeit one where the monitoring can be done cheaply. It will be essential, for fiscal reasons as well as for educational benefits, to involve the public in the monitoring process.

By setting specific targets and goals, the approach taken in the ORM case gives people something tangible to work towards and something specific to collaborate on and negotiate over. The ORM approach also recognizes that no one government agency alone could possibly succeed in developing a successful strategy, and that the form of the final product may need to be as unconventional as the process for producing it.

It is appropriate, then, that the results of the Technical Working Committee are not expected to emerge as an official plan. In fact, they may not look like anything in

existence now. Rather the main product seems likely to be some kind of hybrid document with clear directions, some mapping and definitions of key terms and mechanisms and procedures for implementation and ensuring compliance.

In the work so far there has also been recognition that some entity will be needed that has formal responsibility for implementation—a lead ministry, or an ORM body of some kind. Without such an agency, with a clear sense of "ownership" and a well-defined responsibility to monitor conditions and manage data, the ORM strategy will be vulnerable to being watered down and lost in the bureaucratic shuffle.

Weaknesses and barriers

For the ORM initiative, the major barrier is the state of existing legislation, and the nature of the available regulatory tools. There are evident inadequacies of two kinds here. The first concerns the weakness of existing provisions for preventing cumulative environmental damage. For instance, the current law provides no adequate authority to control vegetation removal and landform grading activities that may have serious detrimental effects in ecologically important areas. Secondly, the current legal regime and associated institutional structures for planning and development offer little encouragement for innovative approaches to development (Ecologistics, 1993). Following conventional planning approaches under the current legislation, each of the many municipalities along the length of the moraine establishes its own development policies. The resulting inconsistencies make it virtually impossible to promote a rationalized approach to appropriate development for the area.

There are also data deficiencies. Some of these are due to the inadequacy of financial resources for collection of much of the required information—a problem that may be addressed positively by putting greater emphasis on the ability of the public (and even the private sector, in some instances) to obtain and share information. But important data deficiencies also result from failures to collect, integrate, interpret and publish information in a coherent and efficient way. Although there are already plenty of data relevant to many central concerns, they have been gathered by a plethora of different agencies, which often have narrow purposes, use mutually incompatible collection methodologies and reporting styles, and have seen no incentive or encouragement to work together. The result, for citizens and planning bodies with broader ecosystem interests, is a state of informational chaos.

Finally, it is unfortunate that the mandate of the Technical Working Committee and the scope of the interim guidelines are limited to those parts of the moraine that are within the Greater Toronto Area. The provincial government has maintained that it has focused attention on the Greater Toronto portions of the moraine because that

is where most of the development pressures are felt. But the limitation is difficult to reconcile with the need for an ecological approach based on natural boundaries.

Lessons for the future

There is a need for better public education and enhanced public awareness of the ecological role of places like the Oak Ridges Moraine. When a knowledgeable public is demanding more environmental protection, planning exercises of this type are more successful. Where there is sufficient collective will at the grassroots level, authorities are moved more easily to make the necessary legislative amendments and provide the required informational and financial resources.

At the same time, the realities of the 1990s mean that the resources available for many good purposes will be limited. For example, there will be little or no money forthcoming for land acquisition. Other mechanisms must be found to facilitate effective preservation and block inappropriate development.
Given the financially straightened situation of the provincial government, whatever results from the ORM exercise will be based on the "partnership" model of collaboration among existing agencies. There may even be a role, albeit limited to certain fields, for free-standing bodies such as public trusts. Their greatest contribution might be in terms of soliciting donations of property and money, selling and exchanging lands, and mobilizing volunteers.

7. Cumulative Effects Assessment on the Niagara Escarpment (Ontario)

Background

As we saw in our review of the principles of ecosystem planning, the need for cumulative effects assessment (CEA) is a commonly identified theme. Research in this area was stimulated by the 1969 US *National Environmental Policy Act*, which mandated an assessment of cumulative effects for projects with significant environmental impacts. This early research focused on the scientific assessment of effects and was confined to biophysical concerns. More recently, the method has begun to take into account social and economic objectives and CEAs are conducted as preludes to or in conjunction with other planning activities.

For instance, the assessment of cumulative impacts may help a community choose among various possible development scenarios. In principle, CEA is ideally suited to this purpose since it is designed to evaluate the environmental impacts of the large number of activities attendant on any development. Cumulative effects may be measured using many existing techniques, including mapping and overlays, risk assessment, trend analysis and forecasting, weighting and evaluation techniques, cluster impact assessment, and biogeographic theory, among others (OMOE, 1992).

Interest in CEA in Canada is likely to be stimulated by the new *Canadian Environmental Assessment Act,* which will require attention be paid to cumulative impacts of any development project coming under the act. In Ontario, the Ministry of Environment and Energy has already begun to use CEA as an approach to its planning activities in areas of provincial concern. For instance, a cumulative effects working group has been established as part of the Oak Ridges Moraine study. The group is preparing a background study on the meaning and methodology of CEA, as applied to the moraine.

Recently, the Ministry of Environment and Energy commissioned a study to provide background information for the design of a cumulative effects monitoring program for the Niagara Escarpment Plan Area, another terrestrial ecosystem. The Niagara Escarpment Plan is a classic example of land-use planning specifically designed to protect environmental and other non-economic values in the face of development pressures. This Plan takes precedence over municipal land-use plans in the area and is applied to private land. Along with a new form of zoning that replaced the conventional municipal zoning controls in the area, the Niagara Escarpment legislation relies on a procedure whereby each proposal to develop or change the use of land within the planning area is individually assessed, approved, approved with modifications, or rejected, in accordance with the policies set out in the plan.

The new cumulative effects monitoring program is being designed to ensure that incremental changes permitted on the escarpment do not accumulate to produce unacceptable levels of change. Specifically the monitoring system will be designed to (a) monitor the state and functioning of ecosystems along the escarpment; (b) assess the short and long term effects of the NEP policies; and (c) provide the environmental data in a form that can be used to support changes through Plan Amendments and future Plan Reviews. One of the outstanding characteristics of this cumulative effects monitoring system is its application at the planning and policy level rather than project specific monitoring. This is to provide a means of assessing the policies of the NEP over time to ensure that they are achieving the purpose and objectives of the enabling legislation.

Phase 1 of the monitoring program has been completed and a monitoring framework has been designed. Phase 2 will be the final selection of monitoring components, indicators and techniques and the development of monitoring targets.

This model has the potential to be an extremely powerful tool under various planning conditions, including the assessment of cumulative effects of official plans, strategic plans, or growth management plans in urban areas.

Strengths of the approach

One of the greatest strengths of the Niagara Escarpment cumulative effects model is the fact that it is plan-based instead of being project specific. In addition, it is designed so that both governmental and non-governmental groups can participate in the monitoring process. The identification of monitoring questions, indicators, and techniques was accomplished through the use of a broad-based Monitoring Advisory Committee with representatives from a variety of interests across the Escarpment. Although the technical aspects of the model are being guided by a team of specialized consultants, the Monitoring Advisory Committee constantly reviews the technical direction of this group to ensure that it remains on track.

Weaknesses and barriers

A few weaknesses have become apparent during the design and development of this model. One difficulty is related to the novelty of this type of approach, which has required a great deal of time-consuming work and discussion. While many groups have indicated interest in participation on the Monitoring Advisory Committee, relatively few have found the time for much active involvement so far.

Data deficiencies have posed problems similar to those identified in the Oak Ridges Moraine case. The existing information base, which reflects the fragmented and incompatible approaches that have traditionally prevailed in environmental and other data gathering, is not well suited for use in cumulative effects assessments, which typically centre on integration of information to identify changes over a large area.

Lessons for the future

One significant aspect of the Niagara Escarpment case study is the development of a cumulative impacts model, which assesses the overall effects of policy decisions on the objectives of the Plan, rather than being focused on project-specific activities. This is an important distinction and the Niagara Escarpment model demonstrates a promising process for designing a plan-based monitoring program for cumulative impacts.

This process is primarily guided by two committees; one is largely made up of consultants and government scientists providing technical expertise; the second committee consists of political interests on the Niagara Escarpment. This structure has provided the necessary bridge between the technical and political aspects of the area. The non-technical committee identifies the questions that become the basis for

the technical design. In addition, the non-technical committee periodically reviews the work of the technical committee and provides comments.

The monitoring program is being designed to take advantage of volunteer data collection. This is especially important at a time when government budgets for monitoring activities are being trimmed. The emphasis on volunteer support is illustrated by the program for collecting Ontario breeding bird data, a massive volunteer effort guided by the Federation of Ontario Naturalists (FON). FON sits on the non-technical advisory committee and provides advice on the potential contribution the volunteers and the database might make to the monitoring program.

8. Laurel Creek Watershed Study (Ontario)

Background

The Laurel Creek watershed drains into the Grand River in southwestern Ontario. Most of the watershed is within the boundaries of the City of Waterloo, and except for the headwaters area, much of it is urbanized. But there are also significant agricultural areas and natural lands in the watershed and the watercourse itself contains a mix of conditions that includes concrete channels, natural streams within forested areas, and constructed reservoirs.

Concerns regarding the existing state of the water resources and the environmental quality of the watershed—especially in the face of further development pressures—stimulated the Grand River Conservation Authority, in cooperation with municipal officials, to develop a watershed plan. One of the key concerns of the plan is the potential impact of future development on the existing flood risk in developed portions of the watershed. Also of concern were degraded water quality and fishery in Laurel Creek, and the potential negative impact of further urban development on the creek, on ground water recharge, and on the wooded headwaters of the watershed.

The goals of the study were to identify existing environmental and hydrological processes; identify the impacts due to existing uses in the watershed; identify the potential impacts of land-use changes; and develop a management strategy for the watershed. The mission statement was "to achieve sustainable development which is aimed at maximizing benefits to the natural and human environments on a watershed basis." The study team was directed by a technical committee and a round table.

During the final stages of the study, the Ontario Municipal Board dealt with the Laurelwood District plan, which covered an area within the Laurel Creek watershed.

The City implemented the watershed study partly through the Laurelwood District Implementation Plan Official Plan Amendment (OPA). A separate OPA was approved adopting the goals and objectives of the watershed study by the City of Waterloo. This is one of the few cases in Ontario where a municipality has embedded the goals and objectives of a watershed study directly into an OPA. In this case, the specific components of the watershed study to be incorporated into the OPA include the constraint area mapping, the basis for sub-watershed studies, stormwater management and quality control, buffers, infiltration, control of erosion and sedimentation, and the application of best management practices.

The Laurel Creek example has been followed in nearly a dozen other subwatershed planning initiatives in southern Ontario. Although most have been less elaborate than the original, all have gone beyond the narrow "urban plumbing" approach to drainage planning (Marshall, 1994: 18-19).

Strengths of the approach

Two of the most evident strengths of the Laurel Creek watershed study reflect ecosystem planning principles. The first centres on the scope of the study, which was based on the natural boundaries of the watershed and encompassed a variety of interrelated environmental concerns. This encouraged all the participating parties to see and assess the development options in an ecological context, giving attention to the overall effects.

The second factor was the open and participative character of the process. The success of the Laurel Creek watershed study was largely due to the variety of normally conflicting interest groups that willingly participated and supported it, and the effective round table that was created to guide the process. This was achieved at a time when there was significant political tension around the ongoing OMB hearings regarding a development proposal within the watershed area.

While plenty of discussion and disagreement attended the work of the Laurel Creek study and the associated planning approvals process, the study helped build an atmosphere of cooperation. The resulting plan amendments and development approvals so far are remarkable both for their environmental enlightenment and for the extent to which they were achieved through consensus. This success has been attributed to the level of openness that was apparent during the round table discussions, especially with the City of Waterloo.

Weaknesses and barriers

The main concerns in this case centre on what happens next. Implementation of the study recommendations, largely through planning and approvals requirements, includes work on additional, more specific studies. Because these will involve the commitment of financial resources, tough decisions will have to be made on the necessary scope and level of detail required for the studies.

The implementation model consists of a public and private partnership consisting of the City of Waterloo, developers, the conservation authority, the Regional Municipality of Waterloo, and the Ontario Ministry of Natural Resources. Much of the process is being paid for by the development industry. A mechanism is being developed to help identify the various agencies' basic requirements and thresholds for satisfaction, and to facilitate achievement of consensus on what needs to be done. However, the parties recognize that finding mutually acceptable positions may be extremely difficult.

One of the most sensitive and potentially dangerous issues emerging in the Laurel Creek situation has to do with public versus private rights over land-uses. Often studies of this nature and their resultant plans are perceived by some landowners as an infringement on their "right" to develop their own lands, and reactions can be volatile. Conflicts of this kind have arisen before in Ontario, particularly in the Niagara Escarpment case, and there is some fear that planning efforts in the Laurel Creek watershed will also stir hostile responses from unhappy landowners.

Finally, the Laurel Creek subwatershed study was carried out and completed under considerable time pressure due to pending decisions on re-zoning and subdivision applications. While this may not have seriously compromised the scope, substance and quality of the work in this case, subwatershed planning is likely to be stronger where it is more anticipatory; that is, where it is undertaken well in advance of applications and approvals for specific developments, and can examine a wider range of development alternatives.

Lessons for the future

The Laurel Creek case clearly demonstrates the importance of establishing a participative and equitable process that brings together several decision-making bodies with the public. Without this, it is extremely difficult to foster a sense of openness or trust among the various players.

The case also shows that the research and planning process should be recognized as a value-laden, broadly political matter, not a purely technical exercise. The issues being decided are community-oriented and do not always lend themselves to technical considerations alone. By involving a wide array of interests in what are

essentially political choices about the future of the community, the planning body is forced to seek a positive accommodation of diverse objectives, including both development and preservation.
Accordingly, it is evident from this case that the decision-making process involved in the development of a watershed plan, and other such planning products, should be structured in a manner that allows the participating agencies and individuals to operate in a way that is convenient, comfortable and familiar to them. Otherwise it becomes extremely difficult to ensure that the players will remain committed to the process.

9. The Regional Municipality of Ottawa-Carleton (Ontario)

Background

The Regional Municipality of Ottawa-Carleton (RMOC) is currently conducting a comprehensive review of its Regional Official Plan. Much of the philosophical basis for this review was developed in 1992 during a discussion of the ecosystem approach, in the early phase of the environmental review. The ecosystem approach has since become a core component of the official plan review.

The guiding statements and principles of the official plan review are as follows:

- RMOC is part of the natural environment and must sustain itself within these ecosystems.
- Life-support systems should be protected by conserving diversity, respecting natural processes, and promoting sustainable use of renewable resources.
- RMOC exists as part of a larger ecological, economic, and social system.
- Anticipate opportunities and prevent problems in advance instead of reacting to them.
- Adopt a long-range perspective that ensures future generations can meet their needs.
- Develop integrated decision-making processes that are sensitive to ecological, economic, and social factors.
- Focus on the quality of change and not just the quantity.
- Work together to develop solutions and create positive change.
- Improve self-reliance and self-sufficiency.

- Aim for an equitable distribution of benefits and costs.

The region's planning committee decided early in the process to examine the environmental aspects of the plan in a larger context, and consultants were contracted to do this. With considerable public input, they came to the conclusion that the environment should not be treated as a separate planning issue, but must be integrated into the official plan process. The next logical step was to review the whole plan and to apply the principles of the environmental review from the outset.

This comprehensive review continues. The region is currently engaged in issue identification and analysis, which will be followed, in 1995, by efforts to set a new direction, evaluate alternative planning options and select a preferred alternative. Completion of a detailed strategy for implementing the new plan is expected in mid-1996.

Strengths of the approach

The unique aspect of this official plan review is its emphasis on moving away from a compartmentalized perspective of planning segments (transportation, environmental resources, servicing, urban development) toward an integrated approach where the components are woven together. The review is also unusual in its emphasis on demand management instead of projecting demand from past trends and planning to meet that demand.

Emphasis has been placed on inter-jurisdictional co-operation in order to achieve the integration of the various segments of the official plan. The Ottawa-Carleton planning department has taken especially great pains to co-ordinate and co-sponsor events with their counterparts in the National Capital Commission and the two adjacent regional governments.

Wide citizen consultation has been emphasized through ideas workshops and inclusive public outreach programs. A community profile was developed to serve as a primer on the region and its surroundings so that the public could access more information in preparation for the consultation process. Visioning exercises with the community have also been an important aspect of this process.

The steps to come include important innovations, including a commitment to develop and evaluate alternative planning options and select the one that promises to respond most effectively to the major issues identified in the plan review. This means, in effect, that the region has incorporated the basic components of Ontario's environmental assessment process in its official plan review.

Weaknesses and barriers

The RMOC is currently one of the most advanced ecosystem approaches toward the "greening" of a municipal/regional official plan in Ontario. This has worried some participants. Early in the process, the planning committee concluded that the staff should focus on the environmental review, and that the bulk of their resources should be used to improve the environmental database. Soon, development interests began to fear that the entire plan review was being biased in favour of environmental concerns.

From the perspective of ecosystem planning, the only evident weaknesses with this process have been that the planning unit is not based on natural boundaries and that it is not apparent how long-term monitoring and feedback mechanisms are being incorporated into the plan review process.

Lessons for the future

An ecological approach to the official plan review has been facilitated by adoption of an integrated view of the environment as a framework in which to review other regional issues, and by having an ecological inventory in place pointing to the significant resources of the area.

Although this case study uses political rather than natural boundaries, it underlines the importance of and potential mechanisms for linking political jurisdictions so that they include key ecosystem processes. It also demonstrates a means of incorporating environmental assessment into land-use plan reviews.
Finally, the case underlines the importance of encouraging the decompartmentalization of planning concerns within a system that is striving to foster an ecological approach. In the case of the RMOC, there was an early recognition that planning themes such as transportation, land-use, and infrastructure were all connected, and any artificial differentiation between them would result in a discontinuous, rigid and stagnant process.

10. Waterfront Regeneration Trust (Ontario)

Background

As the successor to David Crombie's Royal Commission on the Future of the Toronto Waterfront, the Waterfront Regeneration Trust (WRT) was established by the Ontario Legislature in 1992. Like the Crombie Commission before it, the WRT adopted a

strong position in favour of the ecosystem approach in dealing with waterfront and regional issues.

The objectives of the Waterfront Regeneration Trust are

- to facilitate the establishment of a trail and associated green or open spaces on waterfront lands from Burlington Bay to the Trent River
- to co-ordinate programs and policies of the Government of Ontario and its agencies relating to waterfront lands
- to advise the province on any matters relating to the use, disposition, conservation, protection, and regeneration of waterfront lands
- to serve as a resource centre and information clearinghouse for policies relating to waterfront lands.

The Trust is committed to working with all stakeholders in implementing the Commission's recommendations.

A number of priority projects are underway, including the Lake Ontario Greenway Strategy, the Garrison Common project, the Lower Don Lands Strategy, the Toronto Central Waterfront Transportation Improvement Program, and the creation of waterfront partnership agreements.

The most detailed attempt of the Commission to develop an ecological approach to planning took place with the East Bayfront/Port Industrial study. Current work in the same area which builds on this study is the Lower Don Lands Strategy, which includes both sides of the lower Don River, the East Bayfront, the Leslie St. Spit, the Port Industrial Area, and the harbour. Partners in this project include the City of Toronto, Metro Toronto, the Harbour Commission, and the area landowners. The strategy will identify ways to restore the environmental integrity of the area by addressing soil contamination, flooding, rehabilitation of the Don River, and the preservation and enhancement of both natural and built heritage. At the same time the strategy is intended to assist economic recovery in the area by increasing the diversity and intensity of uses—including housing and community development—and by improved public access and transportation. Other goals include the integration of various planning review and approval processes, and support for green industry in the area.

Strengths of the approach

The Waterfront Regeneration Trust has the benefit of being able to implement a vision and a plan that were developed by its own staff during its initial incarnation as the Royal Commission on the Toronto Waterfront. This adds a great deal of continuity to and confidence about the issues being discussed. One of the key reasons for the success of the Commission and the Trust has been the leadership of David Crombie, who has an exceptional capacity for reaching out and relating to a variety

of interests. This has enabled the staff of the Trust to complete difficult diplomatic assignments with relative ease.

When the Royal Commission was active, it developed an almost unique ability to work successfully within the existing regulatory framework, because it had credibility but no legislative base or regulatory power. By having to conduct business in this way, the Commission refined its negotiation and co-operative skills. These skills have been transferred to the activities of the Trust.

The Commission's and Trust's lack of legislative authority may be considered a sign of weakness. However, Crombie and the Trust staff disagree with this; their emphasis has always been on working with other jurisdictions and in helping them explore common interests.

The Waterfront Regeneration Trust is responsible for co-ordinating all activities relating to waterfront lands from Burlington to Trenton. Although the work of the Trust and the Commission has focused on the waterfront, their philosophy reflects a more ecosystemic understanding, and the Trust has consistently seen the waterfront as part of a larger set of systems that reach back to the headwaters, that must be addressed in a comprehensive way.

In undertaking its various projects, the Trust acts as a lead agency chairing a steering committee made up of stakeholders. The Trust has a small staff with few experts. When working on a particularly technical project, the Trust will draw up terms of reference and tender work out to consultants, or tap into the expertise of other public agencies. The Trust has the flexibility to accomplish extremely technical work at the lowest possible cost due to this flexible and interjurisdictionally co-operative approach.

Weaknesses and barriers

The main barrier faced by the Trust in implementing its vision for the Toronto waterfront is a lack of staff. With only 13 staff members, it suffers from inadequate personnel time to follow through on the many projects with which the Trust is involved.

Another weakness concerns the Trust's reliance on the personal reputation and qualities of a single leader, namely David Crombie. Clearly his departure from the organization would present a major challenge to the continuity of the Trust's programs and other activities.

Lessons for the future

The importance of taking an interdisciplinary and an interjurisdictional approach is emphasized with the Trust. Even within the different agencies, it is important to maintain a wide range of contacts at all levels of the agency and ensure that the lines of communication are kept open.

The Trust case also demonstrates that it is possible for a body to do useful planning work through consensus building, without itself having legislated decision-making or enforcement authority. This lesson may not be for general application, however, since the Trust's success here has depended to an important degree on its unique circumstances and leadership.

11. Hamilton Harbour Remedial Action Plan

Background

As one of Canada's best known areas of serious environmental degradation, Hamilton Harbour was an obvious candidate for attention when Great Lakes authorities initiated a remedial action plan (RAP) program under the 1978 Canada-US *Great Lakes Water Quality Agreement* .

The agreement states that RAPs shall embody an ecosystem approach to restoring and protecting beneficial uses in areas of concern. This approach takes into account the interrelationships among water, land, air and living things—including people—and involves stakeholders (including social, economic and environmental interests) in managing the RAP. The majority of the 42 RAPs in progress throughout the Great Lakes Basin involve urban areas. In most cases, stakeholder groups have been established to set ecosystem goals and develop a "vision" for a sustainable future. The visioning process allows for long range planning not usually found in conventional planning methods.

According to Hartig and Hartig (1990: 26):

> The development of remedial action plans represents a challenging departure from most historical pollution control efforts, where separate programmes for regulation of municipal and industrial discharge, urban run-off, and agricultural runoff are implemented without full consideration of overlapping responsibilities. This new process calls upon the interactive talents available in a wide array of programmes, including the involvement of citizens, local communities, industries and a wide array of organizations and government agencies.

Of the 17 sites in Canada—all of which are in Ontario—Hamilton was among the first to get started. Because local steel companies had been trying for a decade or so to rectify past practices, there was some prior work to build on.

Since the RAP approach has been to bring together all the stakeholders who have an interest in Hamilton Harbour, from the outset it has involved a very diverse group. Stakeholders included the various local and regional bodies (municipalities and regional municipalities), major industries, citizens' and recreationalist groups, environmentalists and conservation authorities, the Chamber of Commerce, and business and educational institutions. Unlike in most of the other RAPs, politicians and agencies have been included in the Hamilton Harbour RAP stakeholder group (elsewhere called the Public Advisory Committee), rather than being separate. This may have contributed to its success.

The process has proceeded through three stages. In the first stage, the groups had to define the nature of the problems. In the second stage, the task was to produce a series of recommendations. At this stage, a separate technical group of seven or eight people did most of the writing, with input and feedback from the stakeholder group. Implementation of the recommendations comprises the third stage of the process.

The process as a whole has required that the "experts" spend much time bringing others up to speed on the technical issues—such as toxic contaminants and sedimentation. This slows things down, but is as necessary to the process as seeking consensus and identifying common ground.

Once the stage two report was submitted, the RAP process moved into the third stage of implementation. The Bay Area Restoration Council, comprised mainly of the community-based stakeholders, was established along with the Bay Area Implementation Team, which was comprised of agency personnel. The Council's job is to monitor the implementation, to do fundraising, and to help educate and raise the awareness of area residents.

Strengths of the approach

Emphasis on community involvement is a very important element of the RAP process, which proceeds from the community upwards, rather than adopting the usual top-down approach. People can relate to cleaning up their own backyard, whereas tackling the question of pollution in the whole Great Lakes system seems too daunting. Nonetheless, the Lakes will benefit if progress can be made in places like Hamilton. It has provided a great opportunity for the community to come together.

The stakeholder group met frequently and one of the positive outcomes has been that people have formed personal friendships and common alliances; they have gotten to know each other as people. As well they have been encouraged to take off their hats as representatives of specific interests, and to speak as citizens. A concerted effort to incorporate everyone's input has increased the feeling of ownership and commitment, and the experience of wrestling with the challenges of findings remedies for Hamilton Harbour has helped people to realize that such problems cannot be solved overnight.

Another specific strength of the Hamilton RAP is that it has made a real effort to persuade people that getting involved means more than just going to meetings and giving an opinion. The process has pushed groups and individuals to participate in a "hands-on" way in different projects that contribute to the achievement of the RAP's goals.

The Royal Botanical Gardens, for instance, is raising $4 million for a major restoration project. School children have been involved in painting messages on storm sewers to discourage dumping of toxic chemicals. The RAP is exploring the possibilities of initiating an "Adopt-A-Stream" program, and a landowner contact program to encourage better stewardship of lands adjacent to waterways. It has also held walkathons and public workshops on issues related to the RAP. Members find that when people are directly involved, rather than just rubber-stamping things, their awareness and sense of ownership and commitment grow. This degree of community initiative has also persuaded government agencies to allow the community to take on more responsibility.

The RAP has moved ahead with implementation before receiving approval of the previous stage's recommendations. This has proved to be a real strength. Already, there have been improvements in pollution controls for harbour industries, and improvements in municipal sewage treatment, which have been necessitated by the relatively small area that the harbour encompasses. Fish and wildlife habitat restoration programs are underway, and various processes for dealing with toxic sediments are being tested.

Weaknesses and barriers

Not surprisingly, the Hamilton Harbour RAP has suffered from a tendency for groups and agencies to protect their turf or past records, thus making it difficult for people to come together. Only through identification of the common interest in improving the harbour was it possible to enable the parties to move forward. Despite opposition and mistrust, groups eventually saw the advantages of getting the process underway and bought into the projected benefits.

At least initially, government's attitudes were an obstacle because of an apparent preference for community involvement that would simply receive and apply the rubber stamp to proposed programs. Government agencies didn't really trust the community to shoulder the responsibilities of planning and decision-making.

Because the process of consultation and agency vetting takes a long time, the process has been very slow, and this has been a major source of frustration. For instance, the stage two report on recommendations for remedial action has been in government hands for over a year and has still not been approved. Part of the problem here is the desire of governments to avoid new financial obligations. Local and regional municipal politicians and administrators, while supportive of the project, are wary of making any financial commitments and tend to treat the RAP as a federal-provincial initiative. The senior jurisdictions point to the significant local benefits and imply that the municipalities should take more responsibility.

There are also problems of scope. Within the Hamilton RAP, lip service has been paid to air and land issues, but 90 percent of the recommendations focus on water quality. Thus, the RAP process has tended to be a "waterfront" project, with limited integration into broader ecosystem planning.

More broadly, the Hamilton Harbour RAP participants, like their colleagues working in other local areas of concern, are always running up against the fact that not all problems originate locally. Some result from air transport of pollutants or water contaminants originating elsewhere, or fish and wildlife migration. This tends to generate a point of view that "even if we do all of these things, we won't be able to solve the problems."

There's no question that local initiatives need to be supplemented by national, bi-national, and global actions. But local actions help set the stage, because they show experientially the limits of what can be done at the local level, and give more force to arguments for higher levels of action and coordination.

Lessons for the future

The Hamilton Harbour RAP has now recognized, in part due to the work of the Crombie Commission, that its waterfront focus should be broadened into a watershed mandate.

Like several of the other cases, the Hamilton experience has underlined the importance of an open and broadly participative process in attempting to find common ground. It provides an especially powerful example of the value of efforts to enhance citizens' sense of ownership by treating their input with respect and encouraging "hands-on" involvement.

12. St. Lawrence Action Plan

Background

The St. Lawrence Action Plan, launched in 1988, is a federal-provincial initiative designed to implement strategies for the rehabilitation and protection of the St. Lawrence River from the Ontario/Quebec border to the Gulf of the St. Lawrence. It is a multi-component plan which began with a set of restoration and preservation objectives and regulatory commitments, as well as a program for additional scientific research and development of detailed plans for specific remediation work.

Unlike the Great Lakes Remedial Action Planning process, the St. Lawrence Action Plan is not a result of a binational agreement, and does not involve the International Joint Commission. Moreover, the basic plan development and target setting has been done through federal-provincial negotiation, rather than through a broadly participative stakeholder process. However, the Plan does adopt a comprehensive approach to a variety of interrelated environmental concerns about a large portion of the St. Lawrence.

It also faces unique challenges in addressing a very dynamic system where flow rates are high—up to 7000 cubic metres per second. Thus, while the Action Plan has more or less the same objectives as the Great Lakes clean-up efforts, strategies must differ. For example, achieving "zero discharge" of persistent toxic chemicals does not have the same effect in a river which has very few spots where persistent toxic substances can accumulate.

The St. Lawrence Centre is the co-ordinating body for the Action Plan, with Environment Canada acting as the lead agency. Other participating bodies include the federal ministries of Industry, Science and Technology, and Fisheries and Oceans. Quebec's Ministries of the Environment, and Hunting and Fishing also participate. Over the period from 1988 to 1993, the federal government contributed over $83 million to the plan and Quebec provided nearly $30 million.

Protracted negotiations have been needed to develop and finalize the federal-provincial arrangements for organizing, directing and funding the Action Plan's activities. The Plan was initiated as a federal program and its objectives were developed prior to provincial involvement. Once the province entered, the process was stalled as the provincial partners reviewed and renegotiated the initial objectives.

The work of the Plan has centred on five main goals:

- 90 percent reduction of the liquid toxic effluent discharged by 50 priority industrial plants by 1993

- implementation of restoration plans for contaminated federal sites and for wetlands
- preservation of 5,000 hectares of wildlife habitat and creation of a marine park at the mouth of the Saguenay River
- creation and implementation of recovery plans for certain threatened species
- production of a comprehensive report on the state of the St. Lawrence River environment.

Despite the difficulties in gaining federal-provincial agreements in these areas, the Action Plan and the St. Lawrence Centre have taken great strides toward achieving these goals. More than 5,000 hectares of natural area have been protected. The toxic industrial effluent discharged into the St. Lawrence has been reduced by almost 75 percent and it is hoped that the 90 percent will be achieved in 1995 when regulations affecting the 17 pulp and paper industries along the river are activated. New industrial and clean-up techniques are being implemented. The biogeographical regions of the St. Lawrence River have been defined. An impact assessment on decontaminating the Lachine Canal was produced. Scenarios have been proposed for decontaminating certain sections of the ports of Montreal and Quebec. Recovery plans for threatened species have been established and state-of-the-environment reports have been produced on the state of current knowledge and research into the St. Lawrence River ecosystem.

So far the Action Plan has not emphasized public involvement; however, it has mobilized the scientific community, particularly through the St. Lawrence Centre. Located in Montreal, the Centre has over 200 scientists from different disciplines associated with it. These scientists are working to demonstrate and apply new clean-up and restoration technologies, to develop analytic and diagnostic tools for fluvial ecosystems, and to produce a report on the state of the health of the St. Lawrence River ecosystem.

Strengths of the approach

The leaders of the Action Plan believe that they have gained important efficiencies and flexibility by not having the rigorous public consultation process that is used in the Great Lakes RAPs. Action programs have been able to progress relatively quickly from design to implementation. Of course, this may turn into a major weakness if the process is later delayed because some important players were not involved at the outset. It also limits public education benefits of the work.

While there has been little direct public and other stakeholder involvement in plan development in the St. Lawrence case, there have been efforts to build links

beyond the senior federal and provincial authorities that established the Action Plan. In particular, the Plan is being closely integrated with the activities of the regional councils of the Quebec government. These regional councils are responsible for co-ordinating the financial management of all the provincial government departments on a region-by-region basis. They have been instrumental in ensuring that the priorities of the Action Plan receive the funding required for implementation.

As well, the Centre has engaged in some public outreach and consultation. This has been facilitated through a group of non-government environmental organizations known as Strategie Saint-Laurent, which have signed an agreement with the Centre to host the public open houses and assist in public consultation on the Centre's behalf. The Centre's role is to conduct and publish research and incorporate the feedback from the consultation sessions to re-orient or identify priority actions for the river. The river has been subdivided into 26 areas that have unique community and industrial profiles. This enables the St. Lawrence River corridor to be dealt with at a more manageable scale. The creation of a *State of the St. Lawrence Environment Report* has provided another opportunity to integrate public consultation into the process. The process involves gathering information, building databases, and publishing various reports and atlases.

More direct public involvement has come in the implementation of natural area protection strategies. Non-government organizations are now participants in the management of 2,804 hectares, over half of the natural area preserved through the Action Plan

The broad-based ecosystem approach is a more clear-cut strength of the St. Lawrence Action Plan. Remedial work elsewhere, including in many of the Great Lakes RAPs, are primarily focused on toxic chemical contamination problems. In contrast, the St. Lawrence Action Plan considers a wide range of ecosystem attributes including the role of threatened species and the protection of their habitats.

However, the scope of the St. Lawrence Action Plan is currently restricted to the river itself and the municipalities adjacent to it. Future phases of the Action Plan are expected to incorporate a subwatershed approach to toxic input and industrial and solid waste management by selecting Quebec rivers draining into the St. Lawrence, and extending the considerations of the Action Plan up these rivers. Rivers known to transport a highly toxic load or serve particularly important ecological functions will be targeted. It would constitute even more of an ecological approach if the US and Ontario contributions to St. Lawrence River concerns in Quebec were also included in the scope of this plan.

Weaknesses and barriers

Information deficiencies are common in ecosystem planning initiatives. In the St. Lawrence case there have been particular difficulties because the river is an unusually dynamic system. Collecting information on baseline conditions is especially problematic in such a system. For instance, information on toxic substances was found to be insufficient for planning purposes.

Financial resources have also been limited, compared to those available for the RAPs in the Great Lakes. Although some of the funds associated with this program are from the federal Green Plan's Great Lakes-St. Lawrence Pollution Prevention Initiative, most of the money invested in the St. Lawrence must come from the participating agencies. The consequences of this situation are not all negative. Having the process rely on money from the participating agencies means that the agencies must be genuinely committed to the process. Lack of money can also inspire improved efficiencies, innovation, and realism.

Another weakness of the St. Lawrence Action Plan arises from the fact that the participating agencies have yet not made written commitments to the program objectives. Such commitments were intentionally avoided in order to maximize the amount of flexibility during detailed negotiations with the participating agencies. However, the lack of firm commitments has severely restricted the ability of the program to move ahead with public consultation and action-oriented initiatives.

Lessons for the future

The St. Lawrence Action Plan has experienced difficulties in the finalization of agreements in part because the initiative was started as a federal concern, with guiding principles and objectives established before provincial agencies were invited to join. As a result, a number of the objectives had to be reviewed as the initiative expanded. A process of this nature should bring together the various levels of government at the outset and have them determine the direction of the program jointly. It is also important for the partners to recognize that the agreed-upon objectives might change as information is gathered and knowledge is expanded.

The concentration of initiative and decision-making in government agencies alone is also problematic. Such processes are sooner or later highly dependent on the cooperation of a wide variety of people for their success. However, a planning process can be effectively stalled through insistence on consensus decision-making. In order to ensure that a program is efficient and effective, it must maintain the ability to move ahead on researching issues and implementing actions. For this the input of stakeholders is important, but participants in the St. Lawrence Action Plan are not persuaded that all of the stakeholders need to be directly involved or in accord. According to our interviewee, "Democracy is something that gets working

when you force people to work together. What is a stakeholder, anyway? If it is defined as an interested party, then that would include everyone."

Planning processes can also be stalled by undue emphasis on science, and unrealistic expectations of scientific understanding. In processes that are conceived as being primarily scientific, there is a temptation to have all major decisions hinge on the certainty of the scientific data. The scientific understanding of complex ecosystems, especially very dynamic ones like the St. Lawrence, will always be imperfect. Implementation should therefore move ahead on the basis of prudence and common sense, assisted by the best available scientific information, but not shackled by the limitations of this information.

13. St. Croix Estuary Project of the Atlantic Coastal Action Program (New Brunswick and United States)

Background

During the late 1980s, Environment Canada, provincial agencies in New Brunswick, and several universities formed the Atlantic Estuary Joint Venture. The initiative was based on the recognition that there was a considerable amount of ongoing research focusing on estuaries, watersheds, rivers, and the open ocean. In addition, there was a need to be sensitive to emerging concerns around coastal issues. A major product of the joint venture was a proposal which eventually received federal Green Plan funds as the Atlantic Coastal Action Program (ACAP).

Thirteen harbours and estuaries throughout the Atlantic Region have ongoing projects under the ACAP umbrella. One is the St. Croix project, which deals with a waterway and estuary on the Canada/US border.

The basic tenet of the program is to develop a co-operative joint management approach by which the major stakeholders define and find ways of addressing the biophysical and social problems of their areas. Typically, this is accomplished by having a local organization or consultant hold local public workshops to pull together the various interests who are then encouraged to participate in the planning process. Once the stakeholders are identified and agree to join the program, they become organized into non-profit corporations which, in some cases, have attained charitable status. The manner in which these organizations conduct business is left completely to the project group.

Once a group has been formed, a five-year agreement is signed between the non-profit corporation and Environment Canada. Environment Canada provides core funding of approximately $50,000. annually, which is used for administrative

purposes. The overall ACAP budget of approximately $10 million is being distributed to 13 groups over a six-year period.

The objectives of the St. Croix Project are: to preserve the natural and visual character of the St. Croix estuary; to preserve the capacity of the shoreland of the waterway in order that it may serve as an environmental buffer for purposes of ensuring high quality of land and water; to preserve the undeveloped character and natural shoreland area of Spednic Lake and the upper St. Croix River; and to encourage the provision of appropriate public access to the land and the water.

When the St. Croix Estuary Project was established in 1990, the decision was made that the St. Croix Waterway Commission would focus on the freshwater portion of the river, and the Estuary project would focus on the estuary itself. The stakeholders and Environment Canada have agreed to work towards developing a comprehensive environmental management plan. This would encompass not only the river and the estuary, but the entire watershed including land-uses as well.

The board of directors for the St. Croix Estuary Project consists of 20 members including: representatives from Environment Canada, fisheries interests, the port, pulp and paper industries, municipalities (both US and Canadian), tourism, the Department of Fisheries and Oceans, university research stations, the Conservation Council of New Brunswick, and the Province of New Brunswick. There is a mixture of appointed and elected members and decisions are made on the basis of consensus.

Appointments are made to ensure a broad representation from a variety of sectors. There are four working committees associated with the St. Croix project including public participation, estuary monitoring, public education, and a volunteer-based water quality monitoring group.

Strengths of the approach

The main strength of this program lies in its focus on joint management. The stakeholders are expected to develop a common vision around the long term use of the area of concern. This process requires a considerable amount of public consultation in order to identify the pertinent environmental issues and to develop action plans and implementation strategies. As the financial resources for both administration and special projects are restricted, the stakeholder groups are encouraged to establish strong local partnerships in order to ensure long-term self-sufficiency.

The project also gains from being ecosystem-based. While there has been some division of responsibility between the St. Croix Waterway Commission and the St.

Croix Estuary Project, their work is linked and the objective is a comprehensive watershed management plan.

Weaknesses and barriers

One of the major weaknesses of the St. Croix group is that they have not been effective in achieving the required participation and support from the general public, municipalities, non-government organizations and other interests. This is expected to cause problems for the implementation of the plan. Although there is representation from the major stakeholders in the area, the general public has not been kept fully informed or included in the process as yet.

In addition, the group has not received the necessary level of commitment from the province to ensure the effectiveness of the project. Inadequate provincial support is worrisome because many activities that affect the estuary are matters of provincial agency responsibility.

Lessons for the future

In the St. Croix experience it has been important that the local organizations of stakeholders have retained the authority to organize themselves according to what is comfortable for their member representatives. This freedom has helped establish a process that is appropriate to local circumstances. In ACAP, the groups have all approached their situations in distinctly different ways and this variety is considered appropriate and valuable.

In addition, the volunteer-based monitoring approach is proving to be a real asset to the objectives of the project as it acts as a good first indicator of potential problems in the estuary. In part due to legal concerns, Canadian federal agencies—including Environment Canada and the Department of Fisheries and Oceans—have traditionally been reluctant to use volunteers for information gathering. Their US counterparts have shown much more enthusiasm and openness to this concept. This is especially true in the New England states where volunteer-based monitoring programs have been in existence for a long time and have been supported by a large number of agencies.

14. New Jersey Pinelands Commission (United States)

Background

Landscape planning and site design may be interpreted as a form of the ecosystem approach to planning. An immediate forerunner of the ecosystem approach advocates among landscape planners was Ian McHarg, author of *Design With Nature* (1969), who offered this pithy summary of his method:

> The first requirement is an ecological inventory in which physical processes and life forms are identified and located within ecosystems, which consist of discrete but interacting natural processes. These data should be interpreted as a value system with intrinsic values, offering both opportunities and constraints to human use, and implications for management and the forms of human adaptation (McHarg, 1968: 225).

Following in McHarg's footsteps was ecological planner and designer Robert Dorney, who distinguished four types of site planning: flat earth, contour, feature and constraint, and ecosystem, with the latter being the one that he embraced (Dorney and Rich, 1976). In varying degrees, he applied this approach to different site designs, including the establishment of an interconnected system of greenways in a Waterloo, Ontario suburb.

The Pinelands of New Jersey is a unique landscape or ecosystem resulting from human-caused perturbations. Large stretches of it have been burned and/or cut over more than once, and water and soils are naturally acid. The uplands are comprised of pitch pine, scrub oak and related species and, in many parts, tree growth is very slow, because of coppicing and the nature of moisture gradients.

The Pinelands Commission was established at the behest of the federal and state governments in 1979. The resulting Pinelands plan is one of the first and most extensive examples of landscape planning in North America and possibly the world. The Commission, which is answerable to and whose decisions can be vetoed by the Governor of New Jersey, is comprised of seven individuals appointed by the state government, seven by the local counties, and one by the federal government.

Upon its formation, the Commission acted quickly. It conducted a hasty inventory of ecological resources. The entire million acres of the Pinelands were divided into watersheds and the ecological values within each were assessed in terms of the various infrastructure and growth pressures that were impinging on them. The Commission then established a core area of some 400,000 acres, where no development is allowed unless prior development rights have been granted. Surrounding that is a buffer zone where only low-intensity land-uses are allowed. Finally, already developed and adjacent lands were scrutinized and further development was largely restricted to them.

The Pinelands model uses an intergovernmental mix of authority along with representative and participatory mechanisms for land-use planning. It also mixes

fiscal and regulatory measures to discourage unwanted uses and to create incentives. Lilieholm and Romm (1992) summarize the package as follows:

> Landowners in protected areas receive tradable development credits to compensate for their loss of land-use options; rising land values in growth centres thus compensate owners of limited-use lands. Local government are compensated for lost tax opportunities through payments in lieu of taxes. Instead of changing ownership and jurisdictional patterns, the Pinelands model creates opportunities for trade that accomplish its ends without disservice to local interests and needs.

This model may have broad application in protecting valued landscapes that would otherwise be fragmented by development pressures.

The Land-use Management Areas created within the Pinelands include the following designations: preservation, agricultural, forest areas, rural development, regional growth areas, military and federal installation areas, and towns and villages. Pinelands development credits have transferred development opportunities from the preservation and agricultural areas to regional growth areas.

The implementation of the plan is achieved through the revision of county and municipal plans and ordinances. The Commission reviews local approvals that raise issues concerning the resource protection standards of the Comprehensive Management Plan (CMP). State agency actions must be consistent with the CMP. The coastal area review program is designed to implement programs in National Reserves outside of the state Pinelands area. A memorandum of agreement exists with federal land management agencies to ensure accountability and coordination.

Strengths of the approach

This model appears to suit conditions where the land values and population densities are so great that government bodies cannot simply purchase the lands. Landowners in the protected reserve area keep their lands and although they lose development opportunities, they are compensated for this loss. The compensation costs are met by capturing the gains from the rising value of lands in adjacent areas, which become more attractive because of the protected reserve (Lilieholm and Romm, 1992).

Except in relation to agriculture, which is described as a sacred cow in New Jersey, the Commission has the final say over all land-use activities within the Pinelands. Fortunately, however, the main agricultural activity is cranberry farming and cranberries are native to the area. The farmers do not use nitrogen fertilizers and nitrate levels in the local water are virtually non-existent.

There is some forestry activity, though not very much. Tree farm plantations are allowed on private lands if native species are used, but not on state lands. The Commission is committed to retaining the essential ecological characteristics of the Pinelands. An overall strength of the Pinelands program is that, unlike usual state programs which tend to be based on abstract state-wide standards, the Commission's approaches are all ecosystem- and site-specific.

Within the areas where development is not forbidden outright, the Commission enforces performance zoning standards. That is, if there is a protected area downstream from a development site, zero discharge into streams may be mandated. All developments are evaluated within the overall regional context, with emphasis on water quality, protected species and the need to protect habitats. Areas of the highest ecological value are zoned for no-growth. Developments can be downsized at any time if it is felt that this is warranted. Where Commission's standards are stricter than state standards, Commission's standards apply.

A final strength is that public participation is mandated in local decision-making relating to the Plan. Local bodies are allowed a certain amount of leeway in modifying the boundaries of zones and deciding where to put or how to concentrate development, but overall limits on numbers of units and intensity of development are set by the Commission. Although the Plan aroused opposition in the beginning, local people seem to have accepted it and are prepared to live with it.

Weaknesses and barriers

A possible weakness is that the main avenue for public input is through the local commissioners elected by the counties. The Plan itself is not subject to major change,

and local communities have very little power in relation to the Plan. It is doubtful that such an arrangement could be initiated and win acceptance today. Our interviewee, asked whether he thought such a model could be put into place in the present political climate, said, "No, probably not."

Lessons for the future

One key to the success of the Pinelands experience lies in the consistently strong support the project has enjoyed at the executive level. The driving force behind its establishment was the Governor of New Jersey, and that office has maintained its commitment to the project over the last fifteen years.

15. Chesapeake Bay (United States)

Background

The most recent Chesapeake Bay Agreement, signed in December 1987, covers a drainage area that includes parts of West Virginia, New York, Delaware, Maryland, Pennsylvania, Virginia and the District of Columbia. Its origins lie over a decade earlier, in 1976, when the US Congress authorized a major ($27 million) Chesapeake Bay Study to be co-ordinated by the US Environmental Protection Agency.

In December 1983, Maryland, Pennsylvania, Virginia, the District of Columbia, the Chesapeake Bay Commission and the U.S. Environmental Protection Agency signed the first Chesapeake Bay Agreement. This agreement, although without specific goals, established a structure for cooperation and coordination in the area. It created the Chesapeake Bay Liaison Office and subcommittees for data management, planning and monitoring, modeling and research. Also in 1984, the Citizens Advisory and Scientific and Technical Advisory Committees were formed. In 1985 the Non-point Source Subcommittee was established, and in 1986 the Living Resources Task Force was added.

Federal agencies were positioned to provide expertise, information in areas of data management, facilities management, ecosystem monitoring, modeling, large-scale resource management, and technical assistance. Through special agreement with the Environmental Protection Agency, the Department of Defense, the Soil Conservation Service, the Army Corps of Engineers, the National Oceanic and Atmospheric Administration, the Fish and Wildlife Service, and the Geological Survey all became committed to the Chesapeake Bay Agreement.

In 1985, participating agencies produced a catalogue of their goals for the Bay system. This became known as the Chesapeake Bay Restoration and Protection Plan. The overarching purpose of the Plan is to improve and protect the water quality and living resources of the Chesapeake Bay estuarine system so as to restore and maintain its ecological integrity and productivity, and to protect public health.

At the present time, there are significant development pressures in the Chesapeake Bay area, especially in the Baltimore, Norfolk, Richmond, and Washington, DC metropolitan areas. According to state projections, counties closest to the Bay will continue to experience the highest growth. This is also where pollution levels are highest today and where the greatest future impacts are anticipated.

Strengths of the approach

There are several working committees within the Chesapeake Bay Program including an implementation committee and several sub-committees or task forces related to particular areas such as living resources, toxics, modeling and monitoring. Each of these has its own operating budget, which encourages administrative efficiency. The sub-committees are in the process of determining how to implement their objectives on a watershed-by-watershed basis with local governments.

This program has also succeeded in creating a forum where several agencies and various interest groups are able to work together towards the common objective of improving the environmental conditions of Chesapeake Bay. They otherwise would not have had a vehicle for pooling their resources and skills.

Weaknesses and barriers

Inadequate funding has been a major barrier to achieving program objectives. For instance, funding problems have prevented the implementation of a badly needed water quality program.

It should also be noted that the Chesapeake Bay program is technically based and is largely run by specialists on the various sub-committees. Technical recommendations do not always make it to the upper levels of the organizational structure. There appears to be a major gap between the technical and political levels. For example, there has been political pressure on the toxics sub-committee to establish reduction targets without regard for their technical or financial feasibility. As well there continues to be political pressure from environmental groups and public representatives to "do everything, everywhere" with little emphasis on establishing attainable priorities.

Lessons for the future

Initially the emphasis of the strategy was on the Bay itself, but that focus has been slowly shifting away from the Bay and moving up the tributaries to include headwater areas. It is apparent that through a lengthy and costly process, the participants of this initiative have come to learn the benefit of broadening their scope to include source areas that affect the Bay.

There is a strong need for an organizational mechanism that would assist with the education of the political representatives and lobby organizations in order to ensure that unrealistic goals are not pursued. Greater accessibility should be designed into the structure to allow for non-technical review and input. Other planning models that emphasize inter-jurisdictional and vertical organizational integration might prove useful here.

The 15 Cases and the Seven Principles of Ecosystem Planning: Overall Case Study Findings

The 15 cases that we have reviewed here represent a broad spectrum of initiatives that address environmental concerns though some kind of planning effort. In each case, the participants have attempted to apply the ecosystem approach to planning. In most cases this application has been implicit; only the most recent ones include explicit reference to the ecosystem planning concept. But as we indicated in Figure II-2, all of the cases reflect application of at least five of the seven defining principles of ecosystem planning, and in several cases attention to all seven principles is evident.

At the same time, the cases involve very different environments, scales, central concerns, participants and procedures. Even the nature of planning products has ranged widely. The cases include watershed studies and plans, landscape planning, monitoring and response to cumulative impacts, remedial action plans, integrated resource planning, and official plan reviews.

Because of these differences, the cases provide a good test of the ecosystem planning principles and their practical applicability in a variety of circumstances. The cases also reveal much about how each of the principles may be further elaborated in light of experience. Both the general testing and the further elaborations should help us see how the principles of ecosystem planning may be interpreted and used in planning for urban and urbanizing regions.

Accordingly, we turn in this section to an overall examination of what the case studies tell us about each of the seven ecosystem planning principles.

Natural Boundaries

The first principle of ecosystem planning requires that planning units be based on natural boundaries. Many types of natural boundaries can be considered including ecoregions, vegetational zones, or airsheds. In the case studies analyzed here, however, the natural boundaries consistently used were physiographic or drainage related.[3] Despite this limited range of natural boundary types, the cases addressed very different ecosystems including watersheds (Laurel Creek), basins (Georgia Basin, Chesapeake Bay, Fraser River Estuary, St. Croix Estuary), and landform-based systems (Oak Ridges Moraine, Niagara Escarpment, New Jersey Pinelands).

In several cases, the planning boundaries were extended from an originally narrow focus to accommodate more or all of the relevant ecosystem features. For instance, the scope of the Royal Commission on the Future of the Toronto Waterfront was originally confined to the waterfront, but was later expanded to include the rivers flowing through the Toronto area and their headwaters in the Oak Ridges Moraine. A similar broadening of focus is occurring, or is likely to occur, with both the Hamilton Remedial Action Plan and the St. Lawrence Action Plan.

Generally, those initiatives that used natural boundaries as the basis for their planning considerations were most likely to incorporate the rest of the planning principles constituting an ecological approach. It was also found that planning successes appeared to improve significantly if the initiative were scoped in such a way that natural boundaries included both natural and cultural ecological/economic processes.

Design with Nature

The design with nature principle is the most difficult one to pinpoint since it appears in so many forms in the cases. Measures such as re-establishing or protecting natural corridors to provide for wildlife migration, or restoring wetlands to ameliorate flooding or nutrient overloading are certainly valid applications of this planning principle. Most of the cases include at least some emphasis on non-engineered solutions that enhance the ability of the natural system to either heal itself or to process deleterious substances more efficiently and effectively.

Examples of this type of approach can be found in the Niagara Escarpment and Oak Ridges Moraine authorities' adoption of the concept of "appropriate" land-uses, i.e. uses appropriate to the capacity and character of the natural systems under consideration. In the Oak Ridges Moraine case, the landform's critical function as a

[3] As a partial exception, the Oak Ridges Moraine case adopts a physiographic base but recognizes significant drainage aspects.

headwaters area and a ground water recharge and discharge zone is the underlying consideration in the design of the conservation strategy there. In other cases, such as the Fraser River, where the salmon production qualities of the river are so important, the appropriateness of use has both ecological and economic design implications.

In most cases, adoption of the design with nature idea is taken another step. Moving beyond specific design initiatives and general commitments to "appropriate" uses, the planning initiatives reviewed here have typically begun to change their research and decision-making structures to recognizing the interconnected, systemic nature of the biophysical environment and associated socio-economic activities. For example, the Fraser River Estuary Management Program and the St. Croix Estuary Project, have adopted a linked-management approach, which more accurately reflects the ecological connections and conditions within their respective natural systems.

Sensitivity to Cumulative and Global Effects

Few of the initiatives examined here could be said to have developed a global understanding of how the ecological or economic relationships within their area of concern were influenced by—or exert an influence over—relationships in other areas. But in most cases serious attention has been given to off-site, cross-boundary and cumulative effects.

Ambitious programs are now underway to design cumulative effects monitoring systems for both the Oak Ridges Moraine and the Niagara Escarpment. The Niagara Escarpment program is considered below in the discussion of the long term monitoring and feedback principle. It is too early to assess recent attempts to do the same on the Oak Ridges Moraine. In both cases, however, the commitment to cumulative effects concerns that has been demonstrated so far, dramatically distinguishes these initiatives from the prevailing character of land-use planning practice.

Interjurisdictional Decision-making

Encouragement and innovation in interjurisdictional decision-making was reflected in all of the case studies reviewed. The principle was highlighted particularly in: the Fraser River Estuary Management Program, the Alberta Integrated Resource Planning System, the Oak Ridges Moraine Conservation Strategy, the Hamilton Remedial Action Plan, the Chesapeake Bay Program, the New Jersey Pinelands and the St. Croix Estuary Project.

In several cases, interjurisdictional decision-making was viewed as an effective way of getting agencies to pursue a joint-management approach through the linking of their databases and operational programs. Several important effects resulted from this type of integration. A higher level of trust was fostered among agencies participating in the planning process. In turn, increased trust led to an easing of bureaucratic gridlock and permitted innovation with ecological management and planning techniques. Such gains were quite apparent, for example, in the case of the St. Lawrence Action Plan.

Another important result was that the efficiency of communication between stakeholders increased significantly. Even more significant improvements came about when integration occurred vertically throughout the organizational structure of the participating agencies. Once the level of trust improves, there is much greater and more substantial involvement as the players develop a sense of mutual ownership. Overall, better and more ecologically sensitive decisions are made, and important technical-political bridges are constructed.

As described below, the withdrawal of the Rural Municipality of Corman Park from the Meewasin Valley Authority, and the lack of provincial support for the St. Croix Estuary Program are examples of negative results due to a failure to achieve strong commitments from relevant players.

Consultation, Co-operation and Partnering

Some provisions for consultation, co-operation and partnering are apparent in all of the cases. But there have been important differences in the character of consultation activities, the range of participants included as partners, and the degree of success in gaining full co-operation from all parties.

Different approaches are not in themselves a problem. On the contrary, one of the recognized strengths of the Atlantic Coastal Action Program (the larger umbrella of the St. Croix Estuary Project) has been its policy to allow the affiliated groups to organize and conduct themselves in the fashion that is most appropriate to their members. This approach enables the participating groups to establish an identity of their own, which could be a crucial factor affecting their ability to find self sufficiency and to survive over the long-term.

Many of the differences in the reviewed cases, however, reflect the relatively narrow and conventional approaches adopted in certain initiatives. Often these limitations have had regrettable effects. For example, the consultation component of the Chesapeake Bay Program appears far-reaching, but upon closer examination it is apparent that most of the consultation has been with technical and scientific specialists. The failure of this program to communicate effectively with political

representatives has produced major hurdles that the program must now overcome. In contrast, the Hamilton Remedial Action Plan initiative demonstrates the type of strength and commitment that can result from a healthy mix of political, community-based and technical interests sitting at the same table and exercising authority together.

Another initiative that is expected to have some difficulty in this regard is the St. Croix Estuary Project, which has not been effective in its outreach to the general public. Because of the lack of public involvement, this program is in danger of meeting with public suspicion when the time comes to circulate its implementation strategy for public approval.

Similar fears are being voiced by representatives of the Oak Ridges Moraine Technical Working Committee. The committee has been criticized for making important value choices, commissioning the studies, and outlining a strategy before undertaking consultation with the general public.

One way to achieve appropriate consultation while building the necessary technical-political bridges may be found in the cumulative impact modeling exercise on the Niagara Escarpment. In this case a steering committee of political representatives set directions for and reviewed the work of a team of consultants who are designing the model. During the implementation stage, at least one of the non-technical stakeholders will be training volunteers to conduct some of the field monitoring services.

In another example, representatives of the Fraser River Estuary Management Program have found it easier to get co-operation among stakeholders merely by adopting the term "endorsement" rather than the "approval" of plans. Sometimes, but not always, a greater sense of co-operation can be achieved by simple adjustments.

Monitoring and Feedback

A majority of the initiatives reviewed included long-term monitoring work intended to track planning successes and failures, and to guide plan review and adjustment. Definitions of the long-term ranged from five to 100 years. In the case of the Meewasin Valley Authority, a 100 year master plan was the template upon which five-year development plans were based. This model has unique strengths that recommend it to other planning situations: it keeps the original vision of the Meewasin Valley Authority clear and consistent over time without eliminating the potential for making advances when opportunities arise.

While there is little doubt about the value of a comprehensive monitoring program, often there is a tendency to make this exercise extremely technical and

specialized. More and more agencies are finding that under current financial constraints, it is becoming highly desirable to implement a volunteer-based monitoring program. Properly designed, such programs can greatly enhance participation and education, and significantly expand the base of reliable data. Excellent examples of how this could work are available in the Niagara Escarpment and the St. Croix Estuary Project cases.

One of the most innovative attempts at developing a cumulative impact model can be found on the Niagara Escarpment. The model under development there does not have the traditional focus on measuring project-specific impacts but instead focuses at the plan monitoring level. The purpose of the monitoring program is to determine whether the policies of the Niagara Escarpment Plan are achieving the goals and objectives of the *Niagara Escarpment Planning and Development Act.* This model may have important applications for monitoring the success of any plan developed for an urban context.

Interdisciplinary Approach to Information

In one way or another an interdisciplinary approach to information gathering and analysis is evident in all the cases. In addition, several of our interviewees emphasized that interdisciplinary information gathering and analysis are essential for ensuring that considerations are comprehensive and balanced. This approach was promoted especially well by the Alberta Integrated Resource Planning System, the Fraser River Estuary Management Program, the St. Croix Estuary Project, the Cumulative Impacts Assessment Model on the Niagara Escarpment, the St. Lawrence Action Plan, and the Oak Ridges Moraine Conservation Strategy.

Interdisciplinary work has been avoided in traditional planning in part because it involves unfamiliar complexities. These difficulties increase as the scope of planning work becomes more comprehensive and there are more things to measure and more information to integrate. Moreover, with the broader scope and larger scale, issues can become diluted, confusing or apparently too expensive to pursue. To keep the necessary information gathering and analysis manageable, ecosystem planning initiatives must adopt means of focusing the work without compromising its interdisciplinary character.

The case studies reveal several techniques for focusing ecological planning initiatives while still maintaining their effectiveness. A common approach is to start with the early identification of priority areas or issues to be considered, and establishing a comprehensive strategic plan which, imbedded within its structure, has more detailed action plans with objectives that are measurable, attainable, accessible and focused. Ecological integrity monitoring programs utilizing ecological integrity indicators are currently emerging as an effective and relatively inexpensive

method for achieving the maximum scientific knowledge and insight into the entire complex of ecological relationships.

Summary: Lessons from the Ecosystem Planning Case Studies

In this chapter, we have surveyed a broad range of initiatives, all of which can be called examples of the ecosystem approach. While 13 of the 15 cases are Canadian, they have varied considerably in scale and focus from small subwatersheds studies and plans, through the monitoring, planning and management of waterways hundreds of kilometres in length, to landforms and ecosystemically related areas. The cases have also included work initiated by a variety of municipal, provincial and federal authorities and have involved a rich assortment of additional participants in different ways.

Not surprisingly, the cases do not all exhibit the same strengths and weaknesses, nor point to an identical set of prospects and pitfalls. Taken together, however, the cases do reveal important general lessons from initial experience with the ecosystem approach. These lessons, gained under various social and economic conditions and in a variety of political jurisdictions, should be useful in determining how the ecosystem planning approach may best be applied in future initiatives, and—especially for our purposes—how the ecosystem approach may be applied in urban and urbanizing regions.

Perhaps the clearest general conclusion from the case studies is that they strongly confirm the seven principles of ecosystem planning. This is not unexpected, since the cases were selected in large part because they embodied these principles. But the cases also tested the principles and in the testing the principles have been upheld.

This is not to say that all of the principles were fully or easily applied in each case. There were significant differences in extent and success of application, and lessons can be drawn from both.

Not all of the initiatives were centred within boundaries established to respect ecological functions, and not all of those that have natural boundaries gave adequate attention to the main ecological functions in their areas. In particular, several initiatives failed to integrate water planning and land-use planning. Overall the case experiences suggest that adoption of natural boundaries and integration of planning across the various environmental media within these boundaries contribute greatly to effective, environmentally-responsible planning. Where natural boundaries and a fully integrated systemic approach could not be taken, the planning problems were greater and the planning results weaker than they might otherwise have been.

At the same time, however, it is evident that some of the difficulties in integrating land-use and water planning are deeply rooted in the established treatment of land as property. In most cases involving land-use controls to help protect or rehabilitate the water system, the reaction of land owners and property interests threatened to undermine the effectiveness of the planning agency.

The design with nature principle also appears in many forms in the cases. It seems to have been one of the most difficult principles to operationalize. This may be due to the nature of the selected initiatives, many of which are still in the study or early implementation stages. But the application weaknesses may also indicate that the technical insights of other movements in urban design have not yet been fully absorbed by those undertaking ecosystem planning initiatives.

Few of the case studies examined for this research could be said to have developed a global understanding of how the ecological or economic relationships within their area of concern were influenced by or exert an influence over relationships in other areas. Again, some of the explanation may rest in the selection of initiatives focused on local and regional issues. However, there is an evident opening here as well for insights from the other innovative planning approaches and techniques to be discussed in Chapter III.

Interjurisdictional sharing of responsibilities and decision-making was a feature in all cases, even the smallest, municipally-based ones. However, in several cases the interjurisdictional linkages were not well-established from the outset, inter-agency mechanisms remained feeble, and some important authorities were at best marginal and unenthusiastic participants. This is to be expected. Given the usual reluctance of established institutions to embrace change—especially when sharing of long-held powers may be involved—there will usually be inclinations to give ecosystem planning initiatives unduly narrow mandates, inadequate resources, and little authority.

Nonetheless, it is clear from the case studies that interjurisdictional co-operation and mutual "ownership" of ecosystem planning initiatives is crucial, and best achieved before the planning effort is initiated. Several cases also underlined the practical importance of mechanisms ensuring that the interjurisdictional co-operation is established throughout the hierarchy, from technical staff to political leadership, and that the technical and political levels are themselves linked.

Co-operative involvement of the relevant authorities is particularly important where the new ecosystem planning bodies are not granted their own authority to ensure implementation and compliance. With the exception of cases where there was a legislative basis for enforcement, and a formalized basis for agency relationships, all cases were weak when it came down to implementation. While there is apparently no shortage of cases that represent strong, comprehensive approaches to ecosystem planning at a conceptual level, in the absence of an implementation strategy which establishes a schedule and designates a responsible agency, many seem fated to achieve limited results.

Effective involvement of government agencies is clearly not enough, however, and several ecosystem planning initiatives have been weakened by their failure to

foster broad partnerships and influential public participation. Although some recognition of the importance of public consultation is evident in every case, few achieved this goal in a meaningful way. Planning has frequently been done in a top-down, technocratic manner, typically justified on grounds of efficiency. In the short term, some hastening of decision-making may be gained in this way. But ecosystem-based planning is necessarily a long term enterprise. Moreover, it is inevitably concerned with making value-laden choices in conditions of uncertainty. In all the cases we reviewed, ecosystem planning has had technical components. But all of them have also involved deciding what objectives to pursue, and how heavily to emphasize precaution when ecosystem effects can be only very roughly predicted.

Developing ecosystem plans requires more research and understanding than is likely to be achieved by government workers on their own, especially in times of fiscal restraint. And in most if not all cases, implementation of ecosystem-based plans will demand that many people and interests change their behaviour to a greater extent than can be simply imposed by government authority. While it may not always be possible to achieve broad participation, or always wise to wait for complete stakeholder consensus, the ecosystem planning initiatives that have worked to include all interests and to foster active, hands-on citizen involvement, have built a stronger educational and democratic basis for change than those that have sought quicker decisions with fewer participants.

Ecosystem planning is a way of building a better understanding of ecosystems and how we can live better within them. Broad-participation research and decision-making is a valuable tool for this. But participants in the cases that have proceeded beyond the information gathering and initial planning stages have recognized that the learning must be continuous and must build on experience. While few initiatives have yet established good systems for monitoring and feedback, those that have reached this stage have recognized the importance of testing and readjustment, and are actively working to develop and apply new mechanisms of monitoring. Two particularly significant aspects of these efforts have been the development of means to identify and track cumulative effects, and the encouragement of citizen involvement in monitoring research.

Finally, experience with ecosystem planning so far demonstrated that interdisciplinary work is both practical and enriching. A common theme of the case studies is that integration improves participants' understanding—not only of ecosystems and their reactions to human activities—but also of each other's interests, perspectives and capabilities. The integrations offered in ecosystem planning extend beyond the joint incorporation of socio-economic and biophysical factors in study design. As we have seen, they also include construction of stronger and more co—operative links between land and water planning, between technical staff and political leadership, and between authorities and citizens. In several cases, the logic has been extended to the integration of land-use planning with planning for sectoral

activities (transportation, servicing, urban development, recreation, etc.) and creation of a more coherent, iterative system of information collection, analysis, planning, implementation, monitoring, re-analysis, plan adjustment, and so on.

Taken together, the lessons from the case studies suggest that the seven ecosystem planning principles are valid, but need to be supplemented in a variety of ways. In particular:

- More attention needs to be paid to ensuring that ecosystem planning bodies have, or are supported by, sufficient authority to ensure implementation.
- Insights from beyond ecosystem planning experience are needed to enrich understanding of cumulative and global implications and to guide practical application of the design with nature principle.
- Ecosystem planning initiatives also have much to learn from each other about interjurisdictional co-operation and public involvement—while the cases offer many exemplary successes and important innovations in both areas, the record here is still uneven.
- As ecosystem planning initiatives expand, there will be increasing pressure to recognize and address many entrenched attitudes and practices, including those concerning private property and proper relations between private rights and public goods.

These lessons and concerns need to be respected in designing an appropriate model for applying the ecosystem planning approach to urban and urbanizing regions. First, however, it is worth expanding the scope of inquiry a little to examine some related areas of thought and practices that may shed light on ecosystem planning options. At least some of the problem areas identified above have been given more detailed attention in other initiatives to incorporate environmental concerns in decision-making affecting urban regions. In Chapter III we examine these related initiatives.

Chapter III

Insights from Other Innovative Approaches for Environmentally-Responsible Urban Planning

Introduction

Ecosystem planning is not an isolated phenomenon. The problems it aims to address and the ideas it attempts to apply are visible in a host of other concepts and techniques. Many of these are concerned with urban issues, or are otherwise relevant to the search for ways of improving the environmental quality of planning for Canadian urban regions.

In this chapter, we go outside the immediate realm of ecosystem planning theory and practice to examine other innovative approaches to environmentally-responsible urban planning. On the basis of our experience, and a survey of environmental literature, we have selected 11 approaches for examination here (see Figure III-1). Although none of these approaches is a full-fledged expression of the ecosystem approach, each incorporates some of the defining features and principles of ecosystem planning discussed in Chapter I, and each offers some particular insights for urban application of the ecosystem planning concept.

The 11 selected approaches represent only some of the possibilities. As with the ecosystem planning case studies discussed in Chapter II, we have intentionally chosen approaches that cover a wide spectrum of Canadian thinking and practice, with some attention to innovations in the United States. We have included broad concepts as well as more specific and well-tested techniques, and universally applicable approaches as well as ones that are more narrowly concentrated on urban planning matters. In each case, however, our central interest is in practical lessons that will ease and enrich application of the ecosystem concept in Canadian urban regions.

Accordingly, we have looked at the 11 approaches chiefly through the eyes of practitioners. Instead of relying solely on literature sources, we have in each case interviewed those individuals with knowledge, expertise and experience with the approaches. In most cases the interviewees have also had direct involvement in specific projects applying the approaches.[1] Figure III-1 contains the list of

[1] Interviews were conducted over the phone, and employed a small number of open questions (see Appendix B) to which the interviewees were invited to respond in detail.

interviewees, their affiliations, and the initiatives with which they are associated.[2] While these interviews provided the basis for the discussions of the approaches presented below, the interviewees themselves are in no way responsible for our conclusions or for any errors in interpretation.

Figure III-1 The 11 Other Innovative Approaches and Interviewees

1. Sustainable Urban and Regional Development
Mark Bekkering, senior policy analyst, Planning and Development Department, Regional Municipality of Hamilton-Wentworth (Ontario)

2. Green Cities
Peter Berg, founder of the Planet Drum Foundation (San Francisco), and elaborator of the bioregionalism and green cities concepts

3. Healthy Communities
Marcia Nozick, coordinator of the Healthy Communities Winnipeg Initiative

4. Ecosystem Planning in the Private Sector
Priscilla Boucher, environmental and social policy development consultant, VanCity Savings Credit Union

5. Bioregionalism
Joel Russ, member of the Applied Ecological Stewardship sector in the Kootenay Round Table; researcher and writer

6. Conservation Strategies
Christine MacKinnon, policy and planning coordinator, Department of Environmental Resources, Prince Edward Island

7. Eco-Cities, Eco-Towns, Eco-Villages
Chip Kaufman, architect; principal of Ecologically Sustainable Design; former town architect for Bamberton

8. Growth Management
Ethan Seltzer, Director of the Institute for Portland Metropolitan Studies, Portland State University

9. Round Tables
Rozlynne Mitchell, chair of the steering committee, Howe Sound Round Table.

10. State of the Environment Reporting
Caroline Van Bers, former research officer, State of the Environment Reporting, Environment Canada

11. Environmental Assessment
Peter Mulvihill, former research assistant and co-author of a study on the use of environmental

[2] Contact information for each of the interviewees is provided in Appendix A.

assessment in settlement planning; research worker on the Great Whale environmental assessment scoping process

This chapter is divided into two sections. The first reviews each of the 11 other innovative approaches by presenting the results of the interviews according to the same standard format used for the Chapter II case studies: background, strengths of the approach, weaknesses and barriers, and lessons for the future. The second section integrates and summarizes the findings from the 11 reviews, and distills insights of particular relevance for applying the ecosystem planning concept in Canadian urban regions.

The 11 Other Innovative Approaches: Detailed Findings

1. Sustainable Urban and Regional Development

Background

The notion of sustainable urban development has emerged over the last five years as the application of the concept of sustainable development to urban areas. It therefore draws its ancestry from the international movement among conservation and development officials and non-government organizations that hoped to establish a rapprochement among environmental, social and economic interests.

In Canada, the concept of sustainable urban development is closely associated with the workings of local government as a corporation. Maclaren's 1991 survey of sustainable urban development recorded several hundred initiatives undertaken by 15 large Canadian municipalities. Ouellet's 1993 survey, also under the rubric of sustainable urban development, again concentrated on the municipal sector. Finally, several municipalities in Canada (including Burlington, Hamilton-Wentworth and Kingston Township) have declared themselves committed to sustainable urban or regional development, and have undertaken official plan reviews with this theme in mind.

Sustainable urban development may be distinguished from the ecosystem approach by its greater emphasis on the human dimension—including issues of social equity, personal empowerment and meeting basic human needs. In contrast, the ecosystem approach tends to place more emphasis on the biophysical dimension of sustainability.

In 1989, the management team and the chief administrative officer of the Regional Municipality of Hamilton-Wentworth were developing their budget for the coming year. They felt they needed a better mechanism for making budget decisions. As well, they wanted to improve coordination among the different departments. Finally,

they recognized that a new official plan and economic strategy were needed. To identify a suitable philosophy to provide a basis for dealing with these issues, the chief administrative officer mandated the region's planning department to conduct some research.

The planners looked at two approaches—healthy communities and sustainable development (SD). Experts on these movements were brought in for workshop discussions with the management team, and in the end, SD was recommended for developing a long-term planning document, and for budget decision-making. The selection was based on the perception that SD, with its focus on economy and environment linkages, would appeal better to council and the business community.

At the same time, it was felt that adoption of SD wouldn't mean anything unless the community "bought into" the process. Consequently, a Citizens' Task Force on Sustainable Development was established to initiate a two and a half year process of public outreach, resulting in a Vision 2020 document.

Strengths of the approach

The SD approach can help guide the decision-making process and encourage people to think in a broader way. In the Hamilton-Wentworth region this new approach has been manifested in council debates and in the workings of the management committee. For instance, the council was recently faced with a tough decision about whether to cut bus service in Ancaster. Instead of looking only at the short term direct cost and benefits for the bus system, council considered indirect effects including increased costs for municipal home care workers whose bus passes would have to be replaced by payments for taxi service or car expenses.

The philosophy of SD has also catalyzed a change in how departments relate to each other in the municipal bureaucracy. Departments are beginning to behave more interactively, and are slowly starting to act like a single corporation instead of 15 different departments, which has been the traditional pattern.

The impact of the SD philosophy on environmental management has been very gradual. The new official plan has borrowed 120 recommendations from the Task Force. Moreover, the region is beginning to make changes in the way that it is looking at development applications. In the past, it used a very technical checklist approach, where projects were evaluated based on the statutes and by-laws. Now it is starting to evaluate proposals based on the goals articulated in the plan. Planning officials are asking themselves, "Will this development help us meet the goals of Vision 2020?" The goals of the official plan have been broadened to include health and economic considerations and other elements previously considered outside the scope of land-use planning. One of the tools they use is a "Sustainable Development

Decision-Making Guide," which includes environmental, social and economic criteria.

The region also has produced a State of the Environment Report and is preparing a State of the Region report, which will look at all three areas: social, ecological and economic. In tandem with this, the region is initiating an indicators project, which will involve citizens in determining SD indicators. Eventually, citizens will be involved in the monitoring process itself.

Weaknesses and barriers

The biggest barrier has been simple resistance to change within regional government. Overcoming this resistance has been complicated by splits within regional council on many issues related to the new orientation.

Progress has also been slowed by limited public awareness and involvement. In order for the new approach to work, it is important that all stakeholders play a role, including taking action in their own lives on matters such as waste, energy and commuting. A focus for the region over the next year is going to be on what people themselves can do. However, a recent public survey showed that only 10 percent had heard of the new sustainable development philosophy and the Vision 2020 document. While there have been some advances—in the beginning, four years ago, only five people would come to meetings; now they're up to 350—the region still needs to reach out to the approximately 400,000 people who remain relatively apathetic.

Lessons for the future

The Task Force took two years to develop Vision 2020. When it came out, many citizens found it was too broad and utopian and lacked hard prescriptions for action. In retrospect, the Task Force should have separated vision and strategy into discrete stages, and explained the whole process better.

A major frustration has been the length of time required to get things going. Local planners in Hamilton-Wentworth feel they've lost some support and participants because things have been proceeding so slowly. Without evidence that progress is being made, people start to lose interest and the project loses credibility. It is therefore important to avoid delays, to work for a series of perhaps small but regular and continuing successes, and keep the sense of momentum building. Quicker steps can also be made by not wasting time and resources reinventing the wheel, especially when more and more is available to be borrowed from the experiences of other jurisdictions.

2. Green Cities

Background

The green cities concept has a different pedigree from sustainable urban development. It is less concerned with municipal operations and is more oriented towards how people live in their region, and how their cities relate to nature (Berg et al., 1989; Berg, 1992). While it does not deny the importance of urban planning and public policy, it has relied principally on citizen-based activism, incorporating such popular initiatives and movements in, for example, alternative technologies, urban ecological restoration, urban wilderness, and urban agriculture (community gardens).

In the green city, municipal infrastructure relies less on conventional engineering systems and more on the use of natural process (such as storm water ponds, or natural soil and topographic drainage features). Green and built space is organized to link human and natural systems, serving as corridors for both humans and wildlife and connecting the city with the countryside. Native plant species are favoured in urban landscapes to minimize needs for intensive watering and maintenance. Water quality is improved by restoring the hydrological cycle through the creation of wetlands, and protecting and enhancing groundwater recharge areas. Urban design is used to influence micro-climatic patterns in ways that improve air quality and reduce the heat-island effect (Spirn, 1984). Built form uses orientation to the sun and wind as well as landscaping to reduce indoor heating and cooling requirements (Akbari & Haider, 1991), and rooftop gardens supply food (Overtveld, 1990) while waste processing (e.g., composting) facilities are integrated into design at the site and building levels.

The impetus behind the green cities movement was recognition that, by the year 2000, 50 percent or more of the human population will live in cities and towns (75 percent already do in North America). Thus, environmentalism will fail to realize its promise unless it can somehow find a way to bring urban issues into its purview.

Planet Drum formulated that goal in 1985, and began to bring together groups with an urban sustainability focus in the San Francisco Bay Area in 1986-1987. By canvassing and working with such groups, they were able to put together a book called *A Green Cities Program for San Francisco Bay Area Cities and Towns.* The book is organized around simple questions (how are things currently? can anything be done? what can people and governments do?) and presents its responses in a carefully reasonable tone, but the substance of the message is radical and provocative. As well the book offers innovative, practical suggestions for local actions such as "daylighting" culverted streams and enabling salmon to spawn in or near the city; setting up neighborhood councils to take over much of the governance of the city,

including crime prevention; and replacing suburbs with new towns in which no place is more than a twenty minute walk from open countryside.

Strengths of the approach

While there are a number of ecological city movements, such as those led by Paolo Soleri, Richard Register (of EcoCity Berkeley), and Urban Ecology of Berkeley and Seattle, they tend to be architect and designer-driven. The strength of the green cities approach is that it is bottom-up. It works with "single-issue groups" such as urban forest, recycling, habitat, energy, and smart transportation groups—which typically lack a fully worked out philosophy of sustainability—and involves them in a Green Cities Network. Planet Drum has contacted thousands of people and enrolled hundreds of volunteers, prints a quarterly calendar of events, and every two months holds day-long workshops.

Another strength of the green cities movement is that it focuses attention on the principle of "design with nature," especially in regard to urban infrastructure. It responds to people's concerns about the declining quality of life in urban areas, especially for people who lack the wealth and mobility to escape the city. It provides a common focus or umbrella for groups with different issue-emphases, but who all seek to improve the quality of urban life. Moreover, it encompasses not just "chlorophyll-based" projects, but all the social and ecological issues embraced by the broader meaning of the term "green".

Weaknesses and barriers

Planet Drum would like to set up a Green City Centre, but its members are finding it difficult in the current economic climate, in which environment is once again seen as a luxury issue. Unfortunately, municipal authorities don't appreciate the potential of urban sustainability projects for putting people to work and improving poorer neighborhoods. Planet Drum is currently building a rooftop garden for the residents of a residential hotel in San Francisco's Tenderloin district, where it's too dangerous to linger on the street, and is thus serving equity and ecological goals at the same time.

When they presented the Green City Program to mayors and city supervisors, Planet Drum representatives were consistently told that the program was far ahead of their constituencies, and that if the public could be won over, governments would begin to act on some of the recommendations. This is the challenge that Planet Drum has taken on.

Lessons for the future

The basic strategy of recruiting volunteers to assist with various urban sustainability projects is a concrete form of assistance to under-resourced groups. Planet Drum also recommends helping such groups to articulate a larger vision.

3. Healthy Communities

Background

The Healthy Cities movement was launched in 1986 by the World Health Organization (WHO). At that time, eleven cities were selected to test new approaches to public health. In 1988, the so-called Ottawa Charter was adopted in Canada, which outlined a framework for a national Healthy Communities Project.

The concept of health embraced by the movement is a holistic one. Its principles encourage efforts to achieve a clean, healthy and safe environment; a healthy ecosystem; a supportive and non-exploitative community; widespread opportunities for participation; attention to basic needs; access to a wide variety of experiences and resources; a diverse, vital urban economy; a sense of connectedness with the past, and with the city's biological and historical heritage; and a high health status.

The movement emphasizes intersectoral action—partnerships among politicians, service providers, and the grassroots—and ensuring that a commitment to Healthy Communities principles exists on the part of political decision makers. There is also a strong emphasis on community participation, innovation, and learning through trial and error. The movement believes interconnections among the social, the economic and the ecological jointly affect individuals' health. By emphasizing context in this way, the Healthy Communities movement offers "an ecological model," in which individual health is linked to the total environment, including the availability of social opportunities.

Healthy community practitioners see the city as a complex organism, which is constantly evolving and changing. The critical idea of the movement is that social relations of mutual aid (with appropriate institutional support) should be fostered so that people are enabled to support each other in achieving their highest potential. The Healthy Communities coordinator therefore has a role as a promoter of "health" in this broadest sense, and their job involves enabling, mediating, and advocating.

Strengths of the approach

The main strength of the Healthy Communities movement is that it offers a holistic and integrated perspective on health. As well, it is anticipatory and far-sighted, seeking to foster health over the long-term.

Weaknesses and barriers

Because the approach is integrated and holistic, it is unfamiliar and uncomfortable for people accustomed to the existing, fragmented and largely reactive health care system. Health professionals, for instance, have learned to think of health in a narrow frame of reference. Also, there is the difficulty of getting people to work together, rather than focusing on protecting their established areas of expertise and authority.

Where Healthy Communities initiatives are dominated by health professionals, they tend to skew the emphasis too much toward fitness, which is only part of the picture. Other factors, such as environment and economy, are neglected.

The lack of funding is a major barrier. In many provinces, the programs are entirely run by volunteers.

In Winnipeg, while the City Plan makes reference to Healthy Communities as a concept, there is no explicit commitment from city council in the form of a declaration, policies or specific municipal department, as there is in Toronto.

Government motivation for supporting the movement seems to stem partly from the perception of an opportunity to off-load government responsibilities onto communities. While it is desirable that communities should take more responsibility for their health, there is a danger that the initiative could be manipulated and used as an excuse by institutions to abrogate responsibility.

Finally, the movement is encountering some resistance from the labour movement, because its emphasis on volunteerism is seen as undermining the position of the civil service.

Lessons for the future

Communities do need to learn to become more self-reliant, since past levels of institutional support are eroding. Furthermore, groups in the community need to learn to work together. People need to see the interconnections of issues, and how their welfare is tied in with that of other groups. It is valuable, for instance, for communities to recognize that urban poverty is an issue that affects the business community, that "we are truly all in this together."

4. Ecosystem Planning in the Private Sector

Background

While ecosystem planning is usually viewed as a public sector responsibility—if only because the ecosystems involved are so large—private sector interests are almost inevitably involved. Often, private sector participants in ecosystem planning initiatives have become strong advocates of the concept, and have begun to consider how to reform their internal operations on similar lines.

Ecosystem planning at the individual company level may seem illogical, since few companies have significant management authority over ecosystems at the subwatershed scale and larger, where ecosystem planning has typically been pursued. However, the essence of ecosystem planning lies in its principles. The Crombie Commission and others have argued that the principles of an ecosystem approach can be put to work on a small site basis, and certainly many of the principles are applicable in corporate decision-making that only indirectly involves large biophysical systems. An important advantage of this effort is that it goes beyond superficial "corporate greening".

Sullivan (1991) has explored the potential for applying the ecosystem approach to the industrial and management operations of individual corporations. In doing so, he defines the ecosystem approach as "one in which human beings, their societies, cultures and economies are considered to be fully a part of the ecosystem in which they exist." Sullivan proposes an "ecosystem strategic planning model," which differs from existing models in the adoption of a long-term planning horizon, the inclusion of an ecosystem evaluation, and the integration of an environmental audit program into the organization's strategies.

One of the several major and minor corporations that have begun to adopt an "ecosystem approach" in recent years is VanCity Savings Credit Union. VanCity's attempts to "green" itself began in 1989, with the initiation of paper recycling and replacing foam cups with employee mugs. There was also an initial environmental audit of the organization undertaken in 1990. This was at a time when environmental awareness was increasing amongst the general public and within the organization.

At VanCity, the approach taken was not to create an environmental policy "in the abstract," but instead to ask, "Who is VanCity, and where is it located—in what social and environmental context?" so that the environmental policy would reflect VanCity's role as a financial institution, and be integrated into the organization's ongoing activities. In other words, the environmental policy was not to be an "add-on", but a holistic, integrated approach.

There are two dimensions to VanCity's efforts. The first concerns the credit union's internal operations and fostering staff awareness. Initially, this focused on paper recycling. It has since been expanded to include other materials, and has been extended to all of the organization's branches. VanCity is working to educate its members and staff and convince them of the need for and desirability of various initiatives, and to encourage their participation.

Externally, it is seeking to support community initiatives through the EnviroFund (initiated in 1990), and through the Sponsorships and Donations program. The organizations and projects supported by the latter must be in harmony with VanCity's environmental goals.

Strengths of the approach

Ecosystem planning in the private sector, if approached as a component of all activities rather than as a separate, additional function, can be quite powerful. Taking an ecosystem approach encourages a fresh view of the whole operation. In contrast, typical "corporate greening" treated as the task of an extra department, tends to get reduced to a public relations exercise.

For the private sector there is always a tension between the narrow and largely conventional effort to polish a "green image" for market advantage, and the more ambitious steps required for fundamental changes in the way the organization functions in its day-to-day operations. If the private sector organization's personnel are convinced of the value of the ecosystem planning principles, the necessary changes can often come more quickly than in government agencies, which are subject to closer scrutiny by competing outside interests.

Weaknesses and barriers

In private sector corporations as in other established institutions it is often difficult to convince people within the organization to adopt a new way of thinking and acting, no matter how attractive the principles involved may be. The barriers here are not just individual; they also arise from the fragmented and hierarchical organizational structure, the technical demands of existing systems, and the deep roots of a prevailing non-ecosystemic corporate culture.

In a hierarchically structured organization, the enthusiastic may not always have authority to act, and organizational bottlenecks can easily develop if there is resistance to change at any one important level. If managers—especially senior managers—are not "on side", issues will be trivialized and reform initiatives will wither.

Even when there is willingness, there may be technical problems. Computerized systems may be set up in a certain way that cannot be easily changed; existing machines may not be able to use recycled materials; or it may not be possible to find sufficient quantities of a certain kind of cleaner or a certain type of paper.

There are also cultural issues. Employees often have fixed notions about what is "proper" or "acceptable" in the corporate world. Many are initially uncomfortable with unbleached paper, for instance. Moreover, in organizations that have traditionally relied on price and narrowly defined quality as the criteria for most decision-making, shifting to broadly environmental criteria is daunting.

Even for people familiar with ecosystem issues and approaches, identifying environmentally-appropriate alternatives to conventional products and services is difficult—it can be heavily contested terrain. Many organizations with vested interests are publishing competing analyses of what are the best environmental choices for paper, packaging, power sources, and a plethora of other items. It is frequently not clear which of the competing claims to believe, or what criteria to use in making the necessary evaluations. What is a "green" building, for instance? Who defines it?

Perhaps the most common obstacle is the focus on immediate profitability. Inevitably there is resistance to taking on additional costs, especially when the benefits of "greening" are hard to identify and likely to be greater in the long term than the short. Because of this, attention to ecosystem principles is best served if environmental responsibilities are spread throughout the organization. In the current economic climate, there is considerable competition within organizations for resources. It is therefore important for proponents of environmental initiatives not to be seen as contending with other departments for power.

Lessons for the future

In private sector organizations, application of the ecosystem approach cannot be achieved through isolated minor adjustments and easy additional activities like recycling, that do not touch basic thinking and overall corporate culture. Adopting the ecosystem approach means putting all core activities in their broader environmental and community context.

It entails, for example, developing an organizational plan, where environmental considerations are integrated into planning and decision-making. This could involve evaluating managers on the extent to which they support and promote environmental initiatives within their departments and within the organization as a whole. In most corporations it would certainly mean re-examining the production process or the design of service delivery, together with assessing its purposes, its

effects on the community and other institutions, and its contributions to local and global environmental problems or solutions.

The ecosystem approach can help the organization to be more proactive and less reactive, and more concerned with long-term change than with "one-off" solutions. It can also increase the pride and commitment of people in the organization. But employees habituated to conventional corporate culture will not all be won over immediately or all in the same way.

The most successful general strategies for developing employee support for the ecosystem approach, centre on allowing people to learn by doing, and by strengthening and improving what already exists. Employees who are helped to participate directly, who enjoy an open sharing of information and who are encouraged to initiate and innovate, are most likely to find the ecosystem approach valuable and enriching, rather than just one more imposed chore on an already crowded agenda.

5. Bioregionalism

Background

Bioregionalism has been called the "politics of place" (Michael, 1983). Its principles include a belief in natural (as opposed to political or administrative) regions as organizing units for human activity; an emphasis on a practical land ethic to be applied at a local and regional scale; and the favouring of locally and regionally diverse cultures as guarantors of environmental adaptation, in opposition to the trend towards global monoculture (Alexander, 1990).

Bioregional author Kirkpatrick Sale (1985: 43) offers the most concise definition of a bioregion as "a place defined by its life forms, its topography and its biota, rather than by human dictates; a region governed by nature, not legislature." Bioregionalists believe that nation-states and other administrative divisions are artificial constructs (Berg, 1986). In contrast with modern industrial society, which effectively alienates people from the land, bioregionalists advocate "living-in-place," which means "following the necessities and pleasures of life as they are uniquely presented by a particular site, and evolving ways to ensure long-term occupancy of that site" (Berg and Dasmann, 1978: 217).

While the bioregionalism idea has been developed by individuals and organizations outside the political mainstream, it has recently attracted attention and support from a range of government and community bodies. Bioregionalism has

been a major influence on the version of ecosystem planning embraced by the Crombie Royal Commission on the Future of the Toronto Waterfront. In turn, the Commission has popularized the use of the term "bioregion" in the context of the greater Toronto region.

In the Slocan Valley of British Columbia, people have become quite aware of the term and the idea of bioregions, even if their understanding of its implications is still rather fuzzy. Over the last five years, an extensive dialogue about bioregionalism and its application has developed in the area.

Strengths of the approach

Bioregionalism is a sort of "ecological localism," with a strong emphasis on "living-in-place."[3] The key questions that it addresses are: where do we live? how do things work here ecologically? what past and present harm has been inflicted on the area? and what are the implications of this ecological knowledge for the way we need to live from now on? However, bioregionalism is not an ideology of isolated islands. Discussions about bioregional approaches increasingly include consideration of the larger downstream effects of local activities.

Bioregionalism reinforces an "identification with place," that is expected to foster a local economy that actually works better for local people. This identification may involve study of pre-existing cultures and ways of life, but the more typical, practical emphasis is on deliberate creation of a locally or regionally appropriate culture. What we can learn from the past is the identification of elements or variables that are needed to "live-in-place," but it is important that this knowledge be applied rather than remaining academic.

As a theoretical and practical focus for people with similar interests and concerns, bioregionalism has focused attention on links between culture, place and sustainability; has aroused interest in what can be learned from traditional cultures; and has fostered cross-cultural contacts. The bioregional approach's main promise, however, is that by borrowing insights from ecology and economics as well as cultural studies, it can be used to work out practical ways to create a sustainable economy with moderate levels of prosperity, and still retain a healthy sense of community and place.

Weaknesses and barriers

[3] "Living-in-place" is a bioregional phrase meaning to make a living and draw spiritual sustenance from the unique constellation of possibilities presented by a specific site (Alexander 1990).

For bioregionalism generally, the most serious obstacles lie in the fact that local economic operations are largely and increasingly tied into provincial, national and international marketplaces. Trade agreements and other international initiatives are also moving government decision-making authority on many issues further from the community and bioregional level. Possibilities for bioregional self-determination are therefore being restricted, and bioregional identity is increasingly threatened. To have a greater sense of bioregional empowerment, it is essential that a strong local economy and a form of decentralized decision-making be allowed to evolve.

For the Slocan Valley, opportunity for local self-determination has also been constrained by the traditionally centralized character of provincial political processes. Another problem is the international border, which intersects the "georegion of Columbiana."[4] Residents value having a "separate reality" from the United States, and don't want bioregionalism used as a vehicle for weakening Canadian sovereignty or extending American influence. At the same time, the interconnectedness of the georegion is an ecological fact, and there needs to be some of way of dealing with that both conceptually and pragmatically.

Lessons for the future

Some of the answers may lie in balancing and integrating local economic activities with the demands and opportunities of a larger marketplace. For the Slocan Valley, this would involve efforts to diversify the economic base beyond the traditional extractive industries, in ways that serve markets within the Kootenays and beyond in Columbiana, perhaps with a focus on Spokane, Washington as a bioregional economic centre. But it would also involve emphasis on locally-controlled, small-scale enterprise (neighborhood-level co-operatives, partnerships or proprietorships, and home-based businesses), perhaps using electronic communications technology to maintain efficient market links.

To build stronger local economies in this way, a certain amount of co-operative, community planning will be needed. In the bioregional approach, however, this is not planning as imposition. On the contrary it is meant to ensure that people living and working in the hinterlands are able to "steer their own course" and rely on their own creativity, rather than continue to be dictated to by the marketplace.

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[4] "Georegion" is one regional unit referred to by some bioregional authors. "Columbiana" is a bioregion based on the drainage basin of the Columbia River.

6. Conservation Strategies

Background

In its ground-breaking 1980 report proposing a World Conservation Strategy (WCS), the International Union for the Conservation of Nature and Natural Resources (IUCN) identified three broad goals for sustainable development:

- maintenance of essential ecological processes and life support systems
- preservation of genetic diversity
- sustainable utilization of species and ecosystems (Nelson and Eidsvik, 1990).

In Canada, the National Task Force on Environment and Economy proposed adding a fourth objective:

- maintaining and improving the quality of life in the urban environment.

To accomplish these goals, the WCS suggested that conservation strategies be developed at the national, sub-national and local levels. Although the WCS focused on conservation of ecological processes, it recognized that this could not be achieved without a broader set of changes. According to Manning (1990: 24),

> Unlike many traditional planning exercises, which are unisectoral or focus solely on land-use planning or economic planning, conservation strategies can encompass environmental, social and economic goals.

In Canada, conservation strategies have been developed in many jurisdictions, typically through comprehensive consultation and collective decision-making, cutting across sectors and integrating all levels of government. The strongest ones have incorporated a broad range of social, economic and environmental factors in the definition of sustainability; have been developed in a bottom-up manner; and have included recommendations for all public agencies operating within the planning unit rather than focusing exclusively on certain environmental management authorities. Thus, conservation strategies have many features in common with ecosystem planning.

Most conservation strategy work in Canada been carried out at the provincial or national level, accepting existing jurisdictional boundaries rather than using ecosystem planning units. But as Nelson (1991: 261) has observed, conservation strategies based on ecosystem boundaries can be developed at the local or regional level:

> A good context for the preparation of local or regional conservation strategies is the watershed or river basin.... Watersheds also are usually large enough to include various urban areas and economic activities whose impact on the environment should be planned in an integrated fashion.

In Ontario, for example, natural-boundary conservation strategies have been undertaken for the Grand River, Rideau River and the Maitland River basins.

At the provincial level, perhaps the only strategy developed on natural boundary lines in Canada so far has been Prince Edward Island's conservation strategy, the first and in some ways still the most exemplary provincial effort.

In the mid-1980s, the PEI Wildlife Federation and the Island Nature Trust began to circulate the idea of a provincial conservation strategy to the public and to provincial politicians. After the 1986 election, won by a Liberal Party whose leader was committed to the conservation strategy idea, the new cabinet enlisted the head of the Land-use Commission to establish a co-ordinating committee and prepare a strategy. Assisted by five working groups, the committee concentrated on soil, water, wildlife, landscape and coastal zone conservation. The completed document, submitted in 1987, included over 65 recommendations for implementation by government departments (McClellan, 1990).

While the strategy was quickly adopted by the provincial cabinet and action has been taken on many of the recommendations, there have been significant limitations, in part due to the small size and restricted resources of the provincial government. Overall responsibility was assigned to the environmental protection branch of the Department of Community and Cultural Affairs, rather than to a separate body more able to build interdepartmental networks. Seed money needed for implementation of various community-based projects has not yet been made available.

An Environmental Advisory Committee was established as recommended, to act as a watchdog over the conservation strategy implementation process, but its role has diminished over the years. The conservation strategy initiative as a whole no longer receives funding, though it still exists on the books as a project of the Department of Environmental Resources—which has taken over from the Department of Community and Cultural Affairs.

Before it became dormant, the provincial round table recommended that the strategy be revised and updated to renew the vigour of the initiative and to broaden its focus. Urban issues and cultural heritage concerns, for example, were not addressed in the initial work. Two years ago, the Department of Environmental Resources started to revise the strategy. This new work included more public consultation than the initial conservation strategy exercise. Three themes emerged through the public consultation process:

- people want more information and better access to ideas about what to do
- better partnerships and coordination between departments are needed
- the scope should be expanded so that the strategy links all sectors of the government, instead of being one department's work plan.

Accordingly, the strategy review was designed to put more weight on inter-departmental discussions, with an emphasis on building consensus and commitment. A new conservation strategy document, *Stewardship and Sustainability: A Renewed Conservation Strategy,* has now been presented to cabinet and released to the public.

Strengths of the approach

The strategy renewal process appears to be a significant strength of the Prince Edward Island approach. While the original strategy was widely admired and copied, it did have serious limitations, at least some of which are addressed in the new strategy. For example, the old strategy was seen within government as having been imposed by non-government organizations. The new one reflects in-house agreement and is therefore expected to result in appropriate agencies being more willing to take on specific responsibilities.

The more thorough process of public consultation in the strategy renewal work has also given the new document more credibility and momentum, and managers are now taking the attitude that it's "everyone's" responsibility to implement it.

Weaknesses and barriers

Resource constraints limited the implementation successes of the Island's original strategy and are likely to affect the new one. The revised strategy does not commit the government to any new financial expenditures. As a partial alternative it advocates more public involvement, and the development of a conservation ethic in the province.

Monitoring of progress seems also destined to be a continuing weakness. For example, while the new strategy will be incorporated into the business plans of departments, it is not clear how or whether there will be careful overall tracking of what is being done about or spent on conservation-related initiatives, and what has been achieved.

Lessons for the future

This case, like others, underlines the value of broad involvement, consensus and ownership. In Prince Edward Island, where fiscal constraint has been a significant limiting factor, a central lesson has been that it is important to use a variety of tools, and to seek to enlist the participation of everyone. Governments will never have enough money to do everything that needs to be done. Instead, government should

attempt to establish a vision, identify means of getting there, and encourage and facilitate appropriate action by relevant participants.

Within government, conservation strategy organizers have also found it helpful to distinguish between genuine commitments from other departments, and contacts within those departments using the project to further their own agenda, without necessarily having wide internal backing.

Finally, the improvements gained through the strategy renewal process in Prince Edward Island suggest that mechanisms for regular review and revision should be standard components of any planning activity of this sort.

7. Eco-Cities, Eco-Towns, Eco-Villages

Background

Ecosystem planning shares certain key features with the planning of ecological communities, of which there is a growing list in Canada and elsewhere. The eco-towns in Scandinavia are perhaps the most well known. But there are also several equivalents in the United States (e.g. the Los Angeles Eco-Village, the Tucson Solar Village, Playa Vista in southern California and Cerro Gordo in Oregon), plus the Halifax EcoCity in Adelaide, Australia. In Canada, projects at the design stage include the Affordable Sustainable Community Project at the University of Calgary, Bamberton in British Columbia, and Seaton in Ontario.

These exercises in site planning and urban design are carried out with the goal of reducing the use of resources, and minimizing on-site and global impacts. Such proposals usually accept that "green" development processes must be comprehensive and embrace the many sectors involved in community building: architects, home builders, engineers, service providers, landscape architects and scientists. Co-operative ownership and housing arrangements are common. Natural processes are fostered by allowing indigenous plants to grow in open spaces and provide habitat for insects, birds and animals. Conservation of energy is paramount: buildings are properly insulated and have passive and other solar heat; land-use development patterns permit home workplaces and support reduced travel; alternative modes of transportation are an inherent design component.

The size of the sites varies considerably, the smaller sites not being large enough to encompass whole ecosystems and their pathways and processes. In larger sites, where whole new towns are involved, a more developed ecosystem planning process may take place.

The eco-cities (or eco-towns) movement—aspects of which used to be known as "neo-traditional" town planning—has recently rechristened itself the "new urbanism." A conference on the new urbanism was held at the University of California at Berkeley in 1989, organized by Peter Calthorpe and others, and attended by Andres Duany. In his talk, Duany outlined the social, ecological and economic benefits to be derived from neo-traditional town planning.

This meeting catalyzed the movement on the west coast, and triggered the beginnings of a sea change away from sprawl, toward traditional neighborhood or transit-oriented planning. Since then, there have been a growing number of eco-town projects, and the ecological aspects and benefits have recently been given more emphasis. Last October, at a congress for the new urbanism in Alexandria, Virginia, the leading proponents renamed the movement (as above) and came to agreement on the basic tenets.

Strengths of the approach

The eco-cities, eco-towns, eco-villages movement has strengths of two main kinds: it has spurred development of new analyses and creative solutions in many areas, and it has introduced and tested fresh approaches to planning.

The comprehensive approach has meant that innovations in content have covered a wide range of design issues, from waste management and energy efficiency to community agriculture and natural area regeneration. Perhaps the most significant solutions have been those that have linked improvements in two or more areas (e.g. using waste water to irrigate and fertilize community gardens).

Beyond specific design features, some of the main contributions of the new urbanism have centred on the implications for transportation in eco-community design. It has been demonstrated, for example, that the new urbanism's street system and land-use mix reduces traffic congestion and vehicle distance traveled by half, bring significant reductions in pollution, energy consumption, transport costs and general aggravation. Since the evidence is solid, the biggest challenge lies in convincing people and developing momentum for change.

The movement's innovations in approach have involved three major strategies—visual comparisons, design workshops and charettes—all of which have proven effective.

Visual comparisons have proven to be an indispensable tool for expanding perceptions. They have enabled traffic planners, for instance, to see beyond their usual preoccupation with safety. As well, they have helped planners and architects to address the public about issues of growth and development—which have often made

citizens nervous—in new ways. The neighboring public has traditionally opposed higher density developments, but this has been because of the way these developments have been designed and carried out. Many citizens are also annoyed by suburban sprawl, but don't realize that there is an alternative. Visual comparisons provide a concrete and interactive means of allowing people to see and understand the differences between sprawl and the new urbanism.

Another tool, largely developed in Australia, is the design workshop. Workshops are attended by 60-100 people who are carefully chosen from various "growth industry" groups—public regulators, elected officials, developers, bankers, builders—and interested citizens who are distributed proportionately into different teams.

The workshops last all day, with the morning being an introduction to the basic approach and the elements of the tool kit. In the afternoon, participants apply what they have learned to a site which they know well. In the process they produce rough, but credible, examples of sustainable "new urban" developments. Soon the concerned citizen is saying to the developer, "Why do you never do stuff like this?" The developer replies, "I'd like to, but there is too much opposition from the planner and I can't afford to risk my investors' money." And the planner says, "I've been waiting for someone to propose something like this, but I'm not sure that council would approve it." And the politician says, "Well, I could get behind this kind of thing." In other words, it breaks the existing logjams in a non-adversarial way.

Such workshops, sponsored by the State of Victoria in Australia, are credited with achieving a major breakthrough in planning and design. A new residential code for the state outlaws cul de sacs in all areas except peninsulas; it is considered by many to be the best growth code anywhere in the world. A new consensus has been effected, and the workshop has proven to be a useful technique, one which is inexpensive and is not politically risky, because it is seen as exploratory rather than mandating anything.

Finally, Andres Duany and Elizabeth Plater-Zyberk have led creation of the design "charette", a more sophisticated variation on the workshop approach involving interrelated meetings on individual issue topics and overall development design, complemented by lectures, polls and other techniques. Five charettes have been held in Australia, and about 90 worldwide.

The charettes are extensively planned: all the site data, legal language and technical material is assembled in advance, and all relevant stakeholders are invited. Topical meetings for the different sectors are held at the same time as the early design sessions. Feedback from the topical meetings is fed directly into the design sessions, so that people can see their ideas are being taken seriously. Once consensus

is achieved, everything is ready to be put into action. Indeed, the idea in most cases is to come up with a site design that can be implemented immediately.

The charettes expand participants' understanding of development alternatives, including possibilities for ecologically beneficial growth. Polls taken after the first lectures accompanying the charettes, show that most citizens dislike urban sprawl, and want ecologically sustainable development. The charettes have proven highly successful in catalyzing change in the built environment.

Weaknesses and barriers

The main barriers are a nearly universal set of interdependent factors that maintain the status quo in urban planning. Officials responsible for traditional planning and growth ordinances habitually take a proprietary attitude to their areas of authority and ways of doing things. Meanwhile, developers favour past methods and styles of development have proven profitable and are understandably conservative about risking their investors' money in ventures that may not be welcomed by planning departments or the real estate market.

Bankers and governments often have policies in place to support existing styles of development. Market analysts tend to assume that what exists is what is possible, and fail to see that even though existing developments sell, something else might sell just as well—if not better—if the public were offered a real choice. And finally, after years of experience with bad growth, many citizens are immediately suspicious of growth proposals and quick to adopt a "not in my backyard" perspective. Lacking confidence in advocates of any new development, and often lacking a sense of the "bigger picture," they tend to pull up the drawbridge without realizing that they are harming themselves in the long run.

Lessons for the future

In addition to the three strategies previously discussed, the presence of enlightened policy makers has proven essential to success, as in the case of the state of Victoria. If the initiative to support the new urbanism comes from the government, it is likely to have somewhat more credibility and acceptance in the eyes of the public than if it comes from developers.

In British Columbia, the [now defunct] Round Table has been developing an interest in these eco-community ideas and in some of the techniques, but has been afraid to venture too far. At present, in the absence of an integrated government policy favouring the new urbanism, the de facto conventional policy supports sprawl. However, as the infrastructure and other servicing costs of low density

sprawl increase, governments facing financial constraints may show increased interest in development alternatives of the kind offered by the eco-city, eco-town, eco-village movement.

8. Growth Management

Background

Growth management first emerged in the United States in response to the continuing deterioration in the quality of urban life that resulted from uncontrolled growth: congestion, air pollution, water quality and quantity problems, land conversion, garbage and toxic wastes. John DeGrove, one of the leading exponents of growth management has defined it as "a system for guiding, directing, limiting, and encouraging growth so that we can meet the inevitable demands for housing, infrastructure and other growth support systems" (quoted in Vogel and Swanson, 1989: 66).

Growth management as a planning movement has several features in common with ecosystem planning:

- internalized costs: development is expected to pay its own way, such as for servicing (e.g., through development charges in Florida and Ontario)
- integrative planning: development is linked to infrastructural provisions and quality of life goals
- balancing objectives: land-use is recognized as the basis for achieving a plurality of social goals and should not be approached on an ad hoc basis
- goal oriented planning: cities are encouraged to think about what rate of growth they desire, and what pattern of development can be sustained fiscally and in terms of the quality of life.

Originally, the growth management movement did not use an ecosystem framework. Its basic motivation was to sustain the socio-economic conditions of growth, not the ecosystems upon which this growth depended. Although environmentalists were often included in growth management coalitions, environmental issues were not usually considered in any integrative framework.

More recently, however, growth management has become cognizant of ecological principles in the design of urban development strategies. On the Pacific Coast, for instance, the British Columbia Round Table on the Environment and Economy has initiated a growth management study on the Georgia Basin, an ecologically defined unit that incorporates parts of British Columbia and the state of Washington (see the Georgia Basin case discussion in Chapter II). In Oregon, the state-sponsored growth management system is not based on ecosystem boundaries, but does incorporate strong ecosystem-based principles.

The growth management program in Oregon started in 1969 with Senate Bill 10, which mandated that all jurisdictions, urban and rural, had to develop comprehensive plans. However, there were no specific criteria for these plans, and no guidelines for how they were to be implemented.

Eventually, it became apparent that these plans were not having the desired impact on urban sprawl, particularly in the Willamette Valley, which has some of the richest farmland in the United States. As a consequence, in 1973, the Oregon Land-use Planning Program was created through Senate Bill 100. The goal of this program was to clearly separate urban and rural land-uses, and to protect agricultural land.

The state established a specific set of goals, and all comprehensive plans had to be demonstrably consistent with these goals before the jurisdictions involved were given control over local zoning. Moreover, all land-use planning decisions made by local authorities had to be consistent with the official plan. Plans, and the decisions flowing from them, were treated as legal actions. As such, jurisdictions had to show that decisions were based on "findings of fact."

Among the devices employed were urban growth boundaries (or limit lines) to separate the urban from the rural. These were based on a 20 year projection of the area that would be needed for urban expansion. This provided a certain amount of guidance for service (infrastructure) providers and speculators/developers. Because of the certainty that it gives all parties, the firm boundaries approach is now supported by a coalition of conservationists, developers and agricultural interests. It has withstood three ballot initiatives.

The program also established areas of exclusive farm-use zoning where it is very difficult for even a single house, except on lots of record, to be developed.

John DeGrove identifies Oregon as one of the "first generation" of growth management experiments, whose goal was containing urban sprawl and protecting agricultural land. With the second generation of initiatives, including Oregon's more recent activities, the focus has shifted. Rather than just containing urban growth, the goal is to influence the pattern of urban development. Limiting urban development does not prevent sprawl within the limit line, therefore more attention is now being given to the nature of metropolitan growth and urban form.

More emphasis is also being given to transportation issues and the link between transportation and land-use, and towards encouraging a shift away from single-use monocultures to more efficient mixed use and pedestrian-friendly developments. As well, attention to landscape ecology, natural systems and livability issues has broadened to the urban growth agenda. In this, the trend in Oregon is similar to that of Georgia, Florida, and New Jersey, but Oregon has so far given less attention to social dimensions.

While urban growth management means different things in different jurisdictions, in general there is more systematic attention being given to what makes for good and efficient communities, and there is a trend against excessive auto-dependence.

Strengths of the approach

One of the most important accomplishments of the approach taken in Oregon is its establishing a clear limit to urban growth, which lends stability to the countryside. Although it doesn't guarantee quality development, it at least helps to prioritize land-uses. Moreover, it is a strength that jurisdictions' plans must be consistent with state land-use goals, and that zoning decisions must be consistent with the plan. This results in a degree of certainty that make planning decision-making more efficient as well as more likely to achieve its goals.

The certainty is not permanent. Conceptually, the urban limit line is supposed to be based on a rolling 20 year supply of land, tied to an assessment of current and projected need. Portland is now nearing the 20 year roll-over period and it is not clear whether the limit will stay the same, or be extended. One indication of the growth management system's success is that the limit may stay the same.

Another strength of the system is that there is a mandatory requirement for citizen involvement in the planning process, and citizens have standing in matters of appeal. Citizens' groups perform an important watchdog function, and have brought lawsuits against those who fail to comply with plans. Also, state authorities have the option of getting directly involved in official plan amendments, though they rarely do so. The system isn't perfect: Land-use patterns and conflicts similar to what can be found elsewhere still exist, but the growth management efforts have brought a major improvement.

Weaknesses and barriers

Oregon's approach is essentially a regulatory system and there are many aspects of the human and built environment that the Oregon system is not well-suited to deal with. For example, for park creation and improvement of public safety, additional tools and collective action are also needed.

While commitment to growth management is relatively well-established and institutionalized in Oregon there is still the temptation to ease restrictions. When there is a downturn in the economy, there is pressure to improve the "business climate" by fostering growth of the kind that is otherwise recognized to be

undesirable in the long run. This suggests that the lessons about the costs of bad growth have not yet been fully appreciated.

There is also the paradox that effective growth management attracts more growth pressure. It is hard to know how much of the quality of life in cities like Portland is due to the planning regime and how much is due to other factors, such as its relatively small size. But people do move to Oregon for the quality of life and they would move in fewer numbers if irresponsible planning and unrestricted development caused quality of life to deteriorate.

Lessons for the future

One insight arising from Oregon's growth management successes is that it is more fruitful to construct a plan based on what you want, rather than one seeking to prevent the things that you fear.

At the same time, the limitations evident in the Oregon experience suggest that defining and pursuing a desired future requires more than a simply regulatory approach. A sense of region and common commitment must also to be fostered. In the San Francisco Bay Area, there is a civic regional constituency in the Greenbelt Alliance, but no official body to act on a regional mandate or take a regional perspective. In Portland, there is the regional regulatory body, but no civic constituency to express area-wide values. Both are needed.

Many factors tend to fragment the way people view their interests, including the economy, traditional suburban design and professional specialization. Developing a stronger sense of regional identity and a better appreciation of the interdependence of different groups is not something that planning bodies and processes can accomplish on their own. But there is much that good planning processes and community design can do to reflect public aspirations, establish common meeting points and establish a community of interest.

9. Round Tables

Background

The development of the round table concept is closely linked to that of conservation strategies. In 1980, the first World Conservation Strategy (WCS) was published with a recommendation that conservation strategies be developed for each country. In 1986, around the time that the Brundtland Commission was concluding its deliberations, a World Conservation Strategy (WCS) conference was held in Ottawa.

According to Manning (1990b), it was becoming apparent to many that there was considerable overlap between the objectives of the WCS and what was being recommended by Brundtland. Questions nonetheless remained about how to relate conservation strategies to the integration of environmental and economic policy as recommended by Brundtland, and about the precise role to be played by the various jurisdictions.

In response, the Canadian Council of Resource and Environment Ministers (CCREM) decided to establish the National Task Force on Environment and Economy, a body comprised of federal, provincial, and territorial government representatives along with representatives of industry, academia and non-governmental organizations. This body came to be known as the federal round table. "Its mandate was to examine the report of the Brundtland Commission and the results of the conference on the World Conservation Strategy and to report to the CCREM and to Canadians on how Canada could best respond" (Manning, 1990b: 26).

The national round table, in turn, encouraged the formation of provincial round tables. Perhaps the most prolific and successful of these proved to be the British Columbia Round Table which had, as part of its mandate, the task of exploring the feasibility and desirability of setting up local round tables and involving local communities in sustainable development. Provincial round tables now exist in almost all territories and provinces in Canada. As well, several local-level round tables have been established, beginning with one created in Peterborough, Ontario in 1988.

The BC Round Table, set up in 1989, includes fewer politicians than at the national level but reports directly to a subcommittee of cabinet. Initially, the BC Round Table was focused on environment and economy issues, and didn't cover social aspects. It also concentrated on developing appropriate processes for solving problems rather than attempting to define solutions itself. Set up chiefly to address the continuing confrontations between environmental and economic interests in the province, the Round Table affirmed the idea of local round tables, and also offered a number of criteria which it felt were essential to their success. These included identifying all relevant interests within the community and ensuring that everyone "buys into" the process; setting up the process so that it is ongoing, instead of the usual one-off task force approach; and operating the tables by consensus.

A regional round table has been at work in BC's Howe Sound for about four years. In this case, establishing a round table was the eventual result of a lengthy process that began with widely shared frustration with the lack of any mechanisms for achieving acceptable long term solutions to the many conflicts that had plagued the area. The main stakeholder groups had a history of mutual antagonism, but agreed on the need for some type of forum for discussion and dialogue. All of them recognized that the old system didn't work. A series of "invitation-only" discussions

were held with the various sectoral groups, and after an extended period of time, a major meeting was held (with a facilitator from out-of-province) where, despite concerns that a new level of bureaucracy might be created, everyone supported the idea of proceeding with the establishment of a regional table.

The people who came together to form the regional steering committee were completely representative of the original stakeholders and, without exception, they were all committed to getting a round table up and running.

The round table process has been time-consuming. In the Howe Sound case, it took three years to get groups to agree on the need for a round table, and another year to establish the steering committee that would set up the round table formally and get it functioning. The same process has occurred, with variations, wherever local and regional round tables have been tried in British Columbia. The Howe Sound table is one of the most advanced. Most other regional round table initiatives in the province are at earlier developmental stages and in some cases the tables remain informal bodies.

Strengths of the approach

Consensus-seeking processes do not always work and are not the total solution; however, they offer both short and long term advantages. The immediate benefits are in finding more broadly acceptable solutions to problems that would otherwise lead to deepened community divisions. The longer term gains are in improved mutual understanding, better use of local resources and heightened commitment to the community.

There is a common, but largely mistaken apprehension that multi-stakeholder processes in general, and round tables in particular, are inefficient luxuries that impose new costs. In fact, the reverse is often true. Non-consensus processes, which increase community conflicts or block unacceptable developments only after considerable time and resources have been spent on detailed planning and initial implementation, are proving to be both more costly and less successful. For those who have concluded that the old ways are failing us, the round table process represents a hopeful alternative.

By inviting people to work together, the round tables create a platform for a different kind of communication. Where there are limited financial resources, round tables are a way of tapping the enormous human resources of each community, and of enabling communities to become more self-reliant. As the BC Round Table has attempted to do provincially, the Howe Sound Round Table solicits ideas from and shares ideas with the local community. This contributes to a learning process extending well beyond the round table membership itself.

Even round tables that began with narrower mandates have found it necessary to address the social, ecological and economic dimensions of change. The concerns of some parties that economic interests would become marginalized have not persisted, largely because the round tables have found a sound economy is a precondition for paying for social and environmental programs, and people in the community consistently recognize the need for a strong local and regional economic base.

Creation of a sustainable community depends on incorporating these three dimensions in a broadly shared long-term vision. Round tables, especially the local and regional ones, have helped encourage agreement on desired futures by stressing the values of a healthy community, and by creating bridges for people of all sectors who have a common interest in a community in which they can work, live and play. The round tables foster the value of citizenship and an emphasis on the higher community good.

Weaknesses and barriers

A major hurdle has been getting potential participants in general, and municipal politicians in particular, to understand the nature of the round table process and the relationship between the round tables and existing government bodies. Current government structures are often too rigid to accommodate significant change in response to changing circumstances. But round tables are a new concept, and people want to know what they mean in practice and how they will change things. Where existing authorities have feared loss of power and responsibilities, they have attempted to constrain round table initiatives, for example by providing inadequate funding.

Some municipal government fears are understandable. Municipalities may understand that nothing can go forward as a recommendation until all round table members, including the municipal representatives themselves, agree. But they can also see that what is involved is a change in governance systems. Municipal politicians may recognize that the old system is not working, but the round table alternative means a big shift for politicians who assume that their role, as elected officials, is to lead rather than to represent or to build consensus.

Municipalities have sometimes mistakenly assumed that round tables represent a specialized interest or segment of the community, when in fact they can enable far broader and thorough consultation than is usually achieved. With good consultation there will be no surprises for the public any more than for the municipality; the public also has to participate in the agreements if consensus is to be achieved.

Effective public consultation and involvement has in some cases been hampered by the inadequacy of information being disseminated to communities. One attractive

solution would be to get the media involved as working partners for educating, not just providing information to, the public. The media's tendency has been to use round tables for sensational headlines, but not to explore background or context issues.

Consultation, however, is only the first step. The round table process also runs on collaboration. This is often difficult to foster, especially for regional round tables, which must overcome a long tradition of jurisdictional fragmentation. In the Howe Sound case, the three regional districts and the five municipalities had no mechanism for communication. In these circumstances the round tables themselves often must act as the linking mechanism allowing communities to respond to proposed developments, and conveying solutions, strategies or suggestions to the relevant bodies and levels of government. The Howe Sound Round Table has served as such a vehicle for inter-municipal communication. But significant challenges are involved, at least some of which could be reduced by greater efforts by provincial authorities to require co-operation and communication among provincial agencies, and to encourage municipal participation.

Round tables also face internal frustrations, many of which are related to the inadequacy of government support. Some round tables have operated despite governments rather than because of them. To date, the Howe Sound Round Table has received $5000 from the province, $7000 from the federal government, and $5000 from a local organization. Many round tables surviving on the "human energy" of their volunteers have suffered from burnout and failure to implement recommendations. Dedicated round table members have pushed themselves to the point of exhaustion, and things have fallen apart as a result. Frustration has also resulted when participants who have put a lot of work into an initiative see few concrete results.

Part of the difficulty here is that people often fail to accept that change is a cyclical process that happens slowly over generations. The more pressure there is from an aroused and aware public, the more recommendations will be implemented by government. The more recommendations are implemented by government, the more credibility the whole process will have.

Lessons for the future

There is a real need for "how-to" information for citizens attempting to establish local round tables and similar bodies for consensus-building. The experiences of existing round table initiatives could provide a valuable basis for shared learning about establishing multi-stakeholder bodies, building relations with local governments and other existing authorities, and involving the community.

It is also important to establish stronger and more reliable means of providing financial support for local and regional round table initiatives. Various federal and provincial programs pour money into communities on a fragmented, project-related basis. A better approach would allow local communities to choose what the money will be spent on, rather than having to meet external criteria. Allocation of a portion of local tax revenues to consensus-building work would also be desirable.

10. State of the Environment Reporting

Background

State of the Environment (SOE) reporting evolved out of the demand for knowledge of environmental conditions and trends—principally from environmentalists and concerned segments of the public, and later from other sectors, including government policy makers. The fact that some environmental monitoring was already occurring made SOE reporting possible. Efforts in Canada were patterned on efforts being made in other countries, especially the United States, Japan and countries of the Organization for Economic Co-operation and Development (OECD). Some of the international models took the form of statistical compendia. An early OECD report (1979) concluded that

> ...accurate, appropriate, and internationally comparable facts enable the outcome of past activities to be assessed, new initiatives to be taken, and national policy to be harmonized. They permit environmental consequences to be taken into account in public decision-making and, when published, they satisfy the public's right to know. Further improvements to the [human] habitat are therefore dependent on the production of better environmental information.

SOE reporting at a federal level is a product of the collaboration of Environment Canada and Statistics Canada. In 1985, a preliminary document was produced, entitled *Environmental Issues in Canada: A Status Report.* In 1986, the first official SOE report was produced for Canada, but a previous report had been created in 1980 for the Atlantic provinces. The impetus toward SOE reporting was strengthened by the 1988 passage of the *Canadian Environmental Protection Act,* which made such reporting mandatory.

In 1987, the province of Quebec produced a state of the environment report (SOER), and that same year a graduate student produced one for (but not authorized by) the Regional Municipality of Waterloo in Ontario (Elkin, 1990).

Since that time, the Region of Waterloo (RMW, 1991b) has produced an official SOER and a number of other municipalities have followed suit, including the Regional Municipalities of Hamilton-Wentworth and Ottawa-Carleton (1991). These reports aggregate pre-existing information on a myriad of environmental conditions and stress points, are commonly organized by environmental medium (air, land, water) and are relevant to a broad range of policy issues (waste management, water conservation, wildlife management, etc.). The Region of Waterloo SOER work included preparation of a more broadly scoped report by a nine-member Citizens Advisory Committee on the Quality of Life (RMW, 1991a) which held public

meetings and solicited written submissions to identify public concerns. More recently, the City of Toronto (1992) has prepared a State of the City Report covering an extended range of issues, including socio-economic and human health factors.

Strengths of the approach

SOE reporting enables society to have a snapshot of existing conditions. It shows trends and it provides a vehicle for comprehensive assessment of all aspects of the environment. It allows society to monitor progress toward defined goals, and offers guidance for policy development.

In particular, the use of indicators allows concise and consistent measurement of environmental conditions. Another strength is that its practitioners are beginning to explore international linkages, particularly those related to trade and the environment. Transboundary issues such as acid rain and climate change continue to be examined from a global perspective.

Perhaps more significant are the questions SOE reporting begs and the encouragement it provides for finding good answers. SOE reporting cannot be done usefully or efficiently in the absence of some agreement on what conditions and trends are worthy of attention, which in turn requires agreement on what conditions are valued and what trends are worrisome. Similarly, monitoring of progress toward defined goals requires that common goals be defined. In some cases—that of the Regional Municipality of Waterloo for example—the needs for public discussion of the proper focus for monitoring and reporting led to incorporation of public quality of life consultations into the SOE work.

Weaknesses and barriers

Where concerns and objectives are reasonably well defined, a major obstacle is insufficient historical data or current monitoring to enable the "state of the environment" to be adequately described, evaluated and presented. Environment Canada has officially adopted the "ecosystem approach," but implementation is difficult, especially in an urban context where the environment is largely a human creation. There is therefore a tendency to fall back on sector or issue-oriented approaches which offer relatively straightforward concepts and measuring tasks, but neglect interrelations. Revealing the connections between local and global conditions is more difficult still.

Increased attention to the links between the biophysical and the social dimensions of the environment is part of the natural evolution of SOE reporting, but understanding and reporting these links is easier do in theory than in practice. In

general, SOE reporting is still in its infancy. For many areas that we know we should be watching and know what indicators to follow, the necessary monitoring data don't exist. In other areas of concern, science hasn't evolved to the point of knowing what the relevant parameters are, or how to measure them.

Some data and reporting difficulties arise because of the lack of integration and co-operation between information-holding departments. This compartmentalization negatively affects government efforts to deal with environmental issues. Only a stronger commitment to integration and harmonization will help ensure that co-operation is enhanced, and that adequate resources are devoted to improving the quantity and quality of information gathered.

Lessons for the future

SOE reporting work has been most valuable where it has involved efforts to specify and follow community concerns and objectives. This work is not often something that the SOE reporting unit itself has the mandate or capability to undertake. Moreover, since an understanding of shared concerns and objectives is needed for a variety of purposes in addition to SOE reporting, it should be integrated more fully into the larger set of planning initiatives. SOE reporting both needs guidance from, and should be designed to assist, planning work that identifies social, economic and biophysical goals: assesses current conditions and future options: makes decisions on development proposals; and reconsiders the results.

Better integration of SOE reporting with objective-setting and other elements of local and regional land-use planning will need to be balanced with steps to link SOE reporting work across jurisdictions. Since few political jurisdictions have ecologically coherent boundaries, effective SOE reporting needs to be interjurisdictional. At least, the data collection and reporting work has to be done in a consistent enough way to allow integration of data. Otherwise, identification and evaluation of cross-boundary concerns and cumulative effects is impossible.

Establishment of a consistent basic approach would also serve useful efforts to integrate SOE monitoring and reporting at the local, provincial and national levels. Unfortunately, it is not yet clear what the common building blocks for SOE reporting should be. The ecozone/ecoprovince approach of nested regions adopted by Environment Canada is a candidate, but it is based strictly on hydrological criteria. Moreover, it does not necessarily match people's conceptions of their own regions.

11. Environmental Assessment

Background

Environmental assessment processes of various kinds have been introduced in many jurisdictions over the past twenty-five years in response to public concerns about the negative effects of public and private sector undertakings. Initially, such negative effects were addressed only through regulatory initiatives that required identification of certain kinds of environmental impacts. The regulatory approaches typically focused on activities of individual sectors (e.g., projects of the nuclear industry) or particular receptors (e.g., damage to fish habitat or pollution of air) and involved seeking compliance with specified standards. While these initiatives were useful in avoiding or mitigating some negative effects, they proved to be too reactive, too narrowly focused and too tolerant of reduced but continuing degradation.

Over the past twenty years environmental impact assessment methodologies have gradually moved from a concentration on developing inventories of environmental features and identifying specific individual impacts, to a more explicitly value-laden and systemic approach emphasizing ecological realities and a concern for valued ecosystem components (Beanlands and Duinker, 1983)

Similarly, the evolution of environmental assessment laws has been toward greater openness and empowerment of public participants, broader application, more critical examination of proposals in light of alternatives, and more comprehensive consideration of effects (including, most recently, steps to address cumulative effects). As well, the more advanced environmental assessment processes apply higher standards of approval (seeking best options rather than merely adequate mitigation), and demand better monitoring of results and enforcement of obligations. Several of these directions of legal and administrative change reflect and facilitate greater attention to ecosystem concerns—in particular the interrelationships of biophysical and social-cultural effects and the overall impacts of multiple undertakings, new and existing, especially in areas already subject to considerable stress.

Where is it most ambitious, environmental assessment is not just a contribution to planning; it is an approach to planning that incorporates rigorous consideration of environmental concerns, including social, economic and cultural as well as biophysical factors.

Strengths of the approach

Worthwhile avoidance or reduction of environmental damage is a likely benefit even of the narrow approach to environmental assessment that merely examines potential effects and mitigation opportunities for already selected projects. The more ambitious forms of environmental assessment can have multiple benefits. Obligatory consideration of alternatives can win recognition for non-traditional but environmentally-preferable options. Expectation of careful public review can bring much more serious attempts to address public concerns and environmental factors in evaluating options and in detailed design. In turn, better environmental planning and design can sharply reduce subsequent costs.

Longer term benefits can come if the lessons learned from each process are applied to the next one. Moreover, environmental assessments can serve as valuable social learning tools. Public participants especially gain greater familiarity with the substance of the issues and options under consideration, and also greater confidence in their own abilities and knowledge (Richardson et al, 1993).

Environmental assessment is also relatively flexible. It can be applied in policy and program development as well as planning and project selection and design. It can cover and integrate consideration of a range of potential biophysical and social impacts. If used properly, it can support and unlock the local knowledge and expertise residing in local communities. Although often associated with adversarial processes, it can be used as a tool for mediation and informed bargaining. Depending on the governing legislative framework it can be reasonably open-ended.

Weaknesses and barriers

Most established environmental assessment processes in Canada are narrowly conceived and applied. Early and open assessment of alternatives is rarely required. Integration into policy making and planning is still unusual, and the scope of individual assessments is often limited in ways that exclude consideration of issues of greatest public concern.

Environmental assessment work has often been criticized for including poor science, and some practitioners have interpreted this as justification for imposing narrow definitions of acceptable information in hopes of projecting a rigorous scientific image. While there is much that can be done to enhance the quality of information for environmental assessments, narrowness is seldom the answer.

The messy real-world problems that environmental assessments address can seldom be tackled effectively in rigid, standardized approaches. Flexibility is needed with information requirements because, typically, certain kinds of relevant data are not readily available. Especially in transnational and intercultural cases, environmental assessments that are too rigid may also be culturally inappropriate. If

so they will fail to elicit and appreciate crucial local knowledge. Environmental assessment cannot be "brought in a suitcase."

Many practitioners have also tended to overlook or deny the inevitably value-laden nature of their work. The choice of tools and indicators itself reflects certain values. Information gathered scientifically can, at best, inform certain choices, and make clear the consequences of taking certain actions. The common inclination to give more weight to quantifiable variables than the less easily measured qualitative ones, for example, is an expression of bias and values, not a favouring of science and truth.

Government authorities, project proponents and environmental assessment professionals have not always appreciated the public role in environmental assessment. But because environmental assessment is necessarily value-laden, its frameworks, problem definitions, methodologies and assumptions must always be subject to public scrutiny.

Lessons for the future

While environmental assessment is not currently being used to its full potential in Canada, there have been many exemplary efforts to apply the basic principles of assessment effectively and creatively. The Berger Commission on the Mackenzie Valley natural gas pipeline proposals set an early international standard for integrated consideration of socio-economic and biophysical factors and for serious attention to the concerns of local people. Ontario's process has since 1975 consistently demanded assessment of alternatives before a preferred undertaking is selected and proposed. The Great Whale hydro project assessment in Quebec probably offers the best example of a scoping process that incorporates indigenous knowledge and perspectives.[5] And the new federal legislation takes the important step of requiring evaluation of cumulative effects. These and other good qualities need to be incorporated more consistently in environmental assessment processes across the country.

At the same time, there are questions about the extent to which environmental assessment should be further developed as a separate process. As environmental assessment has evolved further toward being an approach—rather than a mere contribution—to planning, environmental assessment requirements have increasingly overlapped with planning requirements. One attractive solution to this

[5] The review panels have explicitly tried to accommodate the plurality of realities and epistemologies that collide in the north. This is reflected in the final guidelines from the scoping exercise, which mandate that the information and conclusions gathered and produced have to be recognizable to all parties and meaningful across cultures.

problem is to integrate the two by incorporating the principles and methods of environmental assessment in redesigned, more environmentally sensitive, planning regimes.

The 11 Other Innovative Approaches: Overall Findings

Each of the 11 other approaches that we have reviewed here is related in some way to ecosystem planning. Some could be more or less directly incorporated in ecosystem planning regimes for urban regions. Others offer lessons and insights that help clarify how ecosystem planning should be initiated.

Taken together, the lessons from the 11 other approaches support the basic principles of ecosystem planning and clarify some of their implications. At the same time, experiences with these other approaches help reveal the nature and extent of the major barriers that face such initiatives, and suggest lessons for overcoming these barriers and strengthening the design and implementation of ecosystem planning models.

The Other Approaches and the Seven Principles of Ecosystem Planning

Only some of the 11 other approaches apply all seven of the basic principles of ecosystem planning. But all seven of the principles are applied, and in some ways illuminated, by the set of approaches we have examined here.

Natural boundaries

While few of the other approaches have focused directly on the importance of adopting natural planning boundaries, most have addressed issues and concerns that cross conventional jurisdictional boundaries and have found difficulties at these points. It is significant that the problematic boundaries are sectoral as well as geographical. The difficulties faced in winning the co-operation of adjacent municipalities that share a common ecosystem have been similar to those of gaining accord among agencies with fragmented mandates. Both centre on the challenges of introducing holistic, integrated and anticipatory approaches where reactive and piecemeal approaches have traditionally prevailed.

Attention to natural boundaries does have some special importance. It arises explicitly in bioregionalism and the green cities movements, where developing a sense of community is tied to developing a sense of place. But it is also at least

implied by other approaches that emphasize respect for the uniqueness of local conditions and use of citizen knowledge and commitment. The key here is that the value of adopting natural boundaries for planning is not solely in facilitating comprehensive scientific studies, but more importantly in strengthening the connections between residents and their environment, and in making use of this enhanced citizen understanding in planning.

Design with nature

In the related approaches, design with nature appears in a wider variety of contexts than in the ecosystem planning case studies. Particularly in the green cities and eco-communities concepts, design with nature is not focused just on watershed drainage issues or even broader protection and rehabilitation of wildlife habitat, ground water recharge areas and basic ecological functions. It applies equally to building and streetscape design. This more comprehensive linking of the socio-economic and ecological worlds could be adopted by ecosystem planning models as well.

Several of the other approaches also stress ecosystem- and site-specific understanding for planning and design. Some standardization of information gathering methodology is necessary and aggregation of local information to identify cumulative trends and effects is crucial. Nonetheless, larger scale planning objectives and standards need to be complemented by local goals and designs that are appropriate to the immediate conditions.

Sensitivity to cumulative and global effects

The other approaches suggest that three things are needed if planning processes are to demonstrate significantly greater sensitivity to cumulative and global effects. The planning horizon must be distant enough that long term considerations can be included. Monitoring and reporting of environmental conditions and changes must be reasonably comprehensive and well co-ordinated, internationally as well as regionally. And the planning work must include setting long-term goals and consistently monitoring process toward them.

Interjurisdictional decision-making

As with the ecosystem approach, the allied movements have found that single jurisdictions by themselves can rarely integrate environmental concerns effectively into planning decisions. This is to be expected in typical current jurisdictions, with ecologically inappropriate boundaries and fragmented agency mandates. But even in bioregionally ideal depictions of relatively self-sufficient ecosystem-based

communities, inter-departmental and inter-jurisdictional cooperation and joint decision-making on matters of shared interest and concern are expected to be important.

Not all of the approaches examined here have proceeded much beyond the conceptual stage and some advocates of these approaches may suffer from naiveté about the practical difficulties of shared inter-jurisdictional decision-making. However, belief in the necessity of shared processes is also retained by those who have long and frustrating experience trying to foster interjurisdictional co-operation.

Consultation, co-operation and partnering

Adjacent and overlapping government bodies are only some of the relevant players. All of the other approaches presume, or have learned from experience, that changes toward more holistic, far-sighted and environmentally-sensitive planning can be accomplished only where there is a broad sharing of commitment and responsibility. Even in conventionally hierarchical private sector applications, informed involvement of the people who will be expected to enact the plans is apparently as important as participation by experts and senior authorities.

A common theme of the other approaches is that mere consultation is not enough. Participants must be encouraged and empowered to join as active collaborators. Moreover, citizens and other interests must be involved throughout the planning process, in the development of a preferred long term vision and the setting of initial goals as well as in decision-making on specific development options, and in subsequent monitoring of changes.

The other approaches are also consistent in favouring consensus-seeking methods of addressing areas of controversy and conflict. There is some recognition that certain changes may have to be imposed. For example, planning legislation may need to be amended to entrench public rights to be informed and consulted, and to appeal apparently unwise decisions. But the clear preference is for non-adversarial models and most approaches have incorporated their own vehicles for bargaining and mediation.

Monitoring and feedback

The visionary character of several of the allied movements has encouraged attention to longer term objectives and monitoring of progress toward them. State of the environment reporting, a tool specially designed for longer term monitoring, would fit well with most if not all of the other approaches.

Most advocates, however, recognize that neither the objectives nor the set of monitoring indicators and methodologies should be established too firmly. While there is considerable confidence in the benefits of more rigorous and better informed approaches to decision-making, it is also recognized that priorities will change and surprises will happen. As a result, monitoring and objective setting should be treated as constantly cycling, iterative processes which are flexible and open-ended enough to adjust to the lessons of experience.

In some of the other approaches this is interpreted as a reason to ensure the planning system includes regular, mandatory reviews.

Interdisciplinary approach to information gathering

All of the approaches discussed here have either begun with, or have moved to adopt, a mandate encompassing social, economic, cultural and biophysical matters and their interrelations. In this, several have gone further than most ecosystem planning initiatives in demanding an interdisciplinary approach to information gathering, objective setting and other components of planning.

This interdisciplinary element has in many cases extended beyond the credentialed experts to include the knowledge and experience of amateur volunteers, native people and local residents.

Facing Implementation Problems

Like the ecosystem planning initiatives discussed in Chapter II, the other innovative approaches have faced implementation barriers of two kinds. The first is a set of institutional barriers which arise largely because of the inappropriate design of conventional decision-making structures, and active resistance from established authorities who fear erosion of their roles and responsibilities. The second, more diverse set of barriers results from uncertainties and controversies over the substance of the social, economic and ecological goals to be pursued and the best procedures for defining priorities.

Such difficulties are probably inevitable whenever serious attempts are made to introduce significant changes. Their influence can be reduced, however, if the strategy for implementation of the new approach is properly designed to anticipate and address the predictable concerns.

Overcoming institutional barriers

The essential institutional problem has been that few existing governance bodies were designed to do integrated, longer term planning and plan implementation. Most were established with specific mandates to react to narrowly-defined problems. Most have also been built on the assumption that economic gains are central, social benefits are consequential and ecological concerns are peripheral. Even "planning" bodies have been, for the most part, intended to encourage, accommodate and direct economic growth, not to set and pursue a package of interrelated long term goals for social and ecological as well as economic well being.

As a result, existing institutions present attitudinal and structural barriers to the kind of innovations pushed by the ecosystem approach and the other approaches examined in this chapter. Long accepted assumptions about the central importance of narrowly economic priorities are often maintained even in the face of clear evidence that more socially and ecologically enlightened options are less costly. Individuals may complain that the current system is not working but hesitate to embrace a more promising but unfamiliar alternative. They may recognize, at least conceptually, the value of integration and broad partnerships, but since they lack mutual trust and a tradition of co-operative work, they tend to fall back on protection of their mandates and fields of expertise. Similarly, they may accept the need for public involvement but seek to minimize its potential to affect decisions.

Where individual authorities are willing to innovate, they are often frustrated by technical and structural barriers. These include incompatible information gathering methods, restricted legal powers, hierarchical management structures that lack horizontal links, and established infrastructural systems that don't easily accommodate ecosystem-based adjustments.

Both attitudinal and structural barriers become further entrenched in times of financial constraint. Officials whose traditional activities are being hampered by staff and budget reductions are unlikely to welcome transfer of resources to new initiatives. Government workers, including planners in many places, have learned to be suspicious of attractive proposals for change that may just be covers for more cutbacks. Citizens, too, have learned to be wary of reforms that are mostly intended to dump government responsibilities onto the community and volunteer sector.

Advocates of alternative approaches have used a variety of means to overcome these barriers. The most common have been emphases on partnerships and collaboration, including efforts to involve the staff of existing decision-making and implementation bodies directly in the initiation and design of new initiatives. As well, the innovators have used experimental applications and demonstration projects to illustrate the advantages of new approaches, and have appealed to traditional concerns by emphasizing the immediate economic and political benefits. They have worked to mobilize broad community support, and often, in the absence of government funding, they have relied heavily on volunteers.

While co-operation and consensus have been stressed in virtually all of the approaches, some leadership has been required. Sometimes, as with the round tables, this has just been to provide a little seed money for studies or small-scale projects. In other cases, steps to open up decision-making and allow more inclusive, collaborative methods have had to be pushed by legal action, for example through planning and environmental assessment court decisions and law reform. But in no case is there much evidence that draconian top-down measures have worked well. Moreover, few implementation efforts in this area appear to have been initiated at the top. Often the "leadership" of senior government authorities in these matters has mostly been in response to pushes by citizen activists and non-government organizations.

Experience with the other approaches also suggests that co-operative and consensual change frequently needs assistance from on-going educational programs. Education in the form of hands-on participation in practical applications has been particularly valuable. Fervent advocates of changes learn to temper their expectations while those who fear innovation are reassured. For everyone, abstract positions are turned into real people with everyday concerns, and an ambitious program of change is translated into a comprehensible bit of progress.

Facing limits of knowledge and uncertainties about goals

Not all of the barriers are institutional. The kinds of changes sought by the various alternative approaches are changes that must occur in society as a whole—in cultural norms, in what people expect of their institutions, and in how power is shared throughout society. Like ecosystem planning, the other approaches are rejections of the "marginal adjustments to economic growth" version of planning. Instead, they presume that people must decide what they value and what kind of future they want, and devise mechanisms, including appropriate land-use plans, that will help them get there.

Planning, then, involves understanding the state of the environment, including the state of community relations, culture, health and expertise, economic strengths and opportunities. It involves expressing values, setting goals and priorities, and applying these in the evaluation of alternative plans and the design of specific projects. Finally, it involves monitoring the results and forever reconsidering and readjusting goals and plans and projects in light of continuous learning from experience.

This is all entirely reasonable. If ecological sustainability and community well-being cannot be achieved and protected by following the current *ad hoc*, marginal adjustments path, then we are apparently obliged to turn to some form of goal-oriented, innovative and iterative planning that is broadly participatory and that

integrates attention to ecological, social and economic factors. But much of it is a great deal easier said than done.

The main difficulties here are information limitations and competing values. In part because of limited and inappropriately designed information gathering, and in part because of the inherent complexity of the subject matter, we have insufficient data about ecosystems, and insufficient theoretical understanding of ecosystem processes, for confident description of the state of our biophysical environment. We are even further from certainty in assessments of resource opportunities or in predictions of the changes likely to result from alternative development plans. Less ambitious planning efforts discussed in this chapter found difficulties even in evaluating the relative environmental merits of individual product options (e.g. paper versus plastic packaging).

Some of these uncertainties persist because, until recently, we have not given much attention to the questions involved. If there are recognized incentives to collect the data and develop accepted methods for evaluation, the quantity and quality of available information in many specific areas will improve quickly. Even at the more comprehensive and complex ecosystem level, better co-ordination of information gathering and interpretation, and greater use of local knowledge and expertise, should lead to significant—if more gradual—improvements in basic understanding.

The problem of information uncertainty can also be faced through adoption of the precautionary principle, that is, making a commitment always to err toward the path of least potential damage. As well, experience with the other approaches indicates that we should value things that help us remember that many of the answers and tools we choose to adopt are only intermediate and transitional.

Unfortunately, continuing uncertainties about the extent of current problems and the implications of alternative approaches make it more difficult to persuade people to abandon the comfort of familiar ways. Government officials have often used the absence of firm scientific evidence as grounds for refusing to take environmental protection initiatives (e.g. against carbon dioxide emissions and other chemical contributors to global climate change). Citizens who are uncertain about the results of "greener" but higher-density urban developments have tended to oppose them in their neighborhoods. And developers who are unsure that the real estate buying public will find a different kind of building and community attractive and proper, are inclined to avoid the apparent financial risks of innovation.

Here again, the responses suggested by the other approaches centre on mechanisms that get the various concerned parties together, preferably face-to-face, to examine the possibilities and seek common ground. This is easiest, and perhaps most successful, at the relatively small scale of undertakings developed using the design workshops and charettes of the new urbanism movement (eco-cities, eco-

towns, eco-villages). But the basic idea can apply more broadly. Other recommendations from implementation experience include focusing planning on what people want, rather than what they fear, build on what already exists, and give people plenty of positive feedback.

Finally, in various ways, all of the other approaches have pointed to the importance of fostering and respecting participants' sense of community and place. In some cases this appears simply as recognition of the practical value of local knowledge. In others, it is what makes co-operative far-sighted planning possible. It is where people most easily come to recognize their interdependence on each other and on the land, where they can most readily develop a sense of long term mutual commitment, and where effective political empowerment and direct participation is most possible.

There is a clear tension between this emphasis and the trend to economic and hence political globalization, with its associated favouring of an international commercial monoculture. This tension may be a healthy one. Valuing of local community and place does not entail rejection of the international marketplace, and dedication to the well being of community and place may be a crucial corrective for global economic forces that appear to have no forward vision or commitments to sustainability. At the same time, globalization can undermine local efforts to achieve sustainability because it moves crucial decision-making authority further away from local concerns and local influence. Communities that become heavily dependent on global markets also become vulnerable to the effects of decision-making over which they have no control.

General Lessons for the Design and Implementation of Ecosystem Planning for Canadian Urban Regions

The 11 approaches reviewed in this chapter both confirm and help enrich understanding of the seven basic principles of ecosystem planning. In addition, experience with these approaches has revealed at least some of the main barriers likely to be faced in attempts to apply the ecosystem planning approach, and has pointed to the most promising strategies for dealing with these problems. Many specific insights are worthy of consideration by advocates of ecosystem planning. However, the main ones can be distilled into a short list of lessons that have particular relevance for the design of a generic model for implementing the ecosystem planning approach in Canadian urban regions.

These general lessons, which complement the seven basic principles of ecosystem planning, are as follows:

- Initiatives that intend to integrate ecological, social and economic concerns in planning are seeking changes in attitudes, structures and behaviour that cannot be imposed, or even effectively fostered through consultation; these changes must be sought through the collaborative efforts of those whose attitudes, structures and behaviour are involved.

- These collaborative efforts will be easier where people have retained or developed a sense of community and commitment to a place; in turn these efforts may be expected to enhance and strengthen the sense of community and commitment to a place.

- Acceptance of change will also be easier where people have practical, direct involvement in designing and applying new approaches.

- The integration of ecological, social and economic concerns is not about finding a balance among these as competing priorities; while there will be conflicts, the essential relation is mutual interdependence and the best economic activities are those that restore and enhance communities and ecosystems.

- Far-sighted planning requires the mutual setting of goals for a desired future. Participants will approach this task with different immediate interests and associated concerns. It is best to begin positively, by focusing on what people want to achieve and retain, rather than what they fear might happen.

- Even in pursuing innovative goals, there is a strong temptation to rely on minor adjustments to old assumptions and solutions. Mandatory elaboration and assessment of alternative plans is therefore crucial.

- There are too many uncertainties in understanding and prediction to justify initiatives that endanger valued aspects of community and place; the precautionary principle should prevail.

- Ecosystem planning and similar approaches are exercises in social learning. There can be no final answers. The process must be cyclical and integrative, always under review and dedicated to learning from experience.

In our final chapter, we will take these lessons, along with the seven principles and the insights from the case studies, and apply them in the development of a basic model for applying the ecosystem planning approach in Canadian urban regions.

Chapter IV

An Ecosystem Planning Model for Canadian Urban Regions

Introduction

Most of the principles raised in Chapter I and elaborated in Chapters II and III are worthy of application through a wide range of policy, planning and project development initiatives, globally and locally. Most are also well accepted, at least at the conceptual level. Especially since publication of the Brundtland Commission's report in the mid 1980s, authorities at all levels of government have officially recognized the need for greater attention to environmental matters and have embraced at least the concept of effective integration of environment and economy in decision-making. While implementation has fallen far short of oration, this does not appear to be due to any serious misgivings about the legitimacy of the concerns or the wisdom of the proposed responses. Instead the main barriers to change have been the usual inertia of established institutions and practices along with understandable uncertainties about just how to proceed.

The application of an ecosystem approach to land-use planning for urban centres and the lands surrounding them is certainly an area where we can begin to overcome the prevailing uncertainties, and initiate appropriate institutional and practical reforms. Urban centres wrestling with the administrative and environmental challenges of growth offer a particularly attractive focus for attention. In many cases there is broad recognition that the old assumptions and processes of development planning are no longer either effective in avoiding damage nor efficient in resolving conflicts. As a result many participants are open to, or actively seeking, new ways of doing things.[1]

In addition, much of the difficult path breaking has already been done by the variety of related undertakings in jurisdictions across Canada and elsewhere that we sampled in Chapters II and III. On that foundation we proceed in this chapter to construct a basic model for applying an ecosystem planning process to urban-centred regions in Canada.

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[1] John Sewell, in defending the recommendations of his Commission on Planning and Development Reform in Ontario, has often and persuasively argued that whatever its failings the Commission's approach to planning reforms would improve on the existing regime which, virtually all parties agree, is not working.

Before doing so, however, we must stress that urban-centred regions are not the only areas where adoption of ecosystem planning would be beneficial. Moreover, land-use planning is not the only area of city-significant decision-making that could gain from greater attention to environmental considerations. Development and application of an ecosystem planning model for urban-centred regions must respect the larger context of related environmental planning needs and initiatives.

The Larger Context for Urban-centred Ecosystem Planning

One of the central virtues of ecosystem planning is its integrative character. It is meant to encourage, even force, conventionally fragmented authorities and experts to do a better job of recognizing the joint implications of their work, at least in the defined area of the ecosystem-based region. But no urban-centred ecosystem or eco-region in Canada can be an isolated island of planning. Inevitably, the development and implementation of urban-centred ecosystem plans will be affected by a host of outside factors, ranging from the negotiation of international trade agreements to the plant expansion decisions of upwind industries.

While many of these factors must simply be accepted as part of an uncertain world which any responsible planning regime must accommodate, some outside planning, policy making and project decision-making activities overlap so significantly with urban-centred ecosystem planning that they must be specifically recognized. The three most important components here are:

- land-use planning for areas adjacent to the urban-centred region, especially where this planning work is, or should be, focused on protecting or rehabilitating environmental qualities or features
- sectoral planning and policy making for management of resources and other activities (e.g., provision of provincial scale energy and transportation infrastructure)
- application of provincial and national environmental assessment requirements, especially for the planning and approval of major undertakings that will affect land-use.

Each of these factors deserves brief elaboration here as a part of the immediate design context for urban-centred ecosystem planning.

Areas Adjacent to the Urban-centred Region

Ecosystem planning is not only for cities or urban-centred regions. Some of the most significant initiatives to date have not been centred on, or particularly concerned about, cities. Even in cases where urban areas or influences have been involved, the organizing focus is often elsewhere. The Niagara Escarpment Plan in Ontario, for example, was created to protect the environmental values associated with a major natural feature (Green, 1993). While some of the area covered is urbanized, and a substantial portion is subject to residential and recreational pressures originating in the nearby cities, including Toronto, the area covered by the Niagara Escarpment Plan extends well beyond the boundaries of potential urban-centred ecosystem planning areas. If an urban-centred ecosystem planning area were established for the Toronto-Hamilton region, its boundaries, however delineated, would inevitably overlap with those of the existing Niagara Escarpment planning area.

A further complexity is that we are just now beginning to identify and respond to the environmental planning needs of many rural, recreational and resource extraction areas that need rehabilitation and/or protection from additional stress and abuse. Taking the Toronto example again, we can see environmentally-focused planning initiatives being pursued for the Oak Ridges Moraine (a headwaters area stretching from north of Toronto east to Peterborough, that is partly within the Toronto commutershed), the Lake Simcoe area (again partly within the commutershed and wholly within the recreational range of Greater Toronto Area residents), and the Georgian Bay and Muskoka areas (further north but still heavily affected by Toronto area recreation demand). Similar illustrations could be provided for the areas surrounding many other Canadian urban centres.

The main implication is that in most provinces the design of urban-centred ecosystem planning mechanisms will have to be done in concert with the design of ecosystem planning mechanisms for rural, recreational and resource extraction areas. These are areas that need planning because they are now subject to ecological stress, or because they will soon be seriously stressed if business continues as usual, or because they need rehabilitation that won't happen or be effective without appropriate planning.

Often the appropriate ecological boundaries for urban-centred and non-urban-centred planning will overlap. At any event, boundary-setting will always be more or less arbitrary. Logical boundaries for urban-centred ecosystem plans will differ from logical boundaries centred on other features (e.g., a Toronto-centred ecosystem plan that adopts the multi-watershed approach favoured by the Crombie Commission will overlap with planning for the Niagara Escarpment and the Oak Ridges Moraine, and will need to find ways of linking with planning for Lake Simcoe and the Georgian Bay/Muskoka areas). It will therefore be important for the design of ecosystem planning mechanisms to include means of and incentives for recognizing overlapping boundaries and for facilitating cross-boundary planning cooperation.

One likely approach will be to use a variety of complementary planning tools, including not only formal ecosystem-based land-use plans, but also special plans, policies and assessment requirements for features and undertakings that cross the official planning boundaries. Thus, an urban-centred ecosystem plan would be designed to respect national and provincial objectives, to integrate the provisions of plans and policies for overlapping natural areas and valued resources, and to comply with other boundary-crossing directives (e.g., a Toronto-centred multi-watershed ecosystem plan established as a regional official plan, which must at points of overlap at least meet the minimum standards of the Niagara Escarpment Plan, be consistent with the provisions of a special set of provincially-set planning policies for the Oak Ridges Moraine, and incorporate the conclusions of a Lake Simcoe management plan).

Overlapping Sectoral Planning and Policy Making

The overlap between spatial and sectoral planning is a well-recognized challenge for planners and dealing with it is no easier in environmentally-focused planning than elsewhere. For our purposes, sectoral planning includes planning centred on the encouragement of certain industries (e.g., manufacturing and agriculture), the management of certain resources (e.g., forests and fisheries), and the provision of certain infrastructural components (e.g., provincial scale energy and transportation infrastructure). Activities in many of these areas can have major effects on land-use and environmental quality. Moreover, the most significant effects often result not from individual decisions in one sector but from the cumulative effects of decisions in several sectors. As a result it is important to recognize and address needs for cross-sectoral integration and better ecological understanding, as well as needs for coordination of sectoral planning with spatial planning.

To some extent, improved integration and attention to environmental considerations in sectoral planning may be achieved by decentralizing some sectoral planning and policy making to the ecosystem or bioregional level and integrating it with land-use planning. However, it would not be appropriate to decentralize all sectoral guidance. Multi-regional and provincial scale sectoral planning would still be needed for transportation, energy, agriculture, and other activities that cross bioregional lines. Even on matters such as wetland preservation that could be largely bioregional responsibilities, assessment of cumulative conditions and rehabilitation needs would have to be done, or at least co-ordinated at the provincial level and followed by development and periodic updating of appropriate provincial scale policies.

Where sectoral planning remains at the multi-regional and provincial levels, it may have to be reformed significantly to facilitate integration with ecosystem-based

land-use planning. Certainly such integration will become much easier where sectoral decision makers adopt more inclusive and consensual approaches to policy development and planning, where they give serious attention to policy and plan alternatives, and where they become more consistently respectful of ecological realities and more evidently devoted to sustainability objectives.

Part of the solution here may lie in the application of formal environmental assessment requirements to sectoral planning and policy making. Tentative steps in this direction have been made by several jurisdictions, including the Canadian federal government (FEARO, 1992, Hanebury, 1994). A second set of possibilities centres on proposals for provincial and national scale sustainability objectives, which may be developed to serve as a means for guiding and smoothing relations among all land-use related planning activities.[2] At least in the interim, however, the design of urban-based ecosystem planning mechanisms needs to include means of interacting with the development and implementation of sectoral policies and plans.

Environmental Assessment and Ecosystem-based Planning

Many jurisdictions in Canada now have established environmental assessment processes which apply to the planning and approval of major undertakings that will affect land-use. Despite recent expressions of commitment to harmonization, the current federal and provincial processes vary dramatically in scope of application, range of required considerations, facilitation of public involvement, rigour of review and enforceability of conclusions. Some are very closed, narrowly focused and arbitrarily applied. Others, however, stand as the most powerful available tools for forcing serious attention to environmental factors in decision-making.

Properly conceived, environmental assessment is an approach to planning. It is intended to force proponents to incorporate environmental considerations, along with conventional technical and financial concerns, throughout their decision-making—from the beginning of deliberations about an identified need or opportunity, through the identification and evaluation of alternative responses, detailed design, approval and implementation (Gibson, 1993). Accordingly, environmentally enlightened land-use (or sectoral) planning incorporates environmental assessment principles. The principles for ecosystem planning are much the same as the principles for environmental assessment and the basic model for urban-centred ecosystem planning discussed below can also be described as a model for applying the principles of environmental assessment to land-use planning.

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[2] This purpose underlies, for example, the Project de Société initiative of the National Round Table on Environment and Economy. Another approach is that of the Sustainable Society Project (Robinson et al, 1990).

Taking this approach to regional land-use planning does not eliminate the need for environmental assessment in the planning of individual or related undertakings subject to the land-use plan. An environmentally enlightened land-use plan provides useful guidance for the planning of undertakings such as widened roads, new subdivisions, extended water service and expanded sewage treatment plants. With this guidance, the planning and approval of such undertakings should normally be much less uncertain and conflict-ridden than it has been where citizens have seen fights against infrastructure project proposals as the best way of challenging environmentally-insensitive planning. But even with good ecosystem planning guidance, environmental assessment will continue to be needed in the selection and design of individual projects. A comprehensive ecosystem planning regime will need to include appropriate rules for applying the general planning guidance in requirements for more detailed environmental assessment of individual undertakings (Gibson, 1994).

A more complicated coordination problem is posed by undertakings located only partly within the boundaries of an urban-centred ecosystem plan. Development or significant upgrading of a major transportation corridor between two urban centres with different ecosystem plans, for example, would be subject to both centres' plans. Proposals for such projects would probably arise from provincial transportation sector planning, and would be properly subject to provincial environmental assessment requirements. If the transportation sector planning had been done in concert, or at least in consultation with the regional planning work, conflicts among the various plans might be minimal. A well-conceived environmental assessment process might also be an effective vehicle for resolution of remaining difficulties. However, it will remain important for designers of urban-centred ecosystem plans and planning structures to anticipate needs for cross-boundary assessments and resolution of associated project conflicts with other planning areas.

Constructing An Ecosystem Planning Model for Urban Regions

Urban or urban-centred planning rarely begins with a blank regional landscape in which planners and other planning participants can create an urban form from scratch. More typically, decisions about land-use change are made in already urbanized areas and, except in urban areas experiencing economic and population decline, the main planning questions have focused on the nature of further development.

As we have seen, the usual package of questions about further urban development has begun to change in many places. The traditional assumption has been that growth is desirable and the job of planning is to foster as well as guide it. Accordingly, the questions have been about how best to encourage further growth, where to direct it (e.g. to the urban fringe or to the core area), what type to favour (e.g. single-family housing, affordable housing, housing for seniors), how to finance the necessary infrastructure and how to minimize environmental effects. Today, we are more likely to hear questions about the immediate and cumulative financial, ecological and community costs of growth. Development is still sought, but it is a more carefully defined development that has long term economic viability, serves social goals and respects ecosystems. Citizens as well as planners in urban centres are now more inclined to accept that active, goal-oriented planning is needed if such development is to be achieved. Moreover, unhappiness with the results of the traditional approach to planning and growth have led many citizens and other interested parties to seek more open and participative decision-making processes.
This is, essentially, a shift is toward acceptance of the seven defining principles of ecosystem planning. It is consequently reasonable to see how the ecosystem planning concept can be translated into a planning model for application in urban regions. In this section, we will offer such a model, setting out the main components or steps of a ecosystem planning process. First, however, it is necessary to consider the nature of the area in which the model is to be applied. Just what is an "urban region" for the purposes of ecosystem planning?

Defining an "Urban Region"

The idea of planning for urban-centred regions is not new. In many of the more heavily populated parts of Canada today, urban growth has overflowed municipal boundaries and has led to politically fragmented metropolitan areas unable to devise area-wide solutions to problems of growth (Kulisek and Price, 1988). As a result, many observers have concluded that problems of urban growth must be dealt with at a broader, regional level (Rees, 1988a; Colnett, 1991; Gibson, 1992a). A regional planning effort appears to be necessary to integrate the otherwise piecemeal efforts at the municipal level that lead development activity into poorly co-ordinated and often counterproductive patterns. It is required to ensure that infrastructure extension is efficient, that local land-use regulation fits well with regional transportation planning, that regional landscape connections are maintained for wildlife and recreation, that farmland is preserved, and that environmental (and other) effects of land-use decisions are monitored for their broader implications.

For these purposes, the urban region can be defined in a number of ways: political, cultural, economic, or ecological (Alexander, 1993). A political region is defined by the existence of regional governments, planning boards or special-

purpose bodies such as utility or transportation commissions dealing with issues on a regional level. A cultural region may reflect linguistic or ethnic groupings, lifestyle-related patterns of recreational destinations, or telephone use and newspaper distribution. An economic definition of a region might use commuter patterns, an analysis of supplier locations to city-core industries, and patterns of trade.

Those who use the ecosystem planning model generally reject adoption of traditional political boundaries, which rarely reflect ecological realities and therefore frustrate efforts to integrate environment and development. Cultural and economic factors must be recognized, however, since they are components in the desired integration. The relevant environment includes both community and ecosystem. For ecosystem planning, we will therefore focus on ecological and economic definitions of the region.

There are a number of options for defining ecological boundaries: airsheds, watersheds, landforms, vegetation, climate, soil, landscapes units, and composites of these features. For example, at the national level a common terrestrial ecological framework of 15 ecozones, 217 ecoregions and over 1,050 ecodistricts have been developed and refined through federal-provincial co-operation under the leadership of the State of the Environment directorate, Environment Canada and the Centre for Land and Biological Resources Research at Agriculture Canada.

This nationwide framework provides a common set of ecological boundaries for integrating existing information, monitoring and planning, in an ecological way. It builds on concepts and data elaborated in the context of the biophysical land classifications of the 1960s and now reflects the current state of knowledge on forest and ecological classifications. The associated national data base and digitized maps reside in Ottawa, with Agriculture Canada's Canada Soil Information System.

Reporting by ecosystems is the principal framework for federal reporting on the State of the Environment (1986, 1991) and is also used in some provinces, for example British Columbia (1993).This national framework and process could serve to inform boundary choices in urban and regional ecological planning.

With respect to watersheds as a boundary, Alexander (1990) has identified five levels of hydrological organization with potential relevance for planning purposes: "the creek level, the watershed level, the river basin level, the lake level (e.g., the Lake Ontario Basin), and the overall basin level (e.g., the Great lakes Basin)."[3] Alexander agrees with Odum (1971) and Imhof (1991) that the watershed is the unit most appropriate for ecological planning. Unlike other ecologically defined boundaries

[3] The distinction between watershed and river basin is made arbitrarily based on their respective size in an Ontario context - for instance, the Otonabee as a "watershed" inside the larger Trent "river basin."

such as landforms or airsheds, watershed boundaries can be precisely identified and change only very slowly.

A recent survey by the Federation of Canadian Municipalities (Progress Report, 1994) indicates that local levels of government are pursuing a variety of ecological approaches to planning. Interim results show that roughly one out of seven of municipalities responding either have or are in the process of adopting an ecosystem-based approach and over one-third are exploring other regional environment-based approaches. Nearly one-half of centres have or are planning to utilize watershed or wetlands-based approaches, while just under one-third reported using or considering waterfront/harbour based approaches to planning. Many Canadian municipalities are using more than one approach.

However, the use of the watershed in urban ecosystem planning presents special difficulties. Most current ecosystem planning occurs in rural and resource areas of Canada and the US, where the watershed unit encompasses the relevant planning variables (CAO 1993; USEPA 1992). This is not always the case in urbanized areas, which frequently span several watersheds. The most important determinants of settlement patterns in large areas are the infrastructural elements that are under public control: harbours, airports, the regional transportation network, trunk sewer lines and so on. Where these are spread across watersheds, individual watershed-based planning would be no less fragmented than planning done on a municipal level.

Thus neither municipal nor watershed boundaries can serve as the planning unit for planning the urbanized region. Nor will the boundaries of existing regional governments serve our purposes here, having in many cases already been spatially superseded by urbanization (as in Toronto and Montreal). Statistical definitions, such as census metropolitan areas or census agglomerations, are more helpful in that they are based on the daily commuting habits into major labour market centres and reflect the housing cost/transport time trade-off (Finkler *et al*., 1974). Unfortunately, these areas do not make allowances for future growth of the urbanized region until it occurs (Self, 1982), nor do they necessarily incorporate the regional hinterland that is expected to absorb the environmental impacts of urbanization.

For ecosystem planning, we need a planning area that anticipates long-term growth and incorporates the likely ecological pathways that sustain intense human use of the land. The purpose here is to "reorient human activity towards dynamic balance in nature," and which will "irrevocably marry human activity into processes of sustainable land, animal, plant, and atmospheric interaction" (Aberley, 1993: 74-75).

In order to satisfy these requirements, one option appears to be use of a multi-watershed planning unit that incorporates the ecological and economic dimensions

and constitutes the urban ecosystem region. While the precise boundaries of the planning region will be determined by the participants in the planning process, we can review some general considerations here. Natural boundaries may involve land features, soils, vegetation, climatic patterns and so on, but in most cases, watershed boundaries will prove most convenient. The biophysical aspect of the region can therefore be conceived as a series of adjacent watersheds and their hierarchies of sub-watersheds, with the outer watershed perimeters serving as the regional boundary.

The watersheds that are chosen for inclusion in the planning unit will depend on a variety of factors, including the location of significant economic development pressures in the region, commuting patterns, and ecological processes that serve as pathways for dispersing the environmental impacts of urban activities. Boundary-setting will therefore rely heavily on the commutershed, but will also include areas of likely development pressures. Whatever set of watersheds is chosen, it may be adjusted periodically as the commuting and development patterns of the region evolve. The boundary adjustments would usually involve adding watersheds.

The aggregation of watersheds approach is not entirely appropriate for all urban areas in Canada. Variations on the theme, however, would be suitable in most places. There are three broad scenarios: aggregations of adjacent watersheds, portions of large river basins, and whole river basins where these are smaller. The following examples illustrate the approaches:

- adjacent watersheds
  - St. John's (Waterford River and adjacent watersheds)
  - Halifax (Halifax Harbour and Subenacadie-Stewiacke)
  - Toronto (watershed area covered by the 10 conservation authorities from Niagara to Ganaraska)
- portions of basins
  - Saint John (Lower Saint John River)
  - Quebec (portion of St. Lawrence River
  - Montreal (portion of St. Lawrence River)
  - Winnipeg (portions of Red and Assiniboine Rivers)
  - Saskatoon (portion of South Saskatchewan River)
  - Calgary (portion of Bow River)
  - Edmonton (portion of North Saskatchewan River)
- whole basins
  - Regina (Qu'Appelle River)
- combinations
  - Vancouver (Lower Fraser Basin-Burrard Inlet, and adjacent watersheds)

In many cases these approaches provide only general guidance for setting regional boundaries. Decisions will still have to be made on which adjacent watersheds and what portions of larger basins are to be included. These should be

guided by the economic and socio-cultural criteria, especially inclusion of the relevant commutershed and areas of anticipated development pressure. The regional boundary setting should respect people's existing sense of regional identity and commitment. The scale should not be so large that citizens do not feel the region is theirs. Some regard for existing administrative divisions is also appropriate. While current political boundaries may seldom be satisfactory bases for defining regions, there is reason to make use of existing administrative units where possible, to ease implementation and to make better use of available information.

In deliberations about appropriate ecosystem regional boundaries, participants need to remember that regional planning cannot do everything. The regional boundaries will not be able to encompass all of the relevant road networks, all of the economic and recreational hinterland, or all of the ecosystem pathways that connect urban centres with their larger surroundings. As a result, decision-making on regional boundaries for ecosystem planning will necessarily centre in part on what matters can be addressed within a suitably delineated region, and what matters are properly interjurisdictional responsibilities.

Finally, setting regional boundaries may often be a gradual and iterative process. Thinking about appropriate boundaries is likely to be initiated in a different ways in different urban-centred areas. In some cases—for example the region around Vancouver—the first steps may lie in ecosystem planning exercises of the kind discussed in Chapter II. In other cases—for example Toronto and Montreal—the evident inadequacies of planning by current metropolitan regional governments may inspire moves to redefine the regional boundaries, at least for planning purposes. Sometimes, public debates about planning problems and needed reforms may lead to general agreement on regional boundaries for ecosystem planning well before there is any official commitment to introducing an ecosystem planning process. It is unlikely, however, that there will be many examples of the simple, rational approach of first defining the region and then beginning ecosystem planning in that region. More often, the planning boundaries will be only rough at the beginning and part of the task of the initial steps in ecosystem planning will be to develop a better understanding of the region and where its boundaries should lie.

Implementing Ecosystem Planning: A Five-step Model

Within any region, ecosystem planning may proceed in steps not entirely different from those that are, at least in theory, accepted in conventional planning. The steps begin with identification of issues, participants and goals, and proceed through data collection and modeling, to setting more specific objectives, evaluating alternative plan options, selecting and implementing the preferred option, and monitoring and revising in light of the results. The differences would be in the subject matter

addressed at each step (e.g. the kinds of goals and development options considered) and the processes for analysis and decision-making (e.g. the range and roles of participants). As noted in Chapter I, the seven basic principles of ecosystem planning contrast sharply with the assumptions underlying conventional land-use planning. Responding to these principles, and to the additional lessons from experience with ecosystem planning and the other innovative approaches, will involve significant departures from conventional planning.

The main successive components of a model ecosystem planning process can be divided in a variety of ways. In what follows, we set them out in five general steps, which we then discuss in relation to specific jurisdictions. The steps are outlined in Figure IV-1.

Figure IV-1 The Main Planning Steps in the Ecosystem Planning Model

Step 1: Initiating and scoping the planning process

(i) identify current problems and issues
(ii) identify all relevant stakeholders
(iii) involve them and members of the general public in drawing up an initial list of goals and priorities

Step 2: Defining and surveying the planning region

(i) settle on the various parameters to be measured
(ii) gather the data, possibly with public assistance
(iii) resolve the issue of the region's boundaries

Step 3: Modeling and analyzing the region

(i) identify the form and structure of the three systems (biophysical, infrastructural, and built environment) and their interrelationships
(ii) identify needs and trends, starting with demography
(iii) begin to determine the optimal location for different types of land-uses, based on criteria of suitability, efficiency, and compatibility

Step 4: Assessing alternatives and developing a structure plan

(i) formulate detailed goals and objectives in relation to the three systems
(ii) formulate rival scenarios, with assessments of their effects on the agreed-upon goals and objectives
(iii) reduce the scenarios to two or three structure plan options through negotiation, and submit them to public debate and a selection process

Step 5: Refining and implementing the chosen option, monitoring the regional environment, and revising the plan

(i) develop detailed plans and zoning designations through consultation and negotiation
(ii) establish requirements and procedures for planning, reviewing and approving individual projects under the plan, and for interim plan amendments
(iii) monitor effects and overall changes
(iv) after a specified period of implementation, undertake a comprehensive plan review

Step 1—Initiating and scoping the planning process

Barrett and Davies (1991) argue that the ecosystem planning process should begin by determining who is to be involved and what concerns are to be addressed. This entails developing an initial list of the main current problems and issues, which can be used in identifying the relevant communities and stakeholders. These parties must then be encouraged and assisted to draw up a first working list of goals and priorities to be used in defining what data about the region need to be gathered and what other research may need to be done to provide a foundation for developing a plan that addresses the identified issues and goals.

Barrett and Davies also recommend defining the region at this stage. There is an important overlap between identifying issues and goals and setting the boundaries in which the issues may be confronted and the goals pursued most effectively. Moreover, boundary setting should be broadly participative and involve the same parties as issue and goal identification. However, as we noted above, boundary setting may often have to proceed in gradual increments. and firm delineation of boundaries may not be possible until after more research is done and more time is allowed for public discussion of boundary options.

Step 2—Defining and surveying the planning region

Good ecosystem planning requires good information on the three interconnected systems of the urban region: the biophysical system, the infrastructural system, and the built environment. While some of this information may be already available, and some will take many years to accumulate, initial ecosystem planning work will need to include efforts to gather, map and interpret enough basic data on the three systems to allow planning for the ecosystem region. Thereafter, information gathering will be a continuous part of the process, not a separate step.

At this stage, the first task is to determine what parameters are to be measured. This determination will be guided by the planning goals and boundaries set—perhaps roughly and tentatively—in step 1. The second task involves gathering the data (using existing data where possible), mapping it and providing basic interpretations, including identification of changing conditions, apparently growing or declining demands, and evidence of worrisome pressures on ecological functions and infrastructural facilities.

Both the planning boundaries and the research foci may be adjusted as understanding of the overall spatial metabolism of the city region improves. By the end of step 2, it should be possible to settle the issue of the region's boundaries.

It is probable that data collection and mapping should first be done on a watershed basis, or be done on a watershed and regional basis simultaneously. Interested stakeholders and members of the general public should be involved throughout this process, perhaps using the model suggested by John Friedmann (1987: 214), in which a mixture of experts and knowledgeable amateurs engages in "a refocusing of organizational structures on temporary, overlapping groups, that are oriented to specific tasks and whose working style is interpersonal and transactive."

Mapping the biophysical environment might begin by mapping areas of Class 1-4 agricultural land (and possibly forest resources, depending on location), mineral and aggregate resources (where relevant), significant vegetation communities and key habitat nodes and corridors (including potential corridors where these are absent), wetlands, hydrologically significant areas (aquifers, recharge and discharge areas, streambanks, etc.), airsheds and areas where trees perform a significant oxygenating function, and hazard lands—such as floodplains and areas subject to slides and erosion.

Physical infrastructure should be broadly defined so that mapping includes major roads and transit facilities, commutersheds, energy infrastructure, aggregates sources, water and sewer infrastructure, waste collection and disposal sites, and the urban shadow area if this does not coincide with the commutershed.

Finally, the built environment would be mapped in terms of form, density, use—and possibly rate of development, age of housing, and demographics. It would also be important to identify key areas of social and cultural significance, from a variety of recreational, aesthetic, commercial, industrial and service standpoints.[4]

The correlations among the various maps should allow selection (or confirmation) of the most appropriate boundaries for the planning region. The maps, and other interpretation of the data collected, should also provide a workable basis for step 3.

Step 3: Modeling and analyzing the region

The next stage initiates work to determine the optimal locations for different types of land-uses, based on criteria of suitability, efficiency and compatibility. This involves use of the step 2 data in developing models of each of the three regional systems (the biophysical system, the infrastructural system, and the built environment) and their interrelationships. Step 2 information on changes in conditions, demands and apparent pressures would be combined with information from additional research on projected needs for housing, for commercial and office space, for industrial sites,

[4] For more on things to consider in measuring some of these parameters, see Tomalty (1993).

for recreational sites, for energy and aggregate resources, for repair of degraded sites and for rehabilitation of ecological functions.

Modeling the urban ecosystem will require not only data on the state of key ecosystem parameters (as well as measures of infrastructural capacity), but also understanding of the functions performed by different parts of the landscape and the size of the areas performing them. An understanding of the total carrying capacity of the urban ecosystem region and the threshold points where carrying capacity could be boosted by further infrastructural investment is also necessary.

In addition, the suitability of particular sites or categories of sites for different activities, and the degree of compatibility among these activities would have to be evaluated. This might determine, for instance, that an area identified as having a prime recharge function would not be appropriate for siting an industrial park. Similarly, a site with strong transit facilities (or the potential for their further development) might be identified as an especially strong candidate area for residential intensification, which would permit economies of scale in mass transit and minimize use of private automobiles.

This information could be aggregated into a classification system such as the following:

- lands that serve essential ecosystem functions and that are in a relatively undisturbed state
- lands that currently have degraded ecosystem functions that could be enhanced by the development process
- lands that do not serve an essential ecological function, but do or could serve essential human needs (transportation, recreation, housing, education, etc.). Again, it would be desirable to conduct these exercises at both a watershed and a regional scale.

In summary, this third step would involve three tasks: (i) identifying the morphology of the three systems and their interrelationship; (ii) identifying needs and trends, starting with demography; and (iii) determining the optimal locations for different types of land-uses, based on criteria of suitability, efficiency and compatibility.

Step 4: Developing a structure plan

The fourth step is the core of the process. It involves specifying the goals and objectives, formulating alternative scenarios for the region's future, and assessing

these alternatives, in part through negotiation and public debate, to identify the preferred option.

Taking the general goals from step 1 and the improved awareness of existing systems, demands and compatibilities from steps 2 and 3, it should be possible to define more specific ecosystem and development objectives. Ecosystem objectives reflect the desire of the community to maintain or improve ecosystem parameters that are affected by urban growth and the choice of urban form. They might include

- regional air quality targets (e.g., to reduce the pollution index by a specified average amount year round; to maintain air quality while fostering future development)
- ground water and surface water quality targets (e.g., to improve ground water quality to drinking level standards; to improve surface water quality in degraded areas of the region such that cold-water fish habitat is restored)
- water quantity targets (e.g., to reduce the impact of urbanization so the baseflow of rivers and streams is maintained at specified levels, to cut per capita water consumption by 20 percent over three years)
- degree of habitat preservation and restoration (e.g., to establish a regional network of linked nodes and corridors; to re-establish original wetlands in 10 percent of the region; to re-establish habitat of locally extinct indigenous species)
- waste generation targets (e.g., to reduce the amount of waste produced by residential development by 20 percent and to increase participation in recycling programs to 100 percent)
- energy use targets (e.g., to reduce energy-intensive forms of transportation by 10 percent per year and to reduce average space heating energy requirements by 5 percent per year).

Development objectives reflect the desired quantity and quality of growth in the urban region. Development objectives could include:

- the desired amount of population growth in the urban region
- the desired amount of employment growth
- targets for housing affordability
- targets for social and public service provision and access to services throughout the region
- the desired modal split for various forms of transportation

- desired major infrastructural improvements and additions.

While these ecosystem and development objects can be distinguished and listed separately, they do and should overlap. Indeed they should be seen as necessarily linked and mutually supporting. In traditional planning approaches ("trend planning"), growth is assumed to be exogenously determined and the planning challenge is to meet this growth with the least disruption to the social and fiscal integrity of the region. In contrast, a carrying capacity approach assumes that growth targets should be set by the community according to its ability to invest in new infrastructure and in recognition of the biophysical limits of the region. Development may also be perceived as a force for change in the region that can help restore ecological functions that have been degraded by unsustainable development practices.

Experience documented in the case studies and accounts of other approaches underlined the importance of seeing ecosystem and development objectives as sides of the same coin rather than as competing demands to be balanced. This new perspective will not be established quickly, however. In our existing political economy the two are often opposed, at least in the short term. Consequently, even in ecosystem planning the setting of development objectives will for some time involve a political process that balances these ecological considerations with each other and with non-ecological variables such as the need for affordable housing, a need to stimulate the construction industry, or attract outside investment.

The ecosystem objectives will therefore have to provide a framework for decisions about the amount of environmental stress that will be tolerated in the region and the degree of remediation or restoration required. Wherever possible, development and ecosystem objectives should be linked, for example by making population and industrial growth conditional on achievement of ecosystem objectives.

Once the development and ecosystem objectives have been established, the potential urban forms that will meet these objectives can be formulated and assessed. This may be done in one or a combination of two ways: through a sequential-iterative process of plan formulation, assessment and reformulation based on the outcomes of the assessment, or by means of formulating several development scenarios and simultaneously submitting them to an impact assessment to determine the preferred form. Because the shift to ecosystem planning demands encouragements to explore unconventional methods and futures, a plan development approach that requires elaboration and assessment of alternatives has important advantages.

The ecosystem and development objectives formulated at the beginning of step 4 will very likely be compatible with several development scenarios. Such scenarios would normally address the following issues:

- the degree of extension of the urban envelope, i.e. the degree to which growth will be accommodated within the already built up areas
- the type of constraint areas that may be considered in planning urbanization, i.e. essential ecological functions, degraded ecological functions, essential human functions
- the regional structure, i.e. the number and hierarchy of urban centres
- region-wide infrastructure needs, i.e. new mass transit facilities, sewage treatment processes, and waste management facilities, etc.

The products of this stage should amount to a selection of "pictures" or maps of the regional landscape summarizing the key features of each development scenario: areas to be developed, areas to be preserved, the structure of settlement and employment nodes, regional transportation and other principal infrastructure supporting the desired urban form. One of the scenarios should represent the situation that would arise if current development and ecosystem trends continued. Each scenario should include:

- a statement of how the scenario is intended to affect ecosystem objectives. including the increase (or decrease) in throughput of energy, water, and waste compared to the current trends scenario
- an estimate of how the scenario will help achieve regional development objectives
- an estimate of the infrastructure costs associated with the scenario.

Once the scenarios are formulated, they will need to be formally evaluated to determine which best meets the established development and ecosystem objectives. In principle, cumulative effects assessment is ideally suited to evaluating the environmental impacts of the large number of development activities contemplated by any regional scenario. The Federal Environmental Assessment Review Office has defined cumulative effects as "the interaction, combination and compounding of environmental effects associated with one or more activities. These effects may occur over time and space, gradually altering the structure and functioning of biophysical systems..." (FEARO 1993b: 1). Jurisdictions, such as Ontario, which include social, economic and cultural as well as biophysical factors in environmental assessments, would apply a usefully more comprehensive and better integrated approach to assessing cumulative impacts.

A rigorous scientific assessment of the cumulative effects of the various urban form scenarios is not possible, for several reasons (Wood 1988):

- the plan is concerned with many types of development in many different locations, rendering the scientific assessment of the cumulative impacts of the plan immensely complicated
- the nature, scale, and precise location of the development permitted by each scenario are not described and therefore the impacts of each scenario cannot be precisely predicted
- techniques for applying environmental assessment methods to the strategic planning level are underdeveloped.

However, even rough predictions and evaluations of potential cumulative effects could help bring better informed decision-making. Furthermore, cumulative effects assessment work can be supplemented through a number of available techniques that, while less scientifically rigorous than formal cumulative effects assessment, allow a structured process of public decision-making on complex matters. Steiner (1991) has reviewed these in the context of an ecosystem planning framework. His survey of techniques includes: opinion polls, task forces, round tables, citizen advisory committees, neighborhood planning councils and public workshops.

By the end of step 4, the alternative development scenarios will have been elaborated and evaluated in light of the specified ecosystem and development objectives, careful examination of potential effects, and public discussion of the relative merits and disadvantages. Step 4 would conclude with selection of a preferred scenario in a public decision-making process, such as a binding or non-binding referendum.

Step 5: Refining and implementing the plan, monitoring the regional environment, and revising the plan as needed

The final step is one of elaboration, implementation and reconsideration. The selected development scenario or plan option will have to be interpreted and specified in detailed targets, policies and zoning measures. These can then be applied in planning decisions, including decisions on projects subject to the plan. The results of the decision-making must then be monitored and adjustments made to the plan where the monitoring reveals unanticipated problems or opportunities.

Needs for elaboration of the selected development scenario or plan option will vary, depending on the level of detail attained for the selection among alternatives in step 4. In some cases, the selected scenario will already include some planning details. But for ease of implementation, the targets, and the policies and zoning measures for attaining them, must be comprehensive and detailed. They must cover

all major planning concerns, and they must provide clear guidance for all parties. As well, they should be, wherever possible, specified in a way that will allow those monitoring implementation to determine readily whether or not the policies and zoning measures are working and the desired changes are happening.

Working out the details should be done with the active participation of those who must implement the plan or who will be affected by decision-making under the plan. Inevitably, a certain amount of iterative negotiation between the regional and sub-regional levels will be necessary. Similar discussions with provincial authorities are also likely.

In ecosystem planning, a major component of plan elaboration will be development of watershed plans and then, through negotiation, achieving their harmonization. The watershed plans, which would address the full range of ecosystem and development objectives, would make use of the urban ecosystem, infrastructure and built-environment modeling from step 3. Sub-watershed plans with particularly detailed policies and zoning would have to be prepared for areas facing significant development pressures or in serious need of rehabilitation. Plans at the watershed level would have to rely more heavily on policies and impose more detailed study requirements (for example, for environmental assessments) on applicants for change where the proposed use was neither indicated nor prohibited.

For effective plan implementation, the planning region must also have a planning authority. One option would be to construct the regional authority as a triad, with one third of its representatives from the province, one third from the included municipalities, and one third from the watersheds—either from existing watershed bodies, or elected from the public at large.

The region would enforce the overall regional plan, ensuring that activities respect the policies and zoning requirements. Following the model of growth management in Oregon, application of the plan could be assisted by citizen watchdogs who are empowered to appeal municipal decisions. These citizen watchdogs might be organized into watershed councils in order to encourage an identification with, and monitoring of, local watershed ecosystems.

Because the greatest challenge for reform here lies in overcoming the traditional planning willingness to neglect or sacrifice ecosystem well-being, plan implementation mechanisms should include checks against any regional authorities who might be tempted to slide back into the old ways. For example, where there are existing watershed bodies (e.g. conservation authorities), these might be given overall veto power over development decisions taken at a municipal level that contravene watershed plans. Such bodies might also be assigned to oversee application of environmental assessment study requirements for proposed developments.

Clear policy and zoning guidance in the regional plan would make planning, review and approval of individual development proposal more certain and efficient. The plan would expect, and be designed to facilitate, certain kinds of developments in specified zones. It would also generally anticipate some particular development projects, including new roads and other infrastructure. But individual project proposals would still have to be examined carefully to ensure that they met the plan requirements and that their specific environmental implications were properly addressed.

The plan would have to set out a review and approval process for the myriad individual development project proposals subject to the regional plan. Like other environmental assessment processes, the regional ecosystem plan's review and approval process would normally include more and less demanding requirements and procedures for more and less significant kinds of anticipated projects.

One useful tool for this would be incorporation of a version of Ontario's class environmental assessment process into the regional plan (Gibson, 1994). This would involve

- defining the sets of undertakings involved
- distinguishing between major and minor undertakings and defining the planning, review and approval requirements and procedures for each
- ensuring openness and early opportunities for public involvement
- providing for binding decisions, including enforceable conditions
- including requirements for monitoring the proponent's compliance with approval conditions and the project's actual effects
- allowing for exceptions to the standard rules (e.g. for "bumping-up" particularly worrisome "minor" undertakings to the more demanding level).

In the provisions for review and approval of individual projects, the regional plan must set out clearly the extent to which these projects are bound by the plan's policies and zoning. The plan must specify the circumstances in which issues addressed in the policies and zoning requirements can be re-opened, and the standard requirements waived or altered, in individual cases.

More generally, the plan must establish grounds and procedures for amending plan policies and zoning provisions. Unlike conventional urban plans, regional ecosystem plans are meant to guard against negative cumulative effects. Therefore they must be firm plans, not just frameworks for incremental amendment. At the same time, plans are imperfect and circumstances change. To maintain flexibility without sacrificing the plan, exceptions and amendments must be allowed, but only where it is clear that the action would assist in meeting the ecosystem and development objectives of the plan and would not add to negative cumulative effects. No significant amendment should be permitted in the absence of an assessment of the likely cumulative effects.

Because the most common motivation for plan amendments is desire to accommodate significant development projects, the plan's provisions for the planning, review and approval of such projects should be integrated with provisions for plan amendments. These integrated provisions might well centre on assessments of cumulative effects. The importance of analyzing the cumulative impacts of development projects from a regional perspective is underlined by Rees (1988: 286), who has suggested that "land-use and development patterns ... be controlled under sustainable use planning criteria," and within this framework, "cumulative effects assessment would provide the means to estimate how close we are to developmental limits specified and imposed by the carrying capacity considerations of the regional plan."

One version of how an integrated process might work would begin with an initial requirement that all major development project proposals include

- an evaluation of how the project would serve the spatial land-use and infrastructural requirements of regional and sub-regional plans, and the contribution the project would make to achieving ecosystem and development objectives expressed in the regional and sub-regional plans
- an impact statement, prepared by the proponent and reviewed by the watershed planning authority, concerning the specific predicted effects of the project and measures to be taken to mitigate the negative effects and enhance the beneficial ones
- a detailed statement of the extent to which the proposed project complies with the specific policies and zoning requirements in the plan.

Where a project does not comply with the plan's policies and zoning requirements, the proposal would also have to include:

- an evaluation of the reasonable alternatives for meeting the stated land-use and infrastructural requirements and ecosystem and development objectives, showing that the proposed project is the most desirable option
- a detailed description of the necessary exceptions and amendments, and a rationale for the requested changes based on an assessment of cumulative effects.

Plan amendments could also be initiated directly by the regional authority, constituent municipal and watershed authorities, or other interests. Again, change should be allowed only where reasonable expectation of net cumulative benefits, for meeting ecosystem and development objectives, can be demonstrated.

One main source of evidence in support of such changes would be monitoring information indicating, for example, that earlier predictions had been wrong and the actual effects of existing and new developments were pressing more (or less) heavily than expected against evident ecosystem carrying capacity. Monitoring of standard indicators to follow ecosystem and community changes of various kinds and at various levels is a crucial component of the ecosystem planning process.

In addition to its use in identifying unexpected problems and opportunities during the life of a plan, the monitoring program would provide much of the basic information for regular plan review and renewal. The flexibility in allowing plan amendments means that regional ecosystem plans would be under controlled but more or less continuous renewal. Nevertheless, regular comprehensive plan reviews, which repeat all five steps of the planning process, are necessary.

All of the obligations in step 5 mean that refining and implementing the plan, with provisions for individual project approvals, plan monitoring and revision, etc., must be incorporated as a package in law. It would be desirable if the exact form and nature of this process, and its resulting structure, be allowed to vary depending on the concrete circumstances. However, the basic process—and in each case the agree-upon regional authority and plan—should be elevated to full legal status though appropriate provincial legislation.

In summary, the four components of the final stage then would be (i) developing detailed plans and zoning designations; (ii) establishing requirements and procedures for planning, reviewing and approving individual projects under the plan, and for interim plan amendments; (iii) monitoring of effects and overall changes; and (iv) undertaking a comprehensive plan review.

Operationalizing the Model: A Possible Scenario

The five step ecosystem planning framework is generic. It could be adopted and applied in any urban region through reforms to various existing institutional arrangements. A regional authority will be needed and sub-regional municipal and watershed bodies are anticipated, but the nature and constitution of these bodies could range significantly. Indeed, each region would be expected to adapt the model to suit local circumstances. For illustrative purposes, however, it may be helpful to outline a possible scenario. The following is a proposal for one way of operationalizing the ecosystem planning model.

Roles of the various planning authorities

While each jurisdiction would be mindful of the total picture, the regional body would be particularly sensitive to issues relating to infrastructural efficiency (which also have environmental implications), the watershed authority would be concerned with ecological integrity, and the municipality with livability. Municipalities, within the limits of the structure plan, would concern themselves with the distribution and density of housing types (single-family, multi-family, apartment), the land-use mix (local employment and residential), and the number and hierarchy of sub-centres, lot size, heritage and architectural planning issues, commercial and office development, and local recreational planning.

Step 1

Ecosystem planning for an urban region would begin with major authorities and stakeholders in a region recognizing that important mutual concerns were not being addressed adequately under the existing arrangements. Perhaps through provincial initiative, but also with the co-operation of other municipal, regional and watershed parties, a multistakeholder technical working committee would be established to explore options and purposes for ecosystem planning.

The committee would be comprised of representatives of the province, municipalities, conservation authorities or equivalents, First Nations, and other relevant parties. Its job would be to identify initial problems and issues (in consultation with the public), tentatively outline the scope of the exercise, identify all other interested parties, and draw up an initial list of goals and priorities for data-gathering.

Basic agreement on these matters could then lead to creation of a formal regional round table. The round table, which would include representatives of the relevant authorities and interests, would be given a mandate to proceed with the subsequent steps of regional ecosystem planning.

Step 2

After the round table had decided on the parameters or categories of information to be gathered, working groups would be organized to gather information on the biophysical system, the infrastructural system and the built environment. Some of the working groups might be organized sectorally (e.g., agriculture, wetlands, infrastructure, etc.) but the goal would be to collect and map information to illuminate the interconnected systems and reveal overall problems and opportunities.

The working groups would be constituted of amateurs and experts, drawn from different authorities and stakeholder groups at both a regional and a municipal and watershed scale. The information gathered would be used by the Round Table to determine the appropriate regional boundaries.

Step 3

The working groups would then be reformed with some groups assigned to model the three systems and their interrelationships, while other groups would identify needs and trends for the region and for the sub-regional units. In both cases, planners seconded from the municipalities, watershed bodies (e.g. conservation authorities) and provincial agencies would probably play a key role. Additional consultants might also be involved.

For example, consultants might assist in making an initial, regional-scale determination of optimal locations for different land-uses. More detailed work at a sub-regional level would be led by municipal and watershed body planners. In regions where there are no existing conservation authorities or other watershed bodies, sub-regional round tables could be established.

Step 4

The formulation of goals and objectives would be done by the regional round table, in collaboration with local authorities. Stakeholder groups, perhaps formed through consolidations of the earlier working groups, could then take all of the material produced to date and produce a variety of scenarios or general structure plans. Through the regional round table, these would then be reduced down to two or three general options for presentation and debate to the electorate.

While it would be desirable to get consensus on ecosystem and development objectives, it may be necessary to allow various combinations of stakeholder groups to take the data and analysis to produce rival plans. Each of these plan alternatives should be supported by an assessment of the nature, significance and certainty of its potential impacts on the various ecological and development goals and objectives.

The alternatives should be identified and elaborated with public involvement and their publication would initiate a period of extensive public debate. Each stakeholder group (and interested members of the general public) would be invited to critique the plans and the assessments made by other groups. A neutral "citizens' planning institute" could help provide the expert advice and assistance necessary for citizens and non-government organizations to participate more fully in this process (Webber, 1983).

If many alternatives were initially proposed, the next step would be to reduce the list, through negotiation, to two or three main options. These would then be reviewed, discussed and presented for decision, perhaps through a public referendum. Thus, while the planning process would allow for the participation and interaction of stakeholder groups, it would also allow all citizens to express their will on the general outlines of a plan.

Step 5

In the final step, a formal regional authority would have to be created. This could be accomplished most easily by re-baptizing the round table; alternatively, a new amalgam of provincial, municipal, and local watershed (or stakeholder) representatives could be created. The new body, in collaboration with lower level bodies, would prepare detailed plan policies and zoning designations. It would also develop a set of requirements and procedures for planning, reviewing and approving individual projects under the plan, and for making interim plan amendments.

Watershed bodies or sub-regional round tables would be responsible for developing detailed watershed plans; however, the regional authority would ensure attention to large scale issues and chair discussions addressing any conflicts at point of overlap. The municipalities and the watershed bodies or sub-regional round tables would also identify more particular requirements (such as performance standards and site specific environmental assessment obligations) suitable to their own specific conditions and concerns.

For instance, in the context of the Toronto region, the Crombie Commission has proposed a regional planning unit that would include the watersheds flowing south from the Oak Ridges Moraine as far east as the Trent-Severn waterway and west to the Niagara Escarpment. Based on the arguments presented above, we would propose expanding this to include the watersheds flowing both north and south from the Oak Ridges Moraine in order to capture most of the commutershed and the most significant development pressures in the region. Sub-regional plans might be developed for the areas under the jurisdiction of the various conservation authorities—e.g., Metropolitan Region Conservation Authority (MTRCA), Central Lake Ontario (CLO), Ganaraska Region Conservation Authority (GRCA)—while also making allowances for individual watershed or subwatershed plans, as advocated by the Ministry of Natural Resources.

In the Vancouver region, some argue that the whole Georgia Basin is the appropriate planning unit. In the interim, however, the old territory of the Lower Mainland Regional Planning Board (basically Burrard Inlet and Lower Fraser Basin)—or what local people call "the Lower Mainland" or "Fraser Valley"—would suffice to capture the most important parameters of the urban metabolism. (This area encompasses four regional districts: the Greater Vancouver Regional District, Central Fraser, Fraser Cheam, and Dewdney-Allouette.). There are no functional equivalents to Ontario's Conservation Authorities, but the provincial Department of Environment, Lands and Parks has jurisdiction over water quantity and quality issues, and the Fraser Basin Management Board (FBMP) and the Fraser River Estuary Management Program (FREMP) share responsibility for managing the environmental quality of the Fraser River and the Fraser estuary, respectively (see Chapter II). More appropriate biophysical subregional units might be provided by the "water allocation

units" or "strategic planning units" created by the Department of Environment, Lands and Parks, though some adjustment of the sub-regional or regional boundaries might be needed. These latter could be turned into conservation authority equivalents or round table units, and a regional round table could be established for the whole region. The local municipalities, district municipalities, and regional districts would participate as mentioned.

Ideally the completed plan, with procedures for individual project approvals and plan adjustments as well as detailed policies, zoning measures, would be the product of consensus, not just majority agreement among regional authority members. Final public approval would also be desirable. Where two or more interests have difficulty reaching agreement, special conflict resolution mechanisms may be helpful. However, not all conflicts will be resolvable and finalization of the plan may have to proceed without full consensus in some cases.

Implementation, including monitoring responsibilities would be shared between the regional and sub-regional (municipal and watershed) bodies. Sub-regional round tables could have veto power over municipal development approvals and official plan amendments, and citizens (including watchdog groups organized into watershed councils) should have rights of appeal. Wherever feasible, citizen volunteers would also be included in monitoring as part of their hand-on involvement in the planning process. Mandatory plan reviews would proceed on essentially the same lines as initial plan development.

Conclusions

The model presented here for ecosystem planning in Canadian urban regions fulfills all of the seven ecosystem planning principles discussed in Chapter I and elaborated in Chapters II and III. It incorporates positive features drawn from experience with ecosystem planning, draws from other innovative approaches to the integration of environment and economy in planning, and attempts to confront the main barriers to the changes demanded by a commitment to ecosystem planning. At the same time, the model is only a preliminary outline that needs to be tested in practice. Moreover, there are some evident issues and concerns to which it does not respond adequately. More work on the concept, as well as its applications, is needed.

The Ecosystem Planning Model and the Seven Principles

The model is designed to define, and undertake planning in, planning units that are based on natural boundaries. It focuses on watersheds, or groups of watersheds and

it aggregates them together to allow systematic, integrated attention to biophysical and other social, economic and cultural processes, such as commutersheds and urban shadows.

In addition, the model "designs with nature" by identifying the key attributes or "values" of the landscape and creating a zoning system of proscribed land-uses based on their compatibility or incompatibility with each other and with these attributes. In areas where certain types of development are not proscribed, it enforces performance standards to ensure that environmental impacts do not exceed certain standards or sees to it that the development actually improves certain parameters.

Cumulative and global environmental effects are addressed through proactive planning—attempting to identify the carrying capacity of the region, and seeking to achieve certain targets, while monitoring biophysical (and other) conditions.

The model takes an interjurisdictional approach by creating a regional body with representatives of the province, municipalities and citizen representation from the watersheds, and it ensures that decisions by other agencies do not contravene the regional plan by enshrining the plan and the decision-making process in law. More generally, the model is based on extensive consultation, cooperation and partnering. Citizens and interest groups are involved at every stage, and have a chance to explore and debate different regional scenarios or structure plans, with the assistance of experts.

Finally, the model emphasizes consistent monitoring, and the feeding back of those results into the planning process, and it requires an interdisciplinary approach to information to understand present environmental, infrastructural, and built environment conditions, and the impact that new development will likely have on them.

Model Responses to Lessons from Ecosystem Planning Experience and Other Innovative Approaches

The five step ecosystem model is intended to incorporate the main strengths and address the main weakness and barriers identified in the reviews of past initiatives and other innovative approaches in Chapters II and III of this report. These features of the model include improvements in both the substance and process of planning.

Improvements in the substance of planning and planning decisions

The central characteristic of the ecosystem planning model is also its main strength. That is the integration of data and analysis in a way that allows effective attention to whole systems and the increasingly worrisome, cumulative effects issues that arise in

whole systems. The systems here are not just biophysical ones, although the model does have the advantage of emphasizing biophysical relations rather than separate resources and receptors. Instead the systems embrace social, economic and cultural as well as biophysical factors. The use of natural boundaries and the commitment to long term sustainability mean the ecosystem and the community can be linked in planning as they are in reality.

The ecosystem-community link is fostered by mechanisms that encourage citizens to develop a practicing commitment to their ecosystem through active involvement in planning. Use of local knowledge in turn improves the quantity and quality of monitoring and other data for planning.

Environmental factors are not secondary or marginal in the model. Ecosystem and development objectives are equivalent. Moreover, they are designed and pursued jointly in a process that actively seeks to identify and reach a future in which both kinds of objective can be met. The model represents a rejection of conventional faith in the inherent goodness of growth and the capacity of advancing technology to repair all damages.

The model requires development of a vision of a desirable and viable future and intends the regional ecosystem plan to be the vehicle for getting there. More than that, the model demands careful elaboration and assessment of alternative draft plans to identify the most promising and attractive route for all parties. The planning is positive in that it focuses on what citizens want, rather than just on what they fear. It is also empowering in that it allows people to choose their future, rather than simply adjust to what comes.

The selected plan is meant to be followed. In contrast to conventional planning models with weak plans subject to constant incremental amendment, the ecosystem planning model produces firm plans that provide stronger protection for ecosystems and communities and greater certainty for proponents of development projects. As a set of enforceable rules and requirements, the plans are a means of overcoming the limitations of existing fragmented and poorly implemented legislation. They should reduce administrative waste by cutting duplication and ensuring more focused regulatory activity. As well, they should eliminate many environmental rehabilitation costs by avoiding damages that would require costly repairs or compensation and they should streamline decision-making on individual development projects by providing a clearer set of decision rules.

At the same time, the model incorporates mechanisms for setting special rules to respect local conditions. Amendment and review provisions, including monitoring and review requirements, allow flexibility and demand regular rethinking and renewal of the plan. And innovation is encouraged by the mandatory consideration

of alternatives and the emphasis on objectives to be reached rather than standards to be followed.

Finally, while demanding more and better information in support of planning, the model appreciates the limits to scientific and professional understanding. The reliance on participative decision-making is in part due to rejection of reductionist science and recognition of the value-laden nature of any area of inquiry. More directly, the adoption of the precautionary principle should be a common element of ecosystem planning.

Improvements in the process of planning

Integration of a sort is also a main strength of the process of planning under the ecosystem planning model. Some of the integration here is consolidation of requirements and procedures in the interests of greater efficiency as well as better decisions. The incorporation of environmental assessment requirements into the planning process is a good example. However, the most significant integrations in the process of planning are in the steps to encourage the relevant interests to be participating partners rather than separate authorities, regulatees and citizens with their own mandates, demands and fears.

The model does not expect or require that long time antagonists will suddenly become cheerfully co-operative, but it favours consensus over conflict, inclusion over imposition, and collaboration over mere consultation. These approaches are adopted for practical reasons and are fostered through self-reinforcing experience throughout the process, beginning at the earliest and least threatening steps of planning.

The favouring of joint, multi-interest as well as multi-authority planning responds to the evident failures of conventionally fragmented approaches. The model's process also recognizes that any planning that focuses on systems, cumulative effects and environment-development links, must necessarily bring together both expertise and interests if there is to be any hope of producing a coherent and acceptable plan. Acceptability is crucial because the kinds of significant change implied in adoption of ecosystem planning are unlikely to be implementable without the agreement, if not enthusiasm, of most parties.

Concerning existing government bodies, the self-reinforcing aspect involves expectations that better communication among municipalities and other authorities will improve mutual awareness as well as provide a better information base. Greater co-operation among provincial and watershed agencies will make all of them more effective and efficient, more evidently valuable and less vulnerable to elimination in times of fiscal pressure. More direct participation of existing authorities as partners

in decision-making will enrich the results and help to defeat resistance from entrenched and nervous traditionalists.

For citizens, the model expects the approach to be empowering and educational in ways that strengthen planning as well as provide benefits for the participants. Where some authorities might see citizens with narrow, backyard protection concerns as reasons to limit participation, the ecosystem planning model sees these concerns as powerful initial incentives for citizens to join in an exercise that leads all participants to relate their own immediate (backyard, local, corporate or agency) interests to desired regional outcomes. This broadening of perspective is further encouraged by the emphasis on regional identity and the "designing you own future" orientation that helps citizens as well as government officials to abandon the fortress mentality and pursue more positive opportunities. Finally, the social action and hands-on involvement elements of the model demonstrate more concretely the seriousness of the new approach's commitment to actual acceptance of citizens as effective participants, rather than subjects for consultative gestures.

The model still must include legislated authority for the regional planning body. It requires mechanisms for concluding conflicts that consensual procedures cannot resolve, and it must have effective enforcement tools to ensure compliance. But it represents a large step away from planning by top-down edicts.

The Next Steps in Strengthening the Ecosystem Planning Concept and Implementation

The definition of ecosystem planning and the ecosystem planning model for urban-centred regions presented here are successful in terms of the objectives of this study. They are supported by our experience with ecosystem planning so far and incorporate the main lessons from this experience and from other related approaches. But neither the set of principles upon which the definition is based, nor the outline of the ecosystem planning model can be said to offer the last word on how to approach ecosystem planning in general or in Canadian urban regions. Ecosystem planning is a new and evolving field in which there are many questions still to be answered and many lessons still to be learned.

For example, we can without much difficulty identify a number of issues that the ecosystem planning model does not fully address:

- although it attempts to respect regional carrying capacity, it does not explicitly deal with the issue of "ultimate limits", or wrestle with the most recent thinking in ecosystem theory, or explicitly integrate economic planning into the process

- it does not explicitly focus on cultural issues and their relationship to sustainability, or the issues surrounding land claims and First Nations' self-government
- it does not explicitly address cultural norms (for instance, regarding the desirability of traditional suburban development) and their potential incompatibility with sustainability
- it does not explicitly address the ways in which the workings of the market economy fail to respect the needs of bioregions
- while it incorporates an assessment of lands possibly needed for various kinds of economic activity, it does not explicitly address the issue of jobs or the possible desirability of shifting how people in a region make their living to a more sustainable basis.

These are difficult areas. Ecosystem planning applications may never begin if we await thorough examination and resolution of all the questions that underlie the issues raised here. Nevertheless, they deserve attention if ecosystem planning is to be as effective and acceptable as it must be. As an initial contribution, we will outline some considerations pointing to three additional principles for ecosystem planning and discuss three priority areas for further research.

Suggestions for additional ecosystem planning principles

Scattered throughout the interviews and the case studies were a number of observations and indications that the list of ecosystem planning principles should be expanded. The main ideas here turn on questions about the relationships between planning at the regional scale we have discussed and the implications of a serious commitment to integrated environment and economy concerns in a way that ensures sustainability.

Thinking about the environment-economy interface appears to have gone through three phases. In the first phase, environmental destruction and degradation was simply a cost of doing business. At best, those who recognized these costs sought to mitigate the worst damage from economic activity. The second phase, represented by cruder interpretations of the concept of "sustainable development," focused on balancing economic and environmental objectives. Despite the emphasis on "integrating" decision-making, in essence this approach called for a series of calculated trade-offs, while hinting at something more substantial.

In the next phase, the one we may be entering now, the opposition and polarity would be substantially overcome—every legitimate act of the economy would be

seen as having the potential for healing and restoring the earth, and society would increasingly demand this of economic actors.

Considered in this light the model we have offered represents only a partial step in the right direction. It does not guarantee that the three defining characteristics of ecological sustainability cited by the International Union for the Conservation of Nature (IUCN) will be met. These include the sustainable use of natural resources, the maintenance of life support systems (soil, water, air), and the maintenance of biodiversity (Nelson and Eidsvik, 1990). Nor does it address explicitly some of the central issues of socio-economic and community sustainability, which the Brundtland Commission and others have recognized as equally crucial components of any successful overall strategy for sustained local and global well-being (Gardner and Roseland, 1989).

There is good reason to conclude that ecological sustainability, and probably community sustainability as well, cannot be fully addressed without seeking to make an urban region more economically self-sufficient. As Mathis Wackernagel (1993) has pointed out, all cities in the developed world appropriate carrying capacity (resources, waste assimilation and life support) from other parts of the globe, and far in excess of their own regional carrying capacity. A human civilization in balance at a global level would be one in which regional settlements were in balance with their own environments, where environmental impacts were internalized sustainably within regions, and in which trade involved merely the export of biological "surpluses".

This concern has been recognized in Canadian ecosystem planning work. For example, it appears to underlie the Regional Municipality of Ottawa-Carleton decision to include, as one of its guiding principles, enhancing "self-reliance and self-sufficiency" within the region. But we have only begun to wrestle with the implications of self-sufficiency as a route to ecological and community sustainability.

One likely element, sooner or later, will involve the need to consider population growth controls at a regional scale. In the absence of them, one is forced to accommodate, ameliorate, and hope for the best, rather than letting regional carrying capacity dictate the limits. True living within regional limits would involve a transition from ecosystem planning to bioregional planning.

While the regional unit posited in our model would be big enough to capture some of the city's environmental impacts, and would possibly enable it to be self-provisioning in water resources, it is unlikely to encompass a resourceshed of sufficient size to meet the city's needs, or provide for adequate soil resources, or be the optimal unit for managing biodiversity. For instance, the Greater Ecosystem Alliance of Washington and British Columbia, in planning for the preservation of a variety of large mammal species, has suggested an ecosystem unit of 45,000 square

kilometers (Friedman and Lindholdt, 1993)—an area considerably larger than the types of planning regions that we've been discussing.

A related problem is that our model makes no specific provision for transcending an anthropocentric position where all planning considerations flow from a concern with the needs of human beings exclusively. This problem has been noted in some of the ecosystem planning literature, but to contemplate a more ecocentric ethic, and to move to greater levels of regional self-reliance (and hence to a decline in consumption) would require a considerable sea change in culture. In this regard, ecosystem planning should not be seen as occurring in a vacuum, but should be initiated as part of a major community (and societal) rethinking of goals, objectives and values. A planning process needs to be evaluated as much by its contribution to social learning and consensus formation, as it does by its success in achieving certain biophysical parameters.

These points suggest the need for additional ecosystem planning principles—principles that are only implicit in the seven we identified in Chapter I:

8) devote careful, critical attention to regional (and appropriated) carrying capacity and self-sufficiency to ensure that planning decisions help meet the conditions for ecological sustainability and avoid the danger of a merely ameliorative approach to growth management
9) recognize that planning, by itself, is not enough, but must be linked to changes in social attitudes and values, which in turn require involvement of people in various forms of social learning
10) integrate environmental and economic planning fully so that every economic activity not only "sustains" the environment, but also helps to restore it.

Suggestions for further research

Unfortunately, our understanding or ecosystems is limited and these limitations have important implications for how we ought to approach ecosystem planning. To clarify the limitations and implications, we recommend further research in three areas—the concept of ecological integrity, the concept of "urban ecosystem" and the rules for planning under conditions of uncertainty.

Ecological Integrity

In this paper, the concepts of ecological health and ecological integrity have been used interchangeably. Although this follows the practice of many of the documents and interviewees consulted for this research, there is nonetheless an important distinction to be made.

There are many ways of defining ecological health. Costanza (1992, at 239), for example, lists "health as homeostasis, health as the absence of disease, health as diversity or complexity, health as stability or resilience, health as vigor or scope for growth and health as balance between system components." One popular set of approaches to assessing an ecosystem's health relies on analogies to practices in human medicine (e.g., Rapport and Friend, 1979; Rapport, 1989). These look for important characteristics or vital signs that differentiate healthy from unhealthy ecosystems, or focus on the ability of an ecosystem to handle stress loadings and to recover its equilibrium, or identify risk factors and, based on probability, assesses the sustainability and well-being of ecosystems resulting from exposure to certain anthropogenic stresses. Examples of ecological health indicators include primary productivity, species diversity indices, structural and functional redundancy, and soil nutrient losses (Rapport and Friend, 1979; Rapport, 1989; Odum, 1969; O'Neill et al., 1977).

The human medical analogy approach is problematic, however. Seeking to achieve and maintain ecosystem health suggests that well-being is a condition of stable functioning at an ideal level for performance. That's what human health means, at least at the individual level. For ecosystems the parallel might be the idea that biological communities are constantly seeking to achieve and maintain themselves at a climax position—the climax community. But ecosystems don't really operate that way. They don't reach for a climax and depart from it only due to some ecological version of ill health. Instead they are dynamic, with complex cycles of birth, growth, death and renewal. Change is not linear. Holling (1992, at 481), for example, describes a figure-eight flow of change through exploitation, conservation, release and reorganization.

In response to the limitations of the medical analogy, some advocates of a broader conception ecological well-being recommend a focus on "ecosystem integrity" rather than "ecosystem health" (Allen et al, 1993; Kay and Schneider, 1994; Checkland, 1976; Allen and Hoekstra, 1992). While the two concepts overlap, ecosystem integrity is more suited to recognizing the complex hierarchy of ecosystems, their interconnections and their dynamic, cyclical character. Three main factors are emphasized in assessing the integrity of any ecosystem. First is the current well-being or "health" of the system. Second is the system's ability to deal with stress, including continued culturally-induced perturbations, since an ecosystem can be healthy but vulnerable (Barrett and Rosenberg, 1981; Edwards and Regier, 1990). Third is the system's ability to maintain the processes needed for continuous self-organization in the face of change, one key to which is maintaining biodiversity (Woodley et al, 1993; Kay and Schneider, 1994).

While the notion of ecosystem integrity would have clear relevance to planning in an urban areas (for example, in the definition of planning boundaries), like many ecosystem concepts, it has been developed in the context of relatively undisturbed

ecosystems. In urban regions, ecological processes have been extensively altered and extensive resources are expended in order to maintain the system in its altered state. For instance, hydrological cycles are engineered to suit human needs and biodiversity has been seriously diminished through the wholesale destruction of habitat. Thus, we need to undertake serious research to define what would constitute ecological integrity in an urban-regional context. This research should include consideration of the types of indicators that would be specifically appropriate to severely disturbed landscapes.

The Urban Ecosystem

These considerations raise a larger set of questions about the state of our knowledge of the "urban ecosystem". In many ways, the urban ecosystem is more a metaphor than a scientific concept. Our knowledge of how this system works is rudimentary in many respects.

For instance, a carrying capacity approach assumes that growth targets should be set by the community according to the biophysical limits of the region. Thus, carrying capacity planning has traditionally been concerned with reducing the intensity of human use of the land and has allied itself with those advocating growth controls designed to minimize or eliminate population growth (Finkler and Peterson 1974). However, in a competing formulation based on throughput analysis, population concentration is seen as the most effective means of reducing the per capita environmental impacts of the human use of land. According to this model, the benefits of concentration would be expressed in the increased efficiency of the urban metabolism and the reduction in per capita energy and materials use and waste generation (Paehlke, 1991).

Presently, we do not have the tools to adjudicate between these competing models of urban sustainability. Without such tools, assessing the environmental impacts of various growth scenarios, as proposed in our planning model, could be a haphazard exercise. We therefore strongly recommend that further research be undertaken to better conceptualize the urban ecosystem, including structural and functional components (Danielse, 1992).

Planning Under Conditions of Uncertainty

This line of thought leads to the still larger set of questions about planning under conditions of scientific and conceptual uncertainty. The planning model presented here relies heavily on the accumulation of appropriate information at the appropriate scale. This presents a number of difficulties. Detailed information is required on the state of the biophysical environment, including air quality, water quality, biodiversity, regional resources, soil characteristics, the regional water cycle and so on. While some of this information is readily available, much of it is not. Information that is available is typically aggregated on the basis of administrative boundaries rather than the ecosystem boundaries suggested here (Environment Canada, 1992).

Even where appropriately aggregated information is available, the vast panoply of human activity (such as the number of pollution sources) in urban areas makes it extremely difficult to link environmental impacts to specific human actions with any certainty. Furthermore, existing models tend to be structured along disciplinary lines (hydrogeology, climatology, aquatic ecology, etc.), making them less useful for a planning approach that relies on interdisciplinary analysis. While work is being

undertaken to correct this situation, efforts are still at an early stage of development (Imhof *et al.*, 1992).

In the meantime, however, we cannot allow ourselves to be paralyzed by uncertainty. As a recent paper prepared for the Regional Municipality of Ottawa-Carleton's Official Plan Review puts it:

> the ecosystem approach implies an understanding of how any decision is likely to affect all key elements of the system. In practice, this is almost impossible because in many cases we simply do not know and there is no information available. To wait until we know everything about everything would mean that no decisions would ever be possible. We have to act, even in the face of uncertainty (Whitwell et al., 1992: 6).

Gibson (1992b) has outlined some planning strategies that may reduce the dangers associated with planning under conditions of uncertainty. The model presented in this report accommodates many of these suggestions. For instance, by mandating various social interests to participate in the generation of rival development scenarios, the community will be encouraged to explore and question the assumptions on which future predictions are based. By building into the plan long-term monitoring requirements and the capacity to adapt to changing circumstances or an evolving knowledge base, we hope the risk of serious and irreversible errors will be minimized. Although the model lends itself to other strategies, they have not yet been incorporated. For instance, the impact review of development proposals might include consideration of how the project could be reversed or adjusted to account for unforeseen consequences of development. Clearly, further work needs to be done in refining the proposed model to ensure its implementation respects the inevitability and significance of uncertainty.

A final word

Ecosystem planning is not for the faint-hearted or the self-satisfied. It involves major, even fundamental, changes in the substance and process of planning and such changes will inevitably be difficult, however attractive the objectives and the approach may be. In most cases, willingness to initiate the necessary reforms will come only when it is clear that the conventional planning process is not working and no amount of tinkering will resolve the evident problems.

This is an unfortunately negative starting point. While it is true that a crucial advantage of ecosystem planning lies in its ability to respond comprehensively to the deficiencies of conventional planning, the central strength of the approach is its potential for helping the citizens of a region to choose their mutual future rather than have the future imposed on them. This choosing is necessarily constrained by

limitations of knowledge and requirements for general consensus. But it is

nonetheless an exercise in both individual empowerment and community building in work that enriches the links between citizens and their environment. Even highly imperfect steps in this direction should make a contribution to sustainability and the quality of life.

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Appendix B

Questions Asked of Interviewees

The following questions were asked of the officials interviewed for Chapters II and III of this report:

- Name of initiative
- Location
- Please provide a brief background of this initiative in terms of the agencies involved, mandate, chronology, current status, and accomplishments.
- What are the major strengths associated with this initiative from your own perspective?
- What are the major weaknesses or barriers associated with this initiative?
- What strategic suggestions would you have for someone undertaking a similar initiative?