INTEGRATING CUMULATIVE EFFECTS ASSESSMENT WITH REGIONAL PLANNING

By

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ABSTRACT

This thesis explores the question of how regional planning for the assessment and management of cumulative environmental effects would differ from existing regional planning systems in terms of goals, planning processes, and regional governance. The thesis begins with a review of the field of cumulative effects assessment, followed by an exploration of the linkages between the assessment of cumulative effects and regional planning. Then, principles to integrate the assessment of cumulative effects with regional planning are identified and explained. The principles are, in terms of planning goals, to maintain ecological integrity, reduce consumption of resources and energy, and minimize waste. In terms of planning processes, the principles are to employ a strategic planning perspective, undertake comprehensive planning, ensure the planning process is adaptable, and involve the public throughout the planning process. In terms of governance and institutional concerns, the principles are to give regional districts the authority and fiscal capacity to implement and enforce decisions and make regional districts accountable to their citizens. The case of regional planning in Greater Vancouver is used to illustrate how these principles can be applied. An evaluation of the degree to which regional planning in Greater Vancouver currently meets the principles is undertaken to identify where efforts for change in regional planning can be directed.

Overall, in terms of a four-point scale from poor to excellent, Greater Vancouver's regional planning is rated as fair in terms of setting relevant policy goals and fair to good in meeting the principles of governance. In terms of planning practice, the region is good but moving to fair with respect to being strategic and comprehensive and only fair in terms of being adaptive and participatory. It is concluded that because regional planning is a suitable forum for linking local action with global issues, regional planning can provide an appropriate institutional context for the assessment and management of cumulative effects. However, current approaches to regional planning in Greater Vancouver would have to change substantially to address this goal. While many constraints stand in the way of change, many opportunities also exist. To realize the potential of regional planning for assessing and managing cumulative effects, institutional arrangements, attitudes, and professional practice will have to change.

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CHAPTER ONE: INTRODUCTION

This thesis is concerned with the role of regional planning in assessing and managing cumulative environmental effects. Cumulative effects result when "insignificant" impacts from many human activities combine synergistically or additively through time and space to create "significant" effects. In Canada, regional planning currently plays a minor role in assessing and managing the cumulative effects of multiple environmental impacts.

The concept of regional planning originally emerged as a response to cumulative environmental and social effects of industrialization and urbanization (Sussman 1976). During the post World War II years, the discipline shifted its focus to facilitating economic growth through industrial development. In the 1970s and 1980s, regional planners became self-critical of the established doctrines of the 1950s and 1960s; economic inequities were growing instead of decreasing among regions (Friedmann and Weaver 1979). Now with a resurgence of interest in protecting and maintaining environmental quality, the original intention of regional planning is being rediscovered. Researchers in environmental assessment suggest that regional planning could provide an appropriate institutional context for cumulative effects assessment (CEA) (Sonntag et al. 1987 and Peterson et al. 1987). This conclusion leads to the following question:

> How would regional planning for the assessment and management of cumulative effects differ from existing regional planning systems in terms of goals, planning processes, and regional governance?

The case of regional planning in the Greater Vancouver region is analysed in this thesis to help answer the above question. The region is suitable as a case study for several reasons.

- The Greater Vancouver region has many similarities with other urban-centred regions in Canada: population size, large number of municipal jurisdictions, overlapping provincial and federal jurisdictions, and cumulative effects such as deteriorating air quality as well as conflicts between developers and interest groups over land use decisions.

- The Greater Vancouver region has over four decades of experience in attempting to deal with the environmental consequences of urban development through regional planning.

- Regional planning in Greater Vancouver has gone through distinct phases. Regional districts had legislated authority from the provincial government for land use planning from 1969 until 1983. Before and after that period, the regional district had no legislated authority for regional planning. This makes it possible to assess if authority for regional planning has any impact on its effectiveness.

Specific questions to be addressed by the case study include:

- Has the assessment and management of cumulative effects been a part of regional planning concerns in the Greater Vancouver region?
- If so, in what ways? If not, what are the constraints?

An Opportunity to Redefine Regional Planning

From the time that regional planning became a tool for governments to improve the quality of life for their citizens, the goals and processes of regional planning have been dependent on the dominant values in society. Over the past several decades these values have fluctuated between having either a regional or a global economic focus. Now, concern about economic disparities and environmental issues is causing a different sort of pressure on regional planning.

Different Approaches to Regional Planning

The concept of regional planning emerged in North America during the early 1900s in response to concerns by social critics about the lack of conservation of natural resources and the rapid spread of cities into the adjacent country (Adams 1917, Friedmann and Weaver 1979). Lewis Mumford, a well known social critic of American life, was one of regional planning's foremost proponents. His definition of what was then a new approach to planning is given in the following quote.

> Regional planning asks not how wide an area can be brought under the aegis of the metropolis, but how the population and civic facilities can be distributed so as to promote and stimulate a vivid, creative life throughout a whole region--a region being any geographic area that possesses a certain unity of climate, soil, vegetation, industry and culture. The regionalist attempts to plan such an area so that all its sites and resources, from forest to city, from highland to water level, may be soundly developed, and so that the population will be distributed so as to utilize, rather than to nullify or destroy, it natural advantages. It sees people, industry and the land as a single unit (Mumford 1925, reprinted in Sussman 1976: 90).

The discipline of regional planning did not emerge in North America until the 1950s. Regional planning did not follow the approach suggested in the above quote by Mumford. Instead, the discipline of regional planning, according to Friedmann and Weaver (1979) was concerned with economic growth in a spatial dimension. This purpose of regional planning is increasingly coming under question, however, as the values and goals of society change (Boothroyd 1989). Economic growth as the goal of development is being replaced by multiple goals which include maintaining ecological integrity, greater attention to social equity, and more emphasis on self-determination (Friedmann and Weaver 1979).

Opposing Social Integration Forces Influence Regional Planning

In addition, political trends towards regionalization are confronting trends towards global economic integration. These two trends can be attributed to different value systems and visions of future development. The regional perspective values the conditions that make a region unique when compared to the rest of the world. These conditions are derived from social or community (in the broadest sense) interests. In contrast, the global perspective values the conditions that can be made common to the rest of the world--in the words of Friedmann and Weaver (1979), mutual self-interest.

In terms of future development, regionalists tend to favour development that meets local needs and conditions whereas proponents of the global perspective see the world as their market. These opposing trends are evident in debates over free trade in North America, where unions and environmental groups are opposing the desires of multinational businesses and federal governments to expand trade opportunities by removing national or regional standards for work and environmental protection. A more local example of the regional versus global argument is the

desire of some resource-based communities, such as Tofino and Port Alberni in Clayoquot Sound on Vancouver Island, to obtain a greater say over development rights to lands which are currently subject to the decisions of multinational corporations.

Friedmann and Weaver (1979) describe these opposing trends as fluctuations between two forces of social integration: territorial and functional. The territorial force refers to the utopian origins of regional planning as defined by Mumford (1925), while the functional force is concerned with a scientistic and pragmatic approach to regional economic development. Scientistic in this context means that science is held to be the only valid form of knowledge.

The territorial force was dominant in the 1920s and 30s but gave way in the 1940s and 50s to the functional force. The rapid spread of industrialization and application of scientific methods to improve economic efficiency supported the shift to the functional force. Friedmann and Weaver (1979) believe North American society is now shifting once again to a territorial force. They claim two conditions are primarily responsible for this shift. One condition is a growing recognition that the functional force has failed to deliver the "good life"; disparities between rich and poor continue to increase. The second is the mounting evidence of environmental degradation, in particular the threat to our agricultural capabilities.

These points are difficult to dismiss. The need to recognize the critical linkages between a healthy economy, human needs, and the quality of the ecological support system has never been more important than at this point in the history of human development. The developed countries, with 26% of the world's population, consumes 80 to 86% of nonrenewable resources and nearly 34 to 53% of food products (WCED 1987). Humans now appropriate nearly 40% of net primary production from terrestrial ecosystems (Rees 1990). Our species is becoming increasingly vulnerable to changes in ecological conditions.

Pressures to Change Regional Planning Practice

According to Friedmann and Weaver (1979), two forms of regional planning are dominant. Most people, especially in Canada, think of regional planning as helping out "backward" regions such as

Atlantic Canada. The other form is urban-oriented, being concerned with spatial organizational principles which lead to the successful development of urban growth centres. As the shift to territorial integration continues because of concern about environmental quality, these approaches to regional planning are under pressure to change.

Pressures to redefine regional planning in relation to environmental issues are coming from two sources. The first pressure is the need to redefine the role and practice of regional planning in the face of increasing public support for environmental protection. The goals and practice of regional planning are primarily oriented towards facilitating economic growth but the public is demanding that environmental quality also be protected. Yet, urban and regional planning do not have the capability to address this issue. As noted in Hall's (1990: 7) definition of a new planning agenda for the 1990s, ". . . the techniques for producing green plans are lacking" and compounding the problem, regional administrative mechanisms to implement such plans are non-existent. Although Hall was referring to Britain, the situation is similar in Canada.

The second pressure is the need to address the cumulative impacts of urban development before they become unmanageable or do irreversible damage to ecological systems. People are just beginning to understand the health and environmental implications of urban air pollution. However the changes required in urbanized regions to reduce dependence on fossil fuels for transportation and energy may not occur soon enough to reverse the process of ecological degradation (French 1990).

Ideally, to maintain ecological integrity, regional planning could provide an area-wide, comprehensive process for evaluating and regulating human activities, thereby reducing or mitigating the negative environmental impacts from development. However, deficiencies in the current practice of regional planning restrict its usefulness in environmental management. Sonntag et al. (1987) identified the following deficiencies: lack of a planning framework for integrating scientific and public concerns; planners not trained in available methods of assessment; inability of current planning approaches to deal with linkages between complex social, economic, and ecological systems; and lack of explicit consideration of cumulative effects.

This dissatisfaction with the current practice of regional planning is really an opportunity to redefine the purpose of planning at a regional scale. Some indication of the future direction is already evident. For example, Holling (1978) proposes applying an adaptive environmental assessment and management approach to regional economic development planning as well as natural resource management. His reasoning for applying an adaptive approach is described in the following quote.

> But it is obvious that at least regional economic systems can be treated in the same way and integrated with the ecological and environmental system. . . it is possible to achieve designs that work with rather than against natural forces. In so doing, more opportunity is provided for less costly and intrusive economic developments and even for the enhancement of natural systems rather than simply for their protection. (Holling 1978: 14)

Other proposals for redefining regional planning have included consideration of cumulative effects assessment. As noted by Roots (1986: 159), undertaking cumulative effects assessment can increase public demand for adaptive regional planning because of an ". . . increased appreciation of the economic and social benefit of environmental protection and sustained management of renewable resources". Rees (1988) also points out how cumulative effects assessment can inform regional planning processes. He suggests that comprehensive regional monitoring be undertaken to estimate how close a region is to reaching the development limits determined by regional carrying capacity.

While regional planning will have to fulfil many purposes in the future, managing the ecological integrity of a region will probably become a central goal. This is the point at which the assessment of cumulative effects and regional planning practice overlap. To be relevant to changing social and environmental conditions, regional planning requires new goals while the emerging field of cumulative effects assessment needs an appropriate context. Regional planning can provide the context and the assessment of cumulative effects can provide a new set of goals. The integration of these two areas will be an important component of national or provincial sustainable development strategies.

The Urban Environment as Focus

This thesis focuses on environmental management in urbanized regions because this aspect is largely ignored in environmental policies. Urban environmental issues are often a result of the cumulative impacts from seemingly insignificant urban-based activities. An individual driving to work contributes to smog. Each flush of the toilet leads to an incremental decrease in water quality. The construction of single family housing at the suburban edge eliminates nesting habitat for yet another species of birds.

The lack of direct attention to this issue can be illustrated by the following examples. The World Commission on Environment and Development (1987), which documented the environmental crisis around the world, included an evaluation of the environmental effects of urbanization but offered no analysis of the relative importance of the problem in industrialized countries and if or how it can be addressed. In B.C., most provincial environmental policies focus on resource extraction activities (e.g., mining and forestry), industrial processes, and wilderness preservation; urban environmental effects are largely ignored. The December 1990 draft of a major policy statement from the Ministry of Environment is reported to contain little reference to urban problems (I. Henderson, pers. comm.). Municipal governments in B.C. have few resources to address complex environmental issues; in 1990, Burnaby was the first municipality in the province to hire an ecosystem planner.

The occasional research project has struggled with assessing the impacts of urbanization. In the U.S., research into cumulative effects in urbanized regions began in the late 1970s because urbanization was not amenable to project-specific environmental assessment. Examples of research into urban cumulative effects assessments include an urbanization assessment method, prepared for the Environmental Protection Agency (Jameson 1976); carrying capacity as a planning tool (Schneider, Godschalk, and Axler 1978); and an areawide environmental assessment procedure, developed for the U.S. Department of Housing and Development (Skidmore, Owings, and Merrill 1981). Although the areawide assessment procedure purported to be "fundamentally" concerned

with cumulative impacts, the methodology for identifying and addressing such issues was poorly defined.

While there are probably a multitude of reasons why these procedures did not evolve into regular practice, three factors stand out as being major constraints. First, because urban planning has a history of facilitating urban growth, assessing the environmental impacts of urban growth is often counter to the attitudes and inherent biases in most planning processes (Forester 1989). A second, related problem is locating the responsibility for such assessments in the appropriate institutional structure. No one municipal government can take responsibility for an areawide assessment; a level of government with greater authority is necessary. Yet, municipal governments often resist attempts by senior governments to get involved in local jurisdictional issues (De Grove 1989). The third factor concerns how the problem of cumulative effects is conceptualized. Most research has focussed on the physical impacts of development, an assessment problem, not on the development which causes the physical impacts, a management problem (Roots 1986). Thus, researchers continue to analyze the physical changes resulting from cumulative effects instead of finding ways to manage the activities that cause the problems.

The interest of government in managing urban environmental quality has been sporadic. State and local governments struggle with various strategies to reduce the negative impacts of urbanization. Growth management is the current catch phrase to describe activities that exert control over urban growth or channel growth and manage its impacts (Deakin 1989). Although growth management activities are largely concerned with protecting environmental quality, they are generally ad hoc and, as indicated by the following quote, cannot yet provide a useful framework for the management of environmental impacts from urbanization.

> We understand little about how urban growth occurs, how urban systems change in the process of growth, how urban development needs can be balanced with environmental and other concerns, or how specific techniques to manage change actually work. (Brower, Godschalk, and Porter 1989: vi).

Concern by local governments about environmental quality has also translated into the recent formation of an International Council for Local Environmental Initiatives (Skinner 1990). This

council will represent over 200 cities in 45 countries, including Toronto, and provide members with technical information and assistance in addressing the problems which are leading to ecological instability. The delegates to this conference concurred that even though cities are the source of much environmental degradation, they can also be the sites of environmental restoration (Skinner 1990).

To address the lack of research to the critical issue of assessing the cumulative environmental impacts of urbanization, this thesis focuses on assessing and managing cumulative effects in a regional planning framework. The region, rather than a municipality, is the chosen unit of study in this thesis because, at the regional scale, concerns regarding cumulative effects and urban planning coincide. For example, extensive use of vehicles for commuting and transporting goods leads to poor air quality in certain municipalities in the Greater Vancouver region. This problem cannot be resolved just at the local level, however, because its occurrence is related to regional patterns of transportation, housing, and environmental conditions.

Odum (1982), a well known ecologist, pointed out that regional problems are highly vulnerable to the incremental decisions which lead to cumulative effects. No one decision is responsible for the loss of nearly 70% of the riparian habitat (marshes and shoreline) in the Greater Vancouver region (Kennett and McPhee 1988). Rather, the loss of wetlands has occurred through one decision to drain a field, another decision to build a coal port, and other decisions to build dykes. These incremental decisions show up as a regional loss of important wildlife habitat that cannot be replaced.

Definitions

"Cumulative effects" and "regional planning" are defined in this section to clarify their meanings as intended in this thesis.

Cumulative Effects and Related Concepts

The Canadian Environmental Assessment Research Council (CEARC 1988: 2) defines cumulative effects as:

> . . . impacts on the natural and social environments [which] take place so frequently in time or so densely in space that the effects of individual "insults" cannot be assimilated; or [when] the impacts of one activity combine with those of another in a synergistic manner.

This concept can be further explained through examples: the gradual loss of wetlands through infilling and lowering of water tables, the incremental decrease in water quality through overland drainage from heavily fertilized croplands, and the synergistic effects of air pollutants to create smog. While all cumulative effects originate with local actions, some effects eventually lead to global problems. The buildup of greenhouse gases in the upper atmosphere, primarily as a result of fossil fuel combustion, is a case in point.

Cumulative effects assessment (CEA) refers to a particular body of knowledge concerned with the identification and prediction of cumulative impacts from development. The recent emergence of this research topic resulted from a growing awareness that traditional environmental assessments are inadequate for taking account of the additive impacts of ongoing development in an area or addressing the dynamic response of ecosystems to increasing perturbations (CEARC and USNRC 1986). Thus, research into cumulative effects assessment aims to develop techniques to overcome these and other shortcomings of environmental assessment. It is rapidly becoming an extension of the field of environmental impact assessment.

The phrase "assessment of cumulative effects" will refer to a more general process of assessing the impacts of development, a concern traditionally associated with planning.

Environmental management encompasses both environmental assessment and CEA and addresses questions such as the appropriate scale for managing the impacts of development and institutional arrangements.

Cumulative effects have a direct bearing on the concept of sustainable development. Recognition by media, interest groups, and government of the extent and seriousness of cumulative effects, is largely responsible for the growing interest in sustainable development. As defined by the World Commission on Environment and Development, sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED

1987: 43). The challenge of sustainable development is to find forms of development which do not exceed the short or long term ecological capacity of the planet. In an ideal world, cumulative environmental impacts from development would be minimized. Therefore, successful efforts to manage cumulative effects will be a major step towards developing a sustainable society.

Regional Planning

Regional planning in Canada takes place over several spatial scales. Nationally, the federal government has directed much effort at resolving inter-regional disparities between industrialized, prosperous Central Canada and less-developed regions such as Atlantic Canada through regional transfer payments and economic development projects. At a provincial level, BC and Quebec have opened up their vast northern regions to development through mega-projects. Finally, at the smallest scale, urbanized areas such as Metropolitan Toronto and Greater Vancouver have attempted to control urban growth through the regional coordination of services such as sewage treatment and water supplies. It is this last scale which is the focus of this thesis.

In terms of process, regional planning is a tool for directing resources and people's activities towards a common goal, be that economic development or improving the environmental quality of life or both. The first goal is usually associated with federal initiatives for regional development. The latter goal, improving the quality of life, is usually associated with provincial and local government efforts to resolve rural-urban conflicts (Hodge 1986), manage natural resources, and accommodate development activities. Regional planning differs from urban planning in that the former is concerned with the general location of activities and resource development, rather than the specific allocation of space among various land uses (Hodge 1986).

Traditionally, the term regional planning has been understood as referring in a metropolitan context only to land use planning. For the purposes of this thesis, regional planning also includes efforts to manage waste, transportation, open space, economic development, social services, and resources at a regional scale.

Methodology

From the literature on cumulative effects assessment (in Canada, primarily reports from the Canadian Environmental Assessment and Research Council) as well as on economics (e.g., Daly and Cobb 1990), environmental management (e.g., Shrader-Frechette 1985; IUCN 1980), planning for sustainable development (e.g., Brown 1990; Rees 1990; TCPA Strategic Planning Group 1990), policy analysis (e.g., Torgerson 1986) and regional planning (e.g., Mumford 1938, Friedmann and Weaver 1979), a set of principles which integrate the assessment of cumulative effects with regional planning was synthesized. These principles were then used as a heuristic framework to analyze regional planning in the Greater Vancouver region.

The Greater Vancouver case study focuses on the evolution of regional planning in relation to the protection of environmental quality. Major planning documents from the Greater Vancouver Regional District (GVRD), starting with its precursor, the Lower Mainland Regional Planning Board, were reviewed to determine the history of regional planning in this area.

Scope

The thesis focuses on the environmental aspects of regional planning, in particular cumulative effects related to urbanization. The social and economic aspects of regional planning are beyond the scope of this thesis.

Organization of Thesis

This introductory chapter has stated the research questions for the thesis and described the context for re-examining the relation of regional planning to the management of cumulative effects from urbanization. Chapter Two describes the current status of research and practice in cumulative effects assessment and explores the structural biases inherent in the current approach. Linkages between the original intention of regional planning and emerging ideas about planning for sustainability are then outlined. In Chapter Three, nine principles to integrate the assessment of cumulative effects with regional planning are identified and explained. The principles fall into

three categories; planning goals, planning practice, and governance and institutional concerns. The case of regional environmental planning in Greater Vancouver is described in Chapter Four. In Chapter Five, the Greater Vancouver case is evaluated to determine to what degree regional planning here currently meets the nine principles. In the final chapter, conclusions are made about how regional planning in Greater Vancouver would have to change to meet the principles. The thesis concludes with some general observations about the issue of addressing cumulative effects in urban-based regions and outlines some research suggestions for moving in the direction of integrating the assessment of cumulative effects with regional planning.

CHAPTER TWO: ASSESSING AND MANAGING CUMULATIVE EFFECTS

This chapter begins with a description of cumulative effects assessment (CEA). This description is followed by a discussion of the structural biases that constrain the effectiveness of CEA. Emerging directions for regional planning in relation to assessing and managing cumulative effects are then discussed. This chapter provides the background to Chapter Three, where principles for integrating the assessment of cumulative effects with regional planning are presented.

An Overview of Cumulative Effects Assessment

In the early 1980s, American and Canadian government research bodies decided to give cumulative effects a much higher research profile. Mounting evidence of multiple social and environmental impacts signified to these research bodies that project-specific impact assessments were not effective in minimizing the negative incremental effects of development (CEARC and USNRC 1986). These bodies concluded other scientific and management techniques were required to address such effects. Consequently, the concept of CEA arose.

American Experience

In the U.S., research into cumulative effects began in the late 1970s with a few unsuccessful attempts to develop methods for assessing urban development impacts.[1] Currently, research into the assessment of cumulative effects is more active in the U.S. than in Canada primarily due to regulatory requirements for CEA from the Council on Environmental Quality and the U.S. Forest Service (Lane et al. 1988). The research focus for cumulative effects has switched from urbanization to analysing the impacts from large scale resource development projects. Handbooks on cumulative impact assessment have been developed for the Army Corps of Engineers, Bonneville Power Administration, and the U.S. Forest Service (Lane et al. 1988). The U.S. Fish and Wildlife Service established a cumulative impacts research program in 1984.

Canadian Experience

The Canadian experience in CEA is a combination of identifying and assessing cumulative effects and outlining strategies to manage the negative effects of development. Table 1 lists studies

undertaken in Canada which were labelled cumulative effects assessments by researchers in the field of cumulative effects assessment. With the exceptions of the cumulative socioeconomic monitoring report (Carley 1984) and the Fraser Thompson Corridor study (FEARO 1986), none of these studies were explicitly undertaken to assess cumulative effects. It is in retrospect that these studies are seen as cumulative effects assessments.

Table 1. A list of cumulative effects studies and research projects in Canada.

Cumulative Socioeconomic Monitoring: Issues and Indicators for Canada's Beaufort Region (Carley 1984)

Fraser Thompson Corridor Review (FEARO 1986)

Great Lakes Water Quality (Regier 1986)

CEA and Management in the Fraser Estuary (Dorcey 1987)

New Brunswick Forest Management (Rattie 1987)

Impact of Northern Development on Resource Harvesting (Everitt 1987)

From Peterson et al. (1987):

- The Cumulative Impact of Leaded Gasoline
- Selected Cumulative Effects in Aquatic Systems, Athabasca River Basin
- Land-use Practices, Habitat Fragmentation and Soil Changes in the Prairie Provinces
- Canada's Management of Cumulative Effects Associated with Radiation Hazards

A reference guide to cumulative effects assessment in Canada (Lane et al. 1988)

Sources: Sonntag et al. (1987), Peterson et al. (1987), Lane et al. (1988)

The last item in Table 1, the first reference guide on CEA in Canada, is unlike the other studies in the table. The guide by Lane et al. (1988) shows a heavy reliance on analytical methods such as cross-impact matrices and checklists commonly used in environmental impact assessment. The approach taken in this unpublished report is similar to the American emphasis on analytical techniques.

The majority of research into cumulative effects is currently carried out by researchers[2] and practitioners in the field of environmental assessment who in turn are largely associated with

natural resource management and the natural sciences. Research into cumulative effects in Canada follows from work on broadening the scope of environmental assessment[3] while research in the United States has a greater emphasis on improving assessment methods. The field of CEA in Canada is evolving as an offshoot of environmental assessment research and practice and is poorly integrated with planning and social science research. As noted in the introduction to the proceedings of the 1985 bi-national workshop on cumulative environmental effects, the social sciences were not well represented at that workshop (CEARC and USNRC 1986). Although the organizers acknowledged that social scientists can make valuable contributions to improving the assessment and management of cumulative effects, they have only played a minor role in CEA research in Canada.

The Canadian studies of cumulative effects have included some limited opportunities for public participation. In the case of the Athabasca River Basin, although user groups along the river first identified the progressive deterioration of water quality, management of these effects became a bureaucratic program of special regional baseline studies, long term monitoring, and government enforcement programs (Peterson et al. 1987). The cases of developing regulations for leaded gasoline (Peterson et al. 1987), the Fraser Thompson Corridor Review (FEARO 1986), and resource harvesting and northern development (Everitt 1987) included opportunities for public involvement because some aspects of the assessments were linked to existing government processes with requirements for public participation. The CEA of the Fraser River Estuary offered the greatest number of opportunities for public involvement. It is also the case which is most closely integrated with planning processes.

Geographically, nearly all cumulative effects studies assessed development outside urban-based regions. The exceptions are the Fraser River Estuary study (Dorcey 1987), which focussed on the Greater Vancouver region, and Great Lakes Water Quality (Reiger 1986) which focussed management activities in the urbanized areas adjacent to the Lakes. The case studies of radiation hazards (Peterson et al. 1987) and leaded gasoline are not geographically based. These studies are more closely related to technology assessments than environmental impact assessments.

Some Problems with the Current Approach to Cumulative Effects Assessment

The overall approach for CEA still closely follows that of environmental assessment. Much effort is directed at developing techniques for evaluating multiple impacts and complex cause/effect relationships after the major parameters of projects or a regional development approach (e.g., Northeast Coal development in B.C.) have been defined. CEA is seen as an adjunct to project planning, not the context for project planning. For example, much of the research in CEA in the United States in the early 1980s was directed at evaluating the impacts of oil shale development, rather than comparing the cumulative effects of alternate forms of energy.

In practice, the methods for CEA are much like that for environmental assessment. The methods are reductionist in approach, leading to specialization within disciplines, with little attention paid to the synthesis of information. A reductionist approach, which simplifies information in order to increase understanding, is inappropriate for understanding complex and dynamic ecological and social systems. When applied to ecological issues, this approach eventually leads to "surprises" (i.e., unintended ecological problems) because the complexity of interactions is not understood (Holling 1986). Valid predictions through impact assessment are nearly impossible to make because the way science is used (analytical instead of synthetic) gives an incomplete and simplified picture of reality.

If this approach continues to be applied to difficult environmental issues, can we expect improvements in environmental quality? Only marginally if at all. As will be argued, structural biases in the practice of environmental assessment, and now CEA, limit the effectiveness of these approaches in addressing the serious ecological issues facing society.

Structural Biases in Cumulative Effects Assessment

The overriding structural bias from which other biases follow concerns the worldview and assumptions behind the "scientific" approach of both environmental assessment and CEA. The development of the "scientific method", the acquisition of knowledge through observing reality,

experimenting, and using inductive reasoning, is based on what is referred to as the "western" worldview. Civilizations in western Europe gave rise to this viewpoint: hence the term western.

The origins and development of the western worldview, which supports the scientific approach to most problems, is the subject of many books and papers (e.g., Berman 1981, 1989; Griffin 1988; Roszak 1978) and will not be discussed here. What is important to this discussion is the characteristics of this viewpoint. It is analytic: it separates, distinguishes, and isolates (Sturm 1989). It is also reductionist (Rees 1988 and Griffin 1988) which means reality is understood by being broken down into its simplest component parts. The reductionist approach eventually leads to "surprises", unintended ecological problems, because the complexity of the interactions has not been appreciated (Holling 1986). The western worldview is materialistic, valuing only that which can be seen or "proven" (Berman 1981). And, most significantly, this worldview believes in the separation of mind from matter so people think they are different than nature, and that nature is dead (Berman 1981 and Roszak 1978).

The western approach to understanding the world has led to the creation of many beneficial technologies and advances in public health and education. The western worldview has also led to many problems because it is now considered to be the only valid form of knowledge. As a result, our perception of problems and solutions is limited to a narrow range of possibilities (Rees 1988, Roszak 1978). This is not to say that the western worldview is "bad" and other worldviews are "good". After all, it is through science that we are discovering the inadequacies of our current worldview (Griffin 1988). The point here is that when any viewpoint is applied to the exclusion of others, what is ignored or repressed by the dominant viewpoint tends to resurface elsewhere, usually in the form of a "wicked" problem (Rittel and Webber 1973, cited in Friedmann 1987) that is difficult to define and resolve within the current frame of reference.

The structural biases which affect the practice of environmental assessment and CEA can be grouped into two categories for the purposes of this discussion. They are the separation of values from material knowledge and increased specialization.

Each bias is described below in more detail with illustrations of how it impacts on the practice of environmental assessment and CEA.

Separation of Values From Material Knowledge

"Currently, science is seen as the only genuine description of knowledge with the result that the acknowledged legislators of humankind are scientists, not poets, theologians, or metaphysists" (Griffin 1988: 6). The dominance of scientific knowledge over other forms of knowledge is a relatively recent phenomena. Knowledge can also be conveyed through history (i.e., legends), religion, the visual arts, drama, and so on. The western worldview (taken to the extreme) views information from these sources as interesting but not representative of the truth because the information is value-laden. Yet, values are a critical component of any decision that is not simply technical (Vickers 1987).

The assertion that science is value-free is increasingly coming under question (Griffin 1988; Shrader-Frechette 1985). As a result, the application of an objective scientific approach to environmental assessment is seen as inappropriate. According to Shrader-Frechette (1985: 74), "It is simply not possible to have an activity which is both wholly objective ('positive') and about the real world." The reality is that decisions about people and ecological systems are based on choices involving values, they are not made on the basis of being true or false. There are no "right" answers.

Evidence of separating values from material knowledge in environmental assessment, and now CEA, is seen in the emphasis on producing facts. Public opinion, community values, indigenous beliefs, and personal stories do not carry nearly the same weight as observable scientific facts. This bias is most obvious in a cross-cultural context when one of the cultures does not have a scientific approach to knowledge. The Berger Inquiry into oil exploration in the Mackenzie Valley was one of the few assessments to accept community values as "evidence".

This bias in separating facts from values and other forms of knowledge has been problematic in the field of social impact assessment. Researchers and practitioners are beginning to recognize that the

scientific method is inappropriate for evaluating certain types of information. A well-known social scientist recently identified this problem when she stated that it might be more productive to view monitoring as a socio-political process of "collective reality testing" rather than a scientific process of data-gathering (Armour 1988).

A related problem stemming from the separation of values from material knowledge concerns the type of questions that are asked in assessments.

> For the last several decades, at least, we have intently formulated our science- and environment-related problems in terms of technological questions about purely technological solutions. . . . Not surprisingly, we have been getting technological answers, ones which respond to the questions asked, but which fail to resolve the more difficult problems which generated the original inquiry (Shrader-Frechette 1985: 106).

The "fallacy of unfinished business" is a concept from applied philosophy which refers to the assumption that technological and environmental problems have only technical but not ethical, social, or political solutions (Keniston 1974, cited in Shrader-Frechette 1985). For example, Shrader-Frechette describes a technology assessment carried out for the Ohio River basin in the 1970s, which investigated whether coal or nuclear power was the best way to meet energy demand. By defining the problem in this way the study team overlooked a relatively inexpensive and low-technology solution: conservation.

This bias towards technical problems and solutions is also evident in the choice of problems for CEA. Most Canadian examples of CEA have been a reaction to various management crises, rather than being a systematic attempt to address a wide range of issues associated with development. The role of science and technology in defining problems weighs significantly in the following examples of CEA studies: New Brunswick forest management (Rattie 1987), water quality in the Fraser River Estuary (Dorcey 1987), regulations for leaded gasoline (Peterson et al. 1987), and changing conditions in the Athabasca River basin (Peterson et al. 1987). The evaluation of land use in the Prairie Provinces (Peterson et al. 1987) comes closer to the ideal broad-based assessment. The researchers concluded that economic incentives, as well as education and extension programs, are the best way to encourage land use practices which do not degrade soil productivity and fragment habitat.

The process of assessing cumulative effects would ideally be focussed on policies and programs that have wide sweeping impacts throughout society and on the physical environment. Topics which could be evaluated include, for example, free trade and GATT (Shrybman 1990), energy conservation (Rees 1988), agricultural practices on the prairies (Peterson et al. 1987), toxic chemical production, and urban transportation policies.

The observation that environmental assessments, CEA in particular, are not well linked to policy and planning processes (Sonntag et al. 1987 and Peterson et al. 1987) could be partially attributed to this bias towards technical definitions of problems and solutions. Technical problems and solutions rely more on expert input than public or political input. Therefore planning and policy processes are not considered appropriate forums for such issues because these processes often deal with values and non-quantitative information. Another reason could be the aversion of many planners and politicians to dealing with scientific information. Whatever the reason, this issue is not easily resolved.

Increased Specialization

> . . . the scientific and technical content of modern political questions has significant implications for political communication, public control of leadership behaviour, public participation in policy formation and the public's fundamental feelings about the country's politics and government (Pierce and Lovrich 1986: 8).

The analytical, reductionist approach of the scientific method leads to greater specialization, and, as a result, the generation of increasingly technical information. Problems are left to experts to define and resolve because few other people feel they understand what is important in the face of the technical information explosion. There are two major outcomes from this bias of specialization: 1) information becomes a commodity, limiting public involvement in assessments and 2) specialization leads to problematic jurisdictional splits in institutional arrangements.

The first outcome is that scientific information is becoming a commodity traded among the political elite. As a consequence, the public is less able to monitor the outcome of policies (Pierce and Lovrich 1986). For the same reason, the public is also less able to participate in assessments.

As currently practised, environmental assessment and CEA involve a high degree of technical knowledge. As a result, the public is at a disadvantage because they are often lacking the resources and skills to acquire the scientific information necessary to counter the expertise of government and project proponents. Special interest groups, such as Greenpeace and Western Canada Wilderness Committee, that are able to enter the arena of scientific debate do not necessarily represent the range of public interests. The question of how the public can participate in these assessments, given the gap in technical knowledge, has not been adequately addressed (Healey 1988, Pierce and Lovrich 1986).

The second outcome is that the bias of specialization is also seen in the organization of institutional arrangements. The responsibility for the environment is shared among agencies with specific responsibilities for fish, lands, parks, forests, and so on, leaving the Ministry of Environment with few responsibilities (Rees 1988). With the large number of agencies involved in environmental management in certain areas, it is no wonder that management programs are difficult to organize. For example, in the Fraser River Estuary, a 1982 B.C. Ministry of Environment survey revealed 67 units of government and 120 interest groups were involved in its management (Dorcey 1986). According to Sonntag et al. (1987), jurisdictional splits have been a major impediment to conducting environmental assessments.

Building Links Between Environmental Management and Planning

As indicated in the previous discussion, structural biases in the current approach to environmental assessment and CEA constrain the effectiveness of these processes to improve or maintain environmental quality. Given the current direction of research, CEA will probably remain an administrative and scientific management process, achieving only marginal gains in addressing the serious ecological problems that face the western world. To become an open, public process for evaluating alternatives to current forms of development, CEA would have to start asking different questions. Because of its close association with environmental assessment, however, CEA is literally not in a position to ask the right questions. CEA is being developed within a limited

perspective where, like environmental assessment, it is seen as a reactive process that is tacked onto a larger planning process.

If, instead of being viewed as one of many scientific techniques, CEA was seen as a context or perspective within which planning took place, the ecological problems facing society might stand a better chance of being addressed. In this case, CEA, the technique, would disappear. What would take its place is the goal of assessing and managing cumulative effects. The process to make this goal a reality would be that of planning: defining the problem, stating goals and objectives, undertaking research, identifying alternatives, creating options, assessing the options, making a decision, then using feedback to monitor the results of the decision. The spatial scale for planning depends on the problem. Odum (1982) observed that regions are highly vulnerable to the incremental decisions which lead to cumulative effects. Because urban-centred regions are the source of many cumulative effects (e.g., urban air quality, water pollution, and conversion of agricultural lands to urban uses), this scale of region is the focus of this thesis. For another type of problem, such as acid rain, the boundaries of a "region" would be larger.

The remainder of this chapter explores the links that already exist between planning and environmental management. While planning in large urbanized areas (metropolitan planning) has only weak linkages with environmental management, it will be shown that the original intention of regional planning and the goal of assessing and managing cumulative effects are strongly connected.

Metropolitan Planning Poorly Linked with Environmental Management

Planning practices in metropolitan areas have only been marginally concerned with the negative effects of urbanization in relation to overall environmental quality. For example, the mitigation of air pollution has relied on the strategies of vehicle exhaust technologies or the introduction of cleaner burning fuels. According to Banta (1989), the experience of dealing with air pollution in Southern California has shown these measures are insufficient to reduce pollution. Strategies such as placing jobs and housing closer together and limiting parking opportunities, concerns of metropolitan planning, will also be needed.

In some cases, metropolitan planning appears to be contributing to the problem. For example, metropolitan planning has had only marginal success in encouraging green spaces in cities or in preventing urban development from sprawling into the countryside. The Strategic Planning Group of the Town & Country Planning Association (1990) observed that urban sprawl continues to be a problem that metropolitan planning has been unable to contain. How best to control urban sprawl also continues to be a major concern of growth management strategies in the United States (Brower, Godschalk, and Porter 1989).

Another issue concerns the effectiveness of expenditures by local governments to maintain the mechanical systems (especially sanitary and storm sewers) which have replaced the "free" systems found in nature. The urban development pattern repeated around the world is paved surfaces and concrete culverts in place of forests or fields and free-flowing waterways. As biophysical processes are replaced by mechanical systems to protect human health, diseconomies of scale will eventually result. Instead of being centres of economic growth, urbanized regions will become sinks for public expenditures (Overby 1985). Not only will the mechanical systems need updating and replacement, better treatment facilities will be required to process the increasing volume of wastes.

In the development of urbanized regions, people have not fully considered the effects of incremental decision-making. In Chapter One, the gradual loss of wetlands in the Greater Vancouver region was given as an example of cumulative effects. Individual decisions to eliminate wetlands were responsible for what is now recognized as a 70% loss of riparian habitat. The loss of that portion of a productive ecosystem is even more significant when viewed in the context of attempting to maintain habitat and feeding areas within the Pacific Flyway, a major migratory route for birds. This broader context for decision-making has only recently been brought to bear on individual decisions through the increasing role of special interest groups in local politics.

The Promise of Regional Planning

If current approaches to environmental assessment, CEA, and metropolitan planning are ineffective in the management of environmental quality, is there another way to begin addressing the cumulative effects of urbanization? Research concerning planning for sustainability (see for example, Town & Country Planning, volume 1, 1990) and cumulative effects assessment (Sonntag et al. 1987 and Peterson et al. 1987) point to regional planning as one of the primary tools to achieve environmental objectives.

In Britain, people are experiencing ". . . a revived recognition of the crucial role that planning can play in protecting and improving our environment" (Gould 1990: 245). Take the issue of global warming for example. To avoid the risk that this condition would entail for life as we know it on the planet, energy use must be curtailed. "There are many routes to curtailing energy use, but the appropriate development of urban form is one of the surest and most effective" (Gould 1990: 245). Gould also feels that planning will be most effective at the regional scale.

This is the point where the intent of cumulative effects assessment and the processes associated with regional planning overlap. Concern about environmental quality is the integrative force and provides a new set of boundaries within which political maneuvering can take place (Caldwell 1970, Healey 1988).

Original Intention of Regional Planning

Connecting regional planning with the goal of protecting and improving environmental quality is not a new concept. The was the original intention of regional planning's earliest proponents, Sir Patrick Geddes and Lewis Mumford.

Geddes was a professor of botany, sociology, and planning in Scotland at the turn of the century. He saw urbanization and industrialization as systemic problems which must be treated as a whole, not broken down into specialized treatments (Geddes 1915). He strongly supported conservation and had a vision of cities in which ecological and social systems were integrated at a regional level.

Geddes encouraged citizenship and a greater awareness of the benefits of town planning among the public.

Both Geddes and Mumford relied heavily on "surveys" as a precondition of planning. Knowledge of the local landscape and an awareness of cultural and social diversity were extremely important to both men. They felt that the whole civic population should be involved in studying their surroundings, but did not see the public involved in planning; the act of developing plans was to be left to the "experts", the planners. Geddes (1915) proposed that each urban region develop its own "Outlook Tower", a study centre open to the public and students. Art, geography, business, history, and biological studies, to name a few, would be combined in one centre so people could gain a greater understanding of human settlements and their personal contribution to that ongoing process.

Lewis Mumford, one of the founding members of the Regional Planning Association of America, admired the ideas of Patrick Geddes and attempted to popularize the concept of regional planning in the United States. According to Mumford (1938: 374), "Regional planning is the conscious direction and collective integration of all those activities which rest upon the use of the earth as site, as resource, as structure, as theatre." Mumford (1938) emphasized that new values be incorporated into the regional planning process because, in planning, values are applied in making choices. Planning is not simply a static exercise in grouping quantitative data.

Mumford noted that people's preference to deal with mechanical and quantitative information was a barrier to effective planning. "We have isolated mechanical factors and learned to deal with them in a fruitful systematic manner; but we have still to invent that wider system of order which will assist in the transformation of our social relations . . ." (Mumford 1938: 381). Fifty-three years later, we seem to be only marginally closer to overcoming this barrier and dealing more effectively with social and political issues.

The Potential of Regional Planning

This discussion of the ideas of Geddes and Mumford is not a call to return to the past. Their ideas have some timeless elements that are important to the way we plan for future development. The

similarity between their ideas and current thinking is described in more detail below. The difference between then and now is that the context for planning has changed: for example, we have a greater understanding of ecology and sociology; technological advances, especially computerization, have revolutionized communications processes; and there is a greater awareness of human rights, especially in relation to public participation in government decision-making processes. This evolving societal context influences the choice of planning processes and the content of policies. However, the goal of finding ways to live more harmoniously with nature and with each other remains the same.

The way for the future is not the abolition of science and the scientific approach. Science can be an extremely valuable way of understanding the world so long as it is recognized as being one of several ways of knowing. This is a major point that underlay the ideas of Geddes and Mumford and is evident in current thinking in the fields of human ecology, planning, and policy analysis.

The connections between the original intentions of regional planning and the goal of creating societies which are ecologically sustainable are described in the following points.

- Geddes and Mumford's concern about integrating sociology and ecology and blending different types of knowledge (science, history, social discourse, and so on) is echoed in the writings of Bookchin (1981), Roszak (1978), Berman (1981), and Schumacher (1974).

- Mumford's recognition of the importance of values in planning and policy making is repeated in the works of Vickers (1987), Rein and Schon (1986), Torgerson (1986), and Healey (1990a, 1988).

- The emphasis on the region as an appropriate scale for integrating ecological, economic, and social concerns, as first identified by Geddes and elaborated by Mumford, is gaining support from many fields. These fields include deep ecology (Devall and Sessions 1985), bioregionalism (Sale 1985), ecology (Rees 1988; Odum 1982), planning (TCPA Strategic Planning Group 1990; Richardson 1989), human ecology (Bookchin 1981), and environmental assessment (Sonntag et al. 1987; Peterson et al. 1987).

  Planning on a broader regional scale, as opposed to a local scale, is seen as one of the best ways

of overcoming the issue of incremental decision making that leads to cumulative effects, according to the TCPA Strategic Planning Group (1990) and Odum (1982). A regional plan can provide the context for local decision-making so that local self-interest is balanced with regional needs.

The connection between regional planning and assessing and managing cumulative effects is becoming much stronger as societal concern for environmental quality increases. The three points described above are central themes in the rationale for a regional approach to environmental management.

Chapter Summary

This chapter began with a review of the current status of research and practice into CEA in North America. Although the practice of CEA in Canada, compared to the United States, is more oriented to management than scientific assessments, research in both countries is basically an extrapolation from environmental impact assessment. It was seen that a reductionist approach to environmental assessment and CEA can lead to CEA being seen as an adjunct to development planning and unintended ecological problems that are termed "surprises".

The reductionist approach to CEA was traced back to a significant structural bias, the western worldview. This worldview, which places a high value on facts and the use of the scientific approach to understanding the world, leads to two other biases, the separation of values from material knowledge and increased specialization. Together, these biases constrain the effectiveness of CEA in addressing the serious ecological problems facing western society.

To change CEA from being a reactionary, project-oriented process into a process for addressing the cumulative effects of development, it was proposed that CEA no longer be viewed as a specialized technique. Instead, the assessment and management of cumulative effects would become a goal. The process to meet this goal would be regional planning.

The remainder of the chapter explored the linkages between the original intention of regional planning and the goal of environmental management. The similarities between the ideas of Patrick

Geddes and Lewis Mumford on the one hand, and current thinking in the fields of human ecology, planning, and policy analysis were noted. These similarities included integrating diverse forms of knowledge about the world, recognizing the importance of values in decision-making, encouraging citizenship, and planning at the regional scale.

CHAPTER THREE: ASSESSING AND MANAGING CUMULATIVE EFFECTS THROUGH REGIONAL PLANNING

The purpose of this chapter is to identify a set of principles for undertaking regional planning to assess and manage the cumulative effects of urbanization. The principles are developed from the literature on cumulative effects assessment as well as on economics, environmental management, planning for sustainable development, policy analysis, and regional planning.

The previous discussion of the current approach to CEA and the potential of regional planning to address the assessment and management of cumulative effects provided the context for selecting the following principles for regional planning. These principles were chosen with the management of an urban-based region in mind.

Principles for Regional Planning

The nine principles fall into three categories: 1) planning goals, 2) planning process, and 3) governance and institutional concerns. A summary of these principles is listed in Table 2. The next sections provide descriptions of the rationale for selecting the principles.

Planning Goals

As indicated in Chapter One, economic growth is losing its place as the central goal of regional planning. Society is beginning to embrace a wider set of goals where maintaining ecological integrity is equal to, or more important than, economic growth. Given the emergence of this ecological goal (and others such as social equity), the central focus of regional planning would ideally shift from facilitating development to managing the ecological integrity of a region. This goal would be achieved by minimizing resource and energy use through reducing consumption and minimizing waste.

Table 2. Principles to integrate the assessment and management of cumulative effects with regional planning.

Planning Goals
1) Maintain ecological integrity
2) Reduce consumption of resources and energy
3) Minimize waste
Planning Process
4) Employ a strategic planning perspective
5) Undertake comprehensive planning
6) Ensure the planning process is adaptable
7) Involve the public throughout the planning process
Governance and Institutional Concerns
8) Give regional districts the authority and fiscal capacity to implement and enforce decisions
9) Make regional districts accountable to their citizens

The concept of minimizing resource and energy throughput is contained within Daly's (1973) description of a steady-state economy, Schumacher's (1974) description of a more humanistic economy, and was recently repeated in Daly's and Cobb's (1990) suggested agenda for building sustainable societies. This concept of minimizing throughput shifts the focus of the economy from production to distribution (Daly 1973). Because wealth will become constant instead of growing steadily, people will have to learn how to share. Therefore, planning with the goal of maintaining ecological integrity is not single purpose but part of a larger vision of creating a sustainable and humane society.

Another reason for putting the goal of maintaining ecological integrity front and centre is the close relationship between the condition of the physical environment and human needs. As long as development continues to degrade the integrity of the environment, the security of people around

the world will also continue to be threatened. This connection between environmental issues and global security is explored in the work of the Brundtland Commission (WCED 1987) and the Toronto Conference on the Changing Climate (Environment Canada 1988). Basically, the reports of these groups said that current forms of development disregard the maintenance of ecological integrity and are leading to economic and social problems. These reports further indicated that these social and economic problems will continue well into the future. The attempt to create permanent settlements in Ethiopia (replacing nomadic lifestyles) and the conflict in the Middle East over control of the oil fields are two current examples.

The three principles which concern the goals of planning are presented below in more detail.

1) Maintain Ecological Integrity

Maintaining the ecological integrity of a region means maintaining essential ecological processes and life support systems, preserving genetic diversity, and ensuring the sustainable utilization of species and ecosystems, all goals of the World Conservation Strategy (IUCN 1980).

The means of implementing this principle are not clearly established at this time. Various concepts have been put forward, for example: applying the concept of carrying capacity, determining appropriate land uses through first defining environmentally sensitive areas, applying integrated resource management strategies, and minimizing resource use.

The carrying capacity approach to managing the ecological integrity of a region was rejected for present purposes for several reasons. Carrying capacity, with reference to human populations, is defined as ". . . the maximum rate of resource consumption and waste discharge that can be sustained indefinitely in a defined planning region without progressively impairing biological productivity and ecological integrity" (Rees 1988: 285). While it is a useful concept to get people thinking about ecological limits to development, in practice carrying capacity would be difficult to define and monitor and may result in some unexpected results.

Through international and national trade, urban areas are using the carrying capacity from other regions. Rees (1988) has suggested using regional trade accounts to track these exchanges. While

this approach would provide a useful education function, in practice, such accounts may be used as a confusing numbers game, rather than as a source of valuable information about rates of resource consumption.

People may use the concept in the same way as maximum sustained yield is used in fisheries. Managing populations to the maximum that can be sustained can result in unexpected collapses in populations that are key to the functioning of an ecosystem (Holling 1978). This form of management can increase the risk of surprises, creating even more management problems.

Another problem with this approach is that it gives the appearance of being based on scientifically defensible information. Unfortunately, not enough is known about most ecosystems to define what rate of pollution discharge can be "sustained indefinitely". Because the definition of "maximum rate" is subject to individual bias, scientific consensus on the definition would be difficult to obtain.

For these reasons, the goal of minimizing resource and energy throughput by reducing consumption and minimizing waste is suggested as a more realistic means to maintain ecological integrity until more is known about carrying capacity. Reducing consumption and minimizing waste is critical in reorienting the current focus of development from resource consumption to resource stewardship. Daly (1973: 20) describes this reorientation in terms of an analogy with ecosystems.

> If we conceive of the human economy as an ecosystem moving from an earlier to a later stage of succession (from the "cowboy economy" to the "spaceman economy" as Boulding puts it), then we would expect, by analogy, that production, growth, and quantity would be replaced by protective maintenance, stability, and quality, respectively, as the major social goals.

Minimizing resource throughput means keeping renewable resource consumption within limits defined by the interest, or annual production, and not touching the capital, or standing stock, of resources (Rees 1990). Non-renewable resources, such as petroleum and minerals as well as soil building and atmospheric maintenance (Rees 1990), must be used in a way to maintain stocks for future generations. With this approach to resource exploitation, efficiency of use becomes a primary consideration. To move the discussion beyond merely efficiency of use, the principles of

reducing consumption and minimizing waste are suggested as the means to achieve lower rates of throughput and reduce the absolute volume of resources actually used.

2) Reduce Consumption of Resources and Energy

This goal is not immediately attainable. Given the history of development in the western world, and the focus of our economy, reducing consumption appears to go against the basic principles of our society. Looking deeper, not reducing consumption goes against basic ecological principles. The human population continues to grow but the planet has finite limits. The combined area of croplands, forests, and grasslands is decreasing while wastelands (i.e., deserts) and areas covered by human settlements are increasing (Brown 1990). Not only is the area of productive lands decreasing, productivity itself is decreasing. After rising steadily since 1950, world grain production per capita decreased during the period 1984 to 1989 (Brown 1990). Although this is too short a time period to be called a trend, it brings home the realization that the world's human population is probably living close to some unknown limits.

This example of decreasing agricultural productivity is useful to convey the concept of limits, but it is not useful for defining where efforts need to be made in terms of reducing consumption. The critical areas for regional planning in Canada concern energy and land use.

- Canadians are among the world's highest per capita users of energy. The United States and Canada, together in 1988, with a population of 270 million, consumed twenty-one percent more energy than all the other twenty-two OECD (Organization for Economic Cooperation and Development) countries, with a population of 526 million (The Global Tomorrow Coalition 1990). About 85% of the energy used in Canada and the U.S. is derived from fossil fuels (oil, coal, and natural gas).

High rates of fossil fuel combustion around the world are very likely "enhancing" the greenhouse effect. As a result, researchers are predicting significant climate change around the world within the next 35 to 100 years (Harvey 1990, Schneider 1989, Hare 1990). In British Columbia this could mean coastal erosion and flooding as a result of rising sea levels, greater fluctuations in annual

precipitation levels, and a higher incidence of extreme conditions (e.g., days in Vancouver with a maximum temperature exceeding 20°C) (Hengeveld 1988).

In Canada, transportation and industry each account for 25% of fossil fuel use (Pender 1990). Reducing consumption in each of these areas has implications for urban development. Most major Canadian cities are already attempting to address transportation issues through building rapid transit systems and encouraging greater ridership on bus transit. In smaller centres where population is more dispersed and transit services are unavailable, reducing fossil fuel consumption becomes more problematic. The technology to increase the efficiency of fossil fuel combustion in industrial settings already exists in many cases but the Canadian federal government is reluctant to set standards for efficiency. Last year at Globe '90, an international conference on business opportunities and the state of the world's environment, Federal Energy Minister Jake Epp was quoted as saying that Canadians are not ready to make the "hard choices" needed to reduce the threat of climate change (Munro 1990: D4).

- In Canada, "Between 1976 and 1981, nearly 100,000 hectares of rural land were converted to urban uses. Fully half this land was farmland of the highest quality" (Environment Canada 1986: 14). And nearly 90% of the highest quality farmland is located within 160 kilometers of major urban areas in Canada (Environment Canada 1986).

While the quality and quantity of agricultural lands in Canada is being reduced primarily through conversion to urban land uses, the population continues to grow. Canada imports much of its fresh produce from California, Mexico, and Florida, areas where agricultural lands are also under the threat of development and are becoming increasingly vulnerable to extreme weather conditions. For example, much of California is experiencing a drought which has now lasted five years. As a result, many orchards are being taken out of production due to lack of irrigation water. Fruit is still appearing in the stores, but each year there is a greater risk that other areas will not be able to provide a surplus. By not protecting agricultural lands more aggressively, Canada is running the risk of losing the ability to feed her people.

In terms of regional planning in urban-centred regions, reducing consumption means encouraging development with less energy demand than we have at present and reducing the demand for land to be converted to urban uses.

3) Minimize Waste

Waste goes by different names depending on where it is found: garbage, sewage, effluents, emissions, pollution, and so on. Regardless of the names given to it, the presence of waste means that the cycle of resource use, which is inherent in natural systems, is broken.

Many cumulative effects issues can be attributed to some form of pollution. As part of their research about cumulative effects assessment in Canada, Peterson et al. (1987) identified the most significant cumulative effects issues facing Canadians. Seven of the thirteen issues are related to pollution:

- long range transport of air pollutants
- urban air quality and airshed saturation
- cumulative effects associated with climatic modifications
- mobilization of persistent or bio-accumulated substances
- effects of use of agricultural, silvicultural, and horticultural chemicals
- long-term containment and disposal of toxic wastes
- increased sediment, chemical, and thermal loading of freshwater and marine habitats.

This is a formidable list of issues to deal with in the future. No medium is left untouched by pollution. Air, land, and water are all being adversely affected.

The concept of zero pollution is being promoted as one means of reducing pollution. It is the approach currently being proposed to reduce pollution in the Great Lakes. Over the long term, eliminating the chemicals and processes that cause pollution in the first place will be more effective and efficient for society than trying to control pollution after it is produced. Zero pollution is more costly to industry and government in the short term, however, because of the need

to redesign most industrial processes and the basic form of cities. Some processes are not amenable to this solution, however. Either the process would have to be eliminated or people would have to accept a certain level of pollution.

The concept of zero pollution is gaining favour in the United States. Nearly ten states have legislation to reduce the use of toxic chemicals in industry, a first step towards a strategy of zero pollution. In Canada, this approach is still in the preliminary stages with the federal government and the provinces of Ontario and Quebec (Hossie 1990). Regional authorities have potential to be involved in this approach in terms of setting specific requirements, based on provincial standards, for industries that operate within their boundaries.

Solid waste disposal did not make the list of issues by Peterson et al. (1987) but where to put the growing volume of solid waste is an issue high on the agendas of most urban areas in Canada. One way of overcoming the solid waste problem is the three R's: reduce, reuse, recycle. Unfortunately, much more emphasis has been placed on recycle than reduce. Reducing the total amount of waste means less consumption (supporting the above principle) and more efficient production processes, resulting in fewer environmental impacts. Because regional governments are usually responsible for waste disposal, they are in an excellent position to implement this aspect of the principle.

Planning Practice

The means through which any type of planning becomes reality is by developing policies which translate planning concepts into action. Since the 1940s, the dominant form of policy-making processes in Canada and the United States has been experts using a rational, synoptic policy model to define and analyse options, with politicians making decisions. This approach is based on the premise of central control and comprehensive analysis of all relevant information. The validity of this model of policy formation and planning began to be questioned in the late 1950s by Lindblom (1959) and later by people such as Etzioni (1968).

Torgerson (1986) has described the evolution of policy analysis in terms of three faces. His analysis can also be applied to the form of planning processes; analysis and planning in this context are

inseparable. According to Torgerson, the first face of policy analysis is the rational model that was rejected by Lindblom and Etzioni. The planning processes which accompanied this model were technical, undertaken by experts who were supposedly neutral and removed from the political process. The second face is the realization that policy analysis is not neutral but deeply connected to political processes. The planning processes associated with this face are much more concerned with how policy questions are addressed than with the content of policy. This type of policy analysis is often associated with advocacy planning between professionals or experts, removed from the publics which they represent, as described by Weiss (1977, as cited in Friedmann 1987). Torgerson (1986: 38) criticizes this approach for pretending to be objective while continuing to reinforce "the order and ideology of the established political world." The third face, which Torgerson feels is just emerging, begins with the realization "that the theory and practice of policy analysis are rooted in inherently political choices" (Torgerson 1986: 45). He means that the policy analyst can no longer attempt to be independent of politics. In terms of planning practice, this third face leads to greater public participation in decision-making, which involves the policy analyst in the political context of the citizens. Torgerson uses the example of the public hearings during the Berger Inquiry into oil and gas exploration in the Mackenzie Valley as an example of this third face of policy analysis in practice.

If this third face is the emerging model for policy analysis and planning practice, then what planners do will have to change. Reid (1989) feels that planners will work in a manner similar to an orchestra conductor, bringing various interest groups together in a cooperative manner to achieve particular goals, but the planners will not participate directly in the implementation as they have in the past. Hodge (1986) indicates that instead of relying on a quantitative approach to planning, planners will also have to be familiar with facilitation and negotiation skills, helping diverse groups of people reach common goals. Healey (1990b) sees planners of the future helping the public to visualize what kind of future they want to create and sustain. Planners would also have multiple roles in mediating between different interests, evaluating the consequences of alternatives, and making people aware of constraints and opportunities (Healey 1990b).

Many aspects of this new approach to planning processes are applicable to the assessment of cumulative effects at the regional level. The most relevant aspects are described below as principles of regional planning practice.

4) Employ a Strategic Planning Perspective

Strategic planning is becoming more commonplace in government bureaucracies. People are realizing that the sum of local decisions does not necessarily produce satisfactory regional development strategies. "The 'hidden hand' of individual public or private decisions rarely produces results that are collectively desirable" (TCPA Strategic Planning Group 1990: 240). Some means of blending local desires with collective regional needs is required.

In addition, as more aspects of society come under the influence of government actions, decisions have greater consequences. Governing on the basis of simple cause-effect (problem-solution) policies is no longer desirable. Issues are much more complex and require a different management approach that is more interactive and dynamic.

Strategic planning addresses these concerns in several ways. Strategic planning provides a vision or sense of direction to guide actions towards a desired result (TCPA Strategic Planning Group 1990). It is proactive, actively pursuing goals over the long term, instead of being reactionary and short term in perspective (Gardner 1988). Strategic planning also provides a context for local decision making, allowing a combination of 'top-down' and 'bottom-up' planning (TCPA Strategic Planning Group 1990). Another key feature of strategic planning, being comprehensive in scope, is explained next in more detail.

5) Undertake Comprehensive Planning

Comprehensive planning refers to the integration and coordination of general policy and actions regarding development in an urban-based area. It is holistic in focus rather than being specific to a site, project, or issue, providing general principles to guide decision making (Richardson 1989). This principle of planning practice is especially relevant to the management of cumulative effects

because of its emphasis on the integration of information. Comprehensive planning is closely linked with a systems approach to planning (Sonntag et al. 1987).

To switch to a systems approach means working with change rather than managing stability. In the past, planning has often been used as a means of maintaining stability: eliminating the high and low points in economic cycles, "preserving wilderness", or maintaining single family neighbourhoods in a rapidly growing urban area. This is a static version of reality. A systems approach is dynamic and entails working with natural forces.

This form of comprehensive planning is not to be mistaken for the rational, comprehensive approach of the 1940s and 50s. In terms of assessing cumulative effects, being comprehensive means taking a holistic perspective in defining the problem but concentrating on the most significant connections in the analysis. According to the popular version of ecological principles, everything is connected to everything else, but not all connections are equally important (Holling 1978). Therefore, planners can take a strategic approach to identifying and working with key linkages between and within systems and the spatial and temporal context of decision-making (Gardner 1988).

Holling and Goldberg (1971) feel the most important conclusion planners can draw from ecological systems is to minimize risks in development rather than planning for "success". Minimizing risk means developers would be asked to ensure that unexpected and disastrous consequences be minimized in their projects. This approach to development would encourage greater flexibility and more decentralized decision making, supporting the principles of being adaptable .

6) Ensure the Planning Process is Adaptable

Having an adaptive planning approach means several things.[4] In the context of assessing cumulative effects at the regional level, two aspects of being adaptable are particularly relevant. One is that environmental assessment is integrated with the design of projects and policies at the beginning of the planning process (Holling 1978). All too often environmental assessments are undertaken after the major components of a project have been decided (Shrader-Frechette 1985).

Two, monitoring and feedback mechanisms are used to learn from management and research activities to determine the degree to which objectives are being achieved. Monitoring can also be used in a less precise way to detect unanticipated changes in systems or gain an early indication of activities that might affect a long range plan (Sutton 1979).

Through taking an adaptive approach, planners (and therefore regional government) would be better able to deal with uncertainty and surprises. This approach is flexible and experimental in terms of management. Being adaptable means a greater variety of management approaches are encouraged, resulting in greater variability and therefore more resilience in times of stress. For example, sewage in a region could be treated in smaller plants, through a variety of methods. When one plant breaks down, then the whole region is not affected. In addition, the effectiveness and operating costs of the various methods could be evaluated. Another example is to use different approaches to collecting and treating compost materials within a region. One municipality could use a centralized collection and composting facility while another municipality or area could experiment with neighbourhood facilities connected to community gardens.

7) Involve the Public Throughout the Planning Process

Closely related to the concept of adaptability is the concept of social learning. Rees (1988: 283) noted that the environmental assessment process, to be compatible with the social changes required by sustainable development, ". . . should incorporate social learning and be structured for continuous managerial and political adaptation to unexpected environmental change." The concept of social learning has diverse philosophical antecedents and is difficult to attribute to particular authors.[5] Social learning is different from problem solving in that it examines the dissonance between an organization, or an individual, and its environment. This leads to a reexamination of reality and values, and to their eventual reformulation and consequently, new action (Friedmann 1987, Vickers 1987).

In more concrete terms, social learning goes beyond sending information to people. It aims to actively involve people in problem solving because to effect change, people need to be personally

involved in learning why they should change and how they can change. Otherwise, the environmental crisis is just another abstract issue like the future of the Canadian constitution. In North America, most people are only marginally aware of environmental degradation because it has occurred through gradual change or can only be detected through scientific measurement (e.g., dioxins in breast milk). To minimize the cumulative effects of development, more people will need to become aware about the incremental contribution of human activities to environmental degradation. Then people may be more motivated to change their behaviour to minimize cumulative effects.

Moving in the direction of creating a sustainable society where cumulative effects are minimized requires substantial changes in values. If planning and policy development are limited to the involvement of a small number of professional disciplines and politicians, the opportunities for the expression of alternative values is minimal. Opening up planning processes to public participation will help bring diverse values to bear in the resolution of issues (Healey 1988, Vickers 1987, Rein and Schon 1986).

Social learning can be incorporated into the design of planning processes and policies. The Berger Inquiry into oil and gas exploration in the Arctic is an example of a large-scale social learning process. The involvement of aboriginal peoples in public hearings helped to promote the ability of residents to effectively participate in decision making (Torgerson 1986). Social learning, albeit for a small group of political elites, is also occurring in Canada through the establishment of federal, provincial, and regional round tables on the environment and economy. Members of the round tables have an opportunity to enter into dialogue with people from a diverse range of backgrounds. By interacting with people who have different points of view, the members' context for decision-making is altered, hopefully to encompass a wider range of values.

This principle of involving the public throughout the planning process means the public and interest groups are involved from the beginning, starting with problem identification through identifying options for action to the evaluation of options and implementation. Opportunities for

public participation also exist in monitoring through state of environment reporting[6] or social monitoring, using community focus groups as a form of "collective reality testing"[7].

Public participation gives people an opportunity to buy into a planning process. Decisions from such processes are often easier to implement, with less resistance to decisions, because the affected people had opportunities to be involved in the decision-making process (Healey 1988). Another benefit of public participation is that relevant information is easier to uncover and people are able to discover critical linkages between issues.

Governance and Institutional Concerns

Our current system of local government in Canada was devised before the advent of the automobile, mass communication technologies, and the nearly ubiquitous distribution of electricity and fossil fuels. Recently, these modern technologies, along with global economic pressures, have enabled the process of urbanization to proceed independently of jurisdictional boundaries. Consequently, most urbanized regions in Canada encompass several local jurisdictions.

The need to find appropriate forms of government to manage the process of urbanization, which does not respect jurisdictional boundaries, is becoming more urgent as the awareness of environmental degradation grows. Currently, municipalities and cities have limited powers to manage the process of urbanization and assess the cumulative effects of development. New by-laws and acts have updated some functions of local governments but the basic concepts remain: decision-making through representative democracy, with administrative powers, including taxation, being delegated by senior governments.

The inability of local governance systems to deal with environmental issues is illustrated by the case of a recent land-use controversy concerning the proposed conversion of agricultural lands to a residential development and golf course. The proposed site is located in the municipality of Delta, south of Vancouver. The land, known as the Spetifore Farm, is also adjacent to Boundary Bay, the only unprotected habitat in the Pacific Flyway (a major bird migratory route).

Extensive public hearings were held by Delta's municipal Council in 1989 regarding the proposed rezoning to a residential designation. Most people who spoke at the hearings were opposed to the proposal. The apparent lack of concern about the environmental implications of development shown by the council and mayor during the hearings motivated a group of citizens to hold their own referendum on the proposal. The turnout for this referendum was larger than the turnout for the previous municipal election. The development proposal was soundly defeated by the residents of Delta (80% against the proposal) and Council eventually rejected the proposal at the third reading of the rezoning (Partington 1990).

Delta Council apparently did not learn from that experience and one year later approved a golf course in an area with even more controversial wildlife habitat values. That decision was successfully contested in court by a group of citizens. In the civic elections held in November 1990, the mayor and majority of Council were defeated, and a new "green" Council and mayor were voted in.

In some urbanized regions, such as Toronto and Winnipeg, regional governments, which cover most of the metropolis, have been set up. The regional district which encompasses Greater Vancouver is part of a province-wide system for the regional coordination of services. These regional governance systems have met with varying degrees of success in managing urban development. They are still wrestling with finding the appropriate means to manage environmental impacts.

The test of being effective is not solely in the development of policy papers and plans, but also in government's ability to implement decisions (TCPA Strategic Planning Group 1990). Many well-intended policies have fallen by the wayside, lacking political support for implementation in the way of operational funding or willingness to support enforcement activities. The principles for governance at the regional level concern two conditions which support the implementation of policy decisions: clear lines of authority as well as the fiscal capacity to implement decisions and having decision-makers accountable to their citizens.

8) Give Regional Districts the Authority and Fiscal Capacity to Implement Decisions

Management of cumulative effects must occur at a level appropriate to the scale of the issue. Some of the most pressing issues, such as the atmospheric impacts of automobiles, cannot be dealt with solely at the local level because the sources of the effects and the effects themselves both move across jurisdictions. The provincial scale is also inappropriate for many issues because environmental effects are localized in ecosystems or geographical regions. Most cumulative effects issues are best addressed at the regional level.

It is not enough to simply draw up regional plans. The move to developing sustainability in our society will require more prescriptive and interventionist policies by government than we have at present (Hall 1990) because the changes required in our economy and to the form of our cities will be substantial. To be truly effective, there must be an administrative mechanism for implementing regional plans (Hall 1990). The regional authority need not be authoritarian. Indeed, as indicated by the previous principle, public participation must be integrated into planning and decision-making processes. Yet, where regional goals take precedence over local goals, the regional authority must have authority to implement plans at the local level.

The relative success of the South Coast Air Quality Management District (SCAQMD) in addressing air pollution in the Los Angeles region can be attributed to SCAQMD's extensive regulatory authority (Berg 1990). The lack of success in coordinating transportation in the Greater Vancouver region can be partly attributed to the absence of clearly defined regional authority for transportation planning. It is only in the last two years that the province has been willing to work together with the Greater Vancouver Regional District in defining needs and priorities.

Fiscal capacity also involves political will. Appropriate legislation and programs to manage environmental quality sometimes exist in name only because sufficient resources to run the program have not been allocated. Programs which require enforcement, such as pollution control, often suffer from this condition. Enforcement is not as politically visible or desirable as capital projects.

Therefore, bureaucrats and concerned members of the public face an uphill battle in educating politicians about the value of enforcement in maintaining environmental quality.

In British Columbia, regional districts currently obtain their operating funds indirectly from property taxes. Because local governments, who collect the taxes, generate a higher income from land that is "developed" rather than left in a natural state, there is a bias towards development. In terms of resources for planning, more urbanized areas will have greater resources, thereby introducing an urban bias into regional planning. This system of funding is a barrier to protecting agricultural lands and natural habitats. Alternative forms of funding regional districts will probably need to be found.

The policy or program options put forth by planners, and decisions made by politicians, must include consideration of the long term fiscal implications of decisions. Ideally, these considerations would include an assessment of all major costs for the region.

9) Make Regional District Boards Accountable to Their Citizens

Regional planning is undertaken within an administrative framework to which it reports. The administrative framework is in turn responsible to a political body. In British Columbia that political body is the Board of Directors, who are in the most part, appointed from municipal councils, and accountable to their councils. Because regional planning can affect many people's lives directly, the regional governing body would ideally be accountable to the people who are affected by its decisions.

Accountability can take many forms. It does not necessarily mean direct election of the Board of Directors. What it does imply is openness and accessibility. A basic condition is to have freedom of information, especially concerning access to decisions. Publicizing the decisions from Board meetings and televising Board meetings are two other ways that a Board can immediately be made more accountable. Annual reports of sub-committees which describe how goals were met or, if not met, what was done instead, would also contribute to a greater sense of responsibility for carrying actions through.

In describing the response of the British planning system to managing the urban environment, Healey (1988) proposes that the best policies are developed when public agencies are required to justify their decisions.

> Expectations of challenge fosters clear reasoning of policies, a justifiable relation between policy and action, encourages coordination with agencies with related interests, and subjects politicians, administrators and professionals to critical public scrutiny while allowing them to exercise their particular judgmental roles (Healey 1988: 415).

This approach would be in keeping with principle 7, involving the public throughout the planning process.

A Comparison of Approaches to Regional Planning

The foregoing description of principles for regional planning is quite different than current regional planning practice in metropolitan areas. To summarize these differences, a comparison of existing conditions versus proposed conditions is given in Table 3. In terms of the overall doctrine or paradigm within which regional planning takes place, sustainable development would replace economic development (Hall 1990, Richardson 1989). As explained above in the description of planning goals, planning for sustainability compliments the shift in society to embrace a wider set of development goals.

Regions are currently defined by administrative boundaries which ignore ecological, cultural, and economic processes. The definition of region would evolve through practice as ecological and cultural "boundaries" are incorporated into management processes (Alexander 1990). The particular focus of regional planning would also be unique to each region, depending on its needs (Richardson 1989).

The current emphasis on extending urban planning practice and economic analysis to a region would be replaced by Mumford's original concept of regional planning where urban and natural resource planning are integrated (Sussman 1976). The proposed condition is labeled strategic regional planning to indicate that it is concerned with integrating planning and understanding over a range

of important issues and considering solutions over long time horizons (TCPA Strategic Planning Group 1990).

Finally, planning practice would no longer be limited to technocrats with their limited technical or economic agendas and supposed "objective" analysis. Instead, regional planning would be opened up to be responsive and accessible to the public (Torgerson 1986). In this way, a broad range of values, which are necessary to consider in the transition to developing sustainability, can be identified and discussed. Such discussion can lead to the creation of a greater number of options for development.

Table 3.
A comparison of existing and proposed conditions for regional planning.

	Existing Conditions	Proposed Conditions
development paradigm	economic development	sustainable development
definition of region	administrative	ecological and cultural
mode of planning	regional analysis & urban planning	strategic regional planning
mode of policy analysis	technocratic	participatory

CHAPTER FOUR: GREATER VANCOUVER AS A CASE STUDY OF REGIONAL PLANNING

This chapter begins with a brief description of the physical attributes of Greater Vancouver, including a summary of the major cumulative effects issues and an overview of the institutional arrangements concerning the regional district. Then the history of regional planning efforts is described in terms of the authority for planning, major planning efforts, and efforts to manage the cumulative effects of urbanization. These activities are evaluated in Chapter Five.

The Study Area

The Lower Mainland, the largest urbanized area in British Columbia, is overlaid by the jurisdictions of four regional districts and many municipalities and includes some unorganized territory. This case study focuses primarily on the planning activities of the Greater Vancouver Regional District (GVRD), as indicated in Figure 1, but also takes into account the planning activities of the Lower Mainland. Hereafter, the term Greater Vancouver refers to the regional district and not the larger area.

Close to half the population of British Columbia lives in the GVRD which is comprised of 18 municipalities and three electoral areas. Some of the key features of this area are described in Table 4.

The physical extent of urban development in Greater Vancouver is limited on three sides by natural features: north, by the Coast Mountains; west, by Georgia Strait; and, east, by the rich agricultural lands of the Fraser Valley. The fourth boundary, to the south, is political--the international border with the United States.

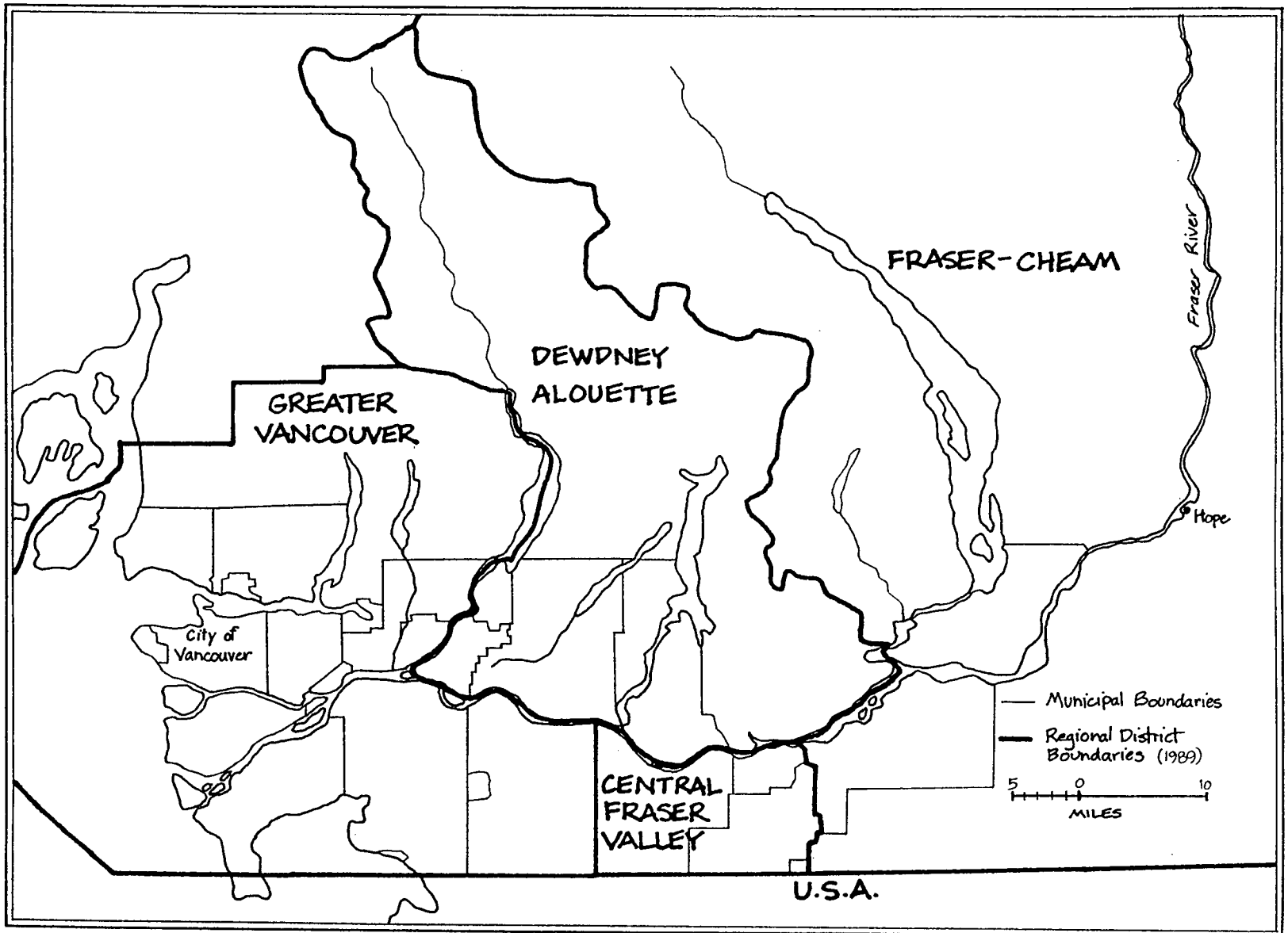

Figure 1. Boundaries of the Greater Vancouver Regional District in relation to other regional districts in the Lower Mainland.

Table 4. Descriptive Statistics of Greater Vancouver*

Total land area (hectares)	278,626	
Total area in municipal jurisdictions	231,054	(83)%
Land in the Agricultural Land Reserve	78,925	(28)%
Streets, roads, and alleys	21,467	(7)%
Population (1989 estimate)	1,493,963	
Labour force (September 1989)	824,000	
Average household income (1985 $)	36,167	
Registered motor vehicles (January 1989)	854,025	

* Includes the municipalities of Maple Ridge and Pitt Meadows, which may become full members in the near future.

Source: Greater Vancouver Regional District Development Services (1989: 4).

Cumulative Effects of Urbanization

Greater Vancouver is world renowned for the physical beauty of its location and significant wildlife habitat. The wetlands of Boundary Bay to the south support the highest density of wintering waterfowls, shorebirds, and raptors in Canada (Kennett and McPhee 1988). Millions of salmon pass through the Fraser estuary each year on the way to their spawning grounds in the interior of British Columbia.

As in any urban area around the world, the development of Greater Vancouver has given rise to environmental impacts: loss of agricultural land, loss of natural habitat, air pollution, and water pollution. These are the primary cumulative effects issues in this region and are described next in more detail.

The B.C. Agricultural Land Commission reports that although the amount of land within the Agricultural Land Reserve has remained nearly the same since 1972, between 1974 and 1987 the net loss of high class (1-3) land was 6000 ha, primarily in the southern and central regions.[8]

The Fraser Estuary, a significant habitat for juvenile salmon, migratory birds, wintering waterfowl, and a diverse variety of mammals and insects has suffered significant losses of

wetlands. By 1974, 71% of the saltmarsh, 29% of the tidal freshwater marsh and 99% of flooded habitat were lost to various developments (Kennett and McPhee 1988).

Vehicle emissions, a significant component of air pollution, are contributing to the problem of excessive ozone concentrations and deteriorating urban air quality. For example, the 1986 Canadian State of Environment report stated that one of the highest national concentrations of ground level ozone is found in south-western B.C. Ozone is harmful to the human respiratory system and also retards plant photosynthesis, reducing agricultural productivity. In the GVRD, mobile sources (passenger and commercial vehicles, trains, buses, vessels, and airplanes) account for 98% of the carbon monoxide, 82% of the particulate matter, and 78% of the nitrous oxides detected in the region. (Concord Scientific Corp. and B.H. Levelton and Assoc. 1989).

Another significant indirect effect of urbanization is the impact of development on water quality, primarily from sewage and non-point sources. The B.C. Ministry of Environment reported in 1986 that since 1970, water quality had decreased in the lower Fraser, Serpentine, and Nickomekl watersheds.

These effects are cumulative in that each impact is somewhat insignificant but when compounded over time, and concentrated within a geographic region, becomes very significant. Impacts in urban areas are not only aggregate, they are also synergistic. For example, water pollution and loss of nesting habitat to development have both contributed to a decline in the heron population in an area south of Vancouver.

Cumulative effects are difficult to manage, as evidenced by the continuation of these issues despite a number of management initiatives over the years. Recently, there has been a renewed interest in dealing with these environmental issues in the context of creating a "livable region". Before taking a historical look at the regional response to these issues, the regional governance system will be explained.

Institutional Framework for Regional Government

Regional districts were established throughout B.C. in 1965 by amendments to the Municipal Act. Regional districts are partnerships of municipalities and electoral areas (unorganized territories) incorporated through letters patent. The purpose of regional districts is to provide and coordinate services in urban and rural areas. The services provided are dependent upon the needs of the members. Typical services are sewage and water supply.

Regional districts are governed by a Board of Directors who are appointed from municipal councils or directly elected in electoral areas. The appointments are for one year terms; elected positions are three year terms. Each director has one vote for every 20,000 population. Because no one director can hold more than five votes, areas with large populations appoint more than one director. Each year, the Board elects a chairperson and deputy and appoints standing committees. In 1990 there were 26 Directors and seven committees.[9] Every regional district has an administrative staff to carry out specific functions; the GVRD has a combined staff of about 625 employees.

The GVRD organization currently comprises five corporate entities, each with different responsibilities. The Greater Vancouver Regional District provides services for air pollution, regional parks, labour relations, development services, general regional government, and services to unincorporated areas. Additional entities are the Greater Vancouver Sewage and Drainage District, the Greater Vancouver Water District, the Greater Vancouver Regional Hospital District, and the Greater Vancouver Housing Corporation.

Funding for regional district activities is obtained indirectly through property taxes, which members pay according to the services provided and their population size. User fees for items such as water are also assessed. The province and federal governments contribute funds for long term financing of major projects such as the construction of hospitals, sewage treatment facilities, and social housing. Regional planning activities, now called development services, are partially financed by the provincial government through grants based on the converted value of land and improvements. Urbanized areas therefore receive more money than rural areas.

Regional Governance and Planning in Greater Vancouver

The following review of regional governance in Greater Vancouver will concentrate on two areas. These areas are the evolution of authority for regional planning over the past 50 years and major regional planning efforts. Efforts to manage the cumulative effects from urbanization are described in the next major section.

Major planning activities that have taken place in Greater Vancouver are arranged chronologically in Figure 2. Provincial actions regarding authority for regional planning are listed in column 1. The planning activities for the Lower Mainland and the GVRD are listed in columns 2 and 3, respectively.

Evolution of Authority for Regional Planning

Support for regional planning in the Lower Mainland began to grow in the early 1940s. The primary motivation was the perceived need to manage urban sprawl. After the war, and a major flood in the Fraser Valley, the Lower Mainland Regional Planning Board (LMRPB) was formerly established by the Provincial government. This agency, consisting of various municipal representatives, who elected their own executive and hired planning staff, was responsible for preparing a plan for the physical development of the region. At that time the region extended as far east as Hope and included agricultural lands in the Fraser Valley.

The LMRPB worked on a volunteer basis with the member municipalities. This arrangement was in keeping with the desires of municipalities to remain autonomous from the Province. After producing several reports on planning issues in the region, the LMRPB produced an Official Regional Plan (ORP), consisting of land use maps and schedules, which was adopted by the municipalities in 1966. Municipalities had to appeal directly to the LMRPB to amend land use designations.

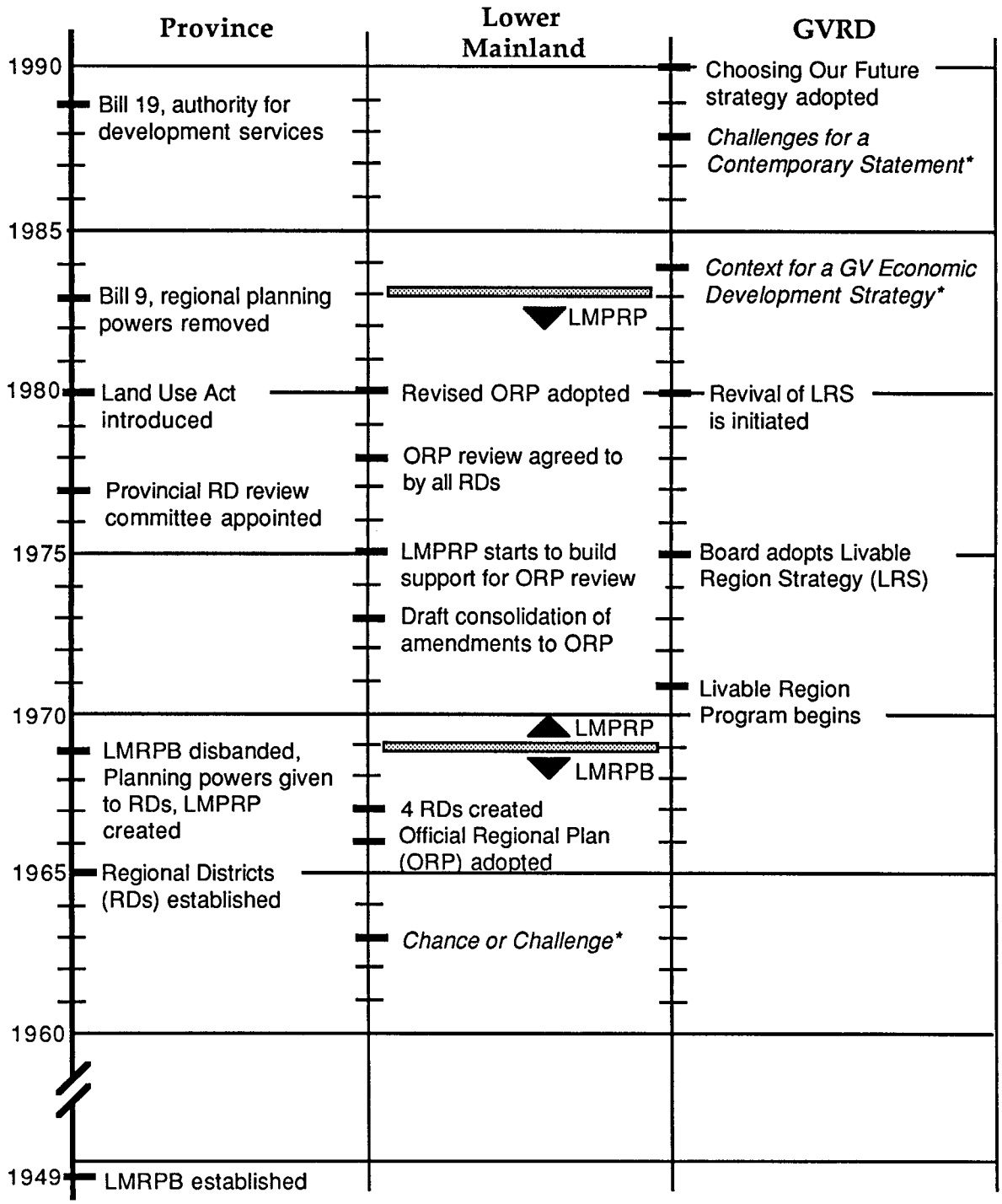

Figure 2. Major planning activities of the provincial government, Lower Mainland, and Greater Vancouver Regional District.

Meanwhile, the Province passed legislation in 1965 that put a province-wide system of regional districts into place. The Lower Mainland was divided into four regional districts, which were formerly incorporated in 1967: Greater Vancouver, Dewdney Alouette, Central Fraser Valley, and Fraser Cheam.[10] To address the resistance from municipalities about having another level of government, the regional districts were not given powers of taxation (Pawsey 1987).

The new regional districts did not receive authority for planning functions until the LMRPB was disbanded by the Province in 1969. Two possible reasons for this action are described by South (1983/5). One is that the municipal representatives on the Board tended to be from a different political party than the governing party in the Province. Second is that the staff of the LMRPB opposed a coal port on Roberts Bank, proposed by B.C. Rail, a Crown Corporation. The Province took offence to the unofficial protest reports written by staff and consequently disbanded the LMRPB, early in 1969, giving the planning powers to the regional districts.

To oversee amendments to the regional plan, a new agency was established by the Province six months after the demise of the LMRPB. This new agency was the Lower Mainland Planning Review Panel (LMPRP). It also consisted of appointed members, this time from the Regional District Boards (now two steps away from being elected by the public). Because the agency's mandate was to review amendments and advise Regional Districts, it had limited authority to implement planning procedures, as demonstrated by Regional Districts overruling LMPRP decisions (Pawsey 1987).

By 1973, due to the large number of significant amendments to the ORP, the LMPRP asked the Province for greater authority for regional planning. This request was refused by the Minister of Municipal Affairs, but he did agree in 1974 to an official update of the 1966 ORP. It took another four years, and a myriad of committees, both political and staff, before the terms of reference for the review were agreed to by all four regional districts.

A year earlier, in 1977, the Province initiated a review of the functions of all regional districts. By 1980, the Province proposed new legislation, the Land Use Act (Bill 9), which would divide the province into seven regions, with the Province playing a major role in preparing economic

development strategies and broad brush land use plans. As a consequence, the planning functions of regional districts were to be eliminated. A provincial-municipal appeal board would be set up to deal with conflicts regarding land use designations.

That same year, in 1980, the revised ORP was finally adopted by the four regional districts. It was less prescriptive than the 1966 plan and, according to Pawsey (1987), increased the fragmentation of regional planning in the Lower Mainland.

The proposed Land Use Act was opposed by municipalities around the province because it centralized land use planning with the Province. The bill was withdrawn by the Minister in 1982, but replaced immediately by a revised act, Bill 72. This too was heavily criticized and died on the order paper.

While the Province was devising new approaches to regional economic development, the LMPRP was attempting to implement the 1980 version of the ORP. The effectiveness of the LMPRP was impeded because the agency only had staff seconded from Regional Districts, uncertain funding from the province, and the agency still operated as an advisory body to the Regional Districts. During this time, two major land use conflicts arose concerning differences between the regional plan and the wishes of the local and provincial governments. Both conflicts involved removal of large tracts of land from the Agricultural Land Reserve for industrial and residential purposes, which were successfully opposed by the LMPRP.

In 1983, following these conflicts, the Minister of Municipal Affairs introduced Bill 9, the Municipal Amendment Act, which removed regional planning powers but did not include any of the previous measures for provincial land use planning. Regional districts could only produce plans for electoral areas. This bill, introduced near the end of the recession, was intended to streamline land use planning and help in the process of economic recovery (Pawsey 1987). From that point on, regional planning was to be a voluntary service offered by regional districts. The GVRD was one of the few regional districts in the province to continue planning activities, such as data collection and transportation planning, through a "Development Services" department.

In 1989, the Provincial government introduced amendments to the Municipal Act which gave regional districts explicit authority for development services "consisting of coordination, research and analytical services relating to the development of the regional district" (Municipal Act, sec 787 (d)). Although regional planning is not included, the Ministry of Municipal Affairs suggests that everything short of zoning and physical land use planning will be acceptable (MMARC 1989). The regional district still has no authority to implement the "plans"; implementation relies on the cooperation of member municipalities. How having authority for development services will affect regional planning remains to be seen.

Regional Plans

The LMRPB prepared the first major regional plan for the Lower Mainland. The plan was developed in two parts. First, in 1963, a policy document, Chance and Challenge, was circulated amongst municipalities to build support for a regional plan. This document was based on earlier work which included an assessment of the physical constraints to urban growth (e.g., soil capabilities, slope, etc.). The LMRPB gave full recognition to Mumford's (1938) ideas about the optimum size of cities and regional development, and proposed the concept of "a series of cities in a sea of green" (LMRPB 1963: 6). This plan was a flexible concept plan, intended to provide a framework for local development decisions.

With municipal support for a regional plan, a series of land use maps were developed and adopted as the Official Regional Plan in 1966. These maps, prepared at two scales of detail, included definitions of permitted land uses, servicing requirements, and possible directions for modifications of use (Pawsey 1987). Attempts were made to maintain the regional nature of the plan through a hierarchical approach to plan amendments, justifying changes in terms of long term development, general objectives, and finally goals. In practice, however, municipalities were able to make their desired amendments through changes in policies, eroding the regional nature of the plan.

After the assignment of regional planning powers to the regional districts in 1969, the GVRD began to develop a plan for its portion of the Lower Mainland region. The plan was to be based on the

objective of managing "growth and change so as to maintain or enhance the livability of the Region" (GVRD 1975: 8). Through a four year period, from 1971 to 1975, the GVRD Planning Department involved the public in a planning process to define goals, objectives, and policies. Working with 30 policy statements or objectives, the Board eventually adopted five strategies for managing growth. These are presented in Table 5.

Table 5. The Livable Region Strategy (1975)

1. Achieve residential growth targets in each part of the region.
2. Promote a balance of jobs to population in each part of the region.
3. Create regional town centres.
4. Build a transit-oriented transportation system.
5. Protect and develop regional open spaces.

Source: GVRD 1975

The document, The Livable Region 1976/1986 (GVRD 1975), provided a brief yet informative description of the strategy and how it would apply in each part of the region. The document also described a rather optimistic vision for the region in the year 1986. It was a strategic plan, focussing on key actions which the people believed would alleviate some of the major problems associated with urban growth.

Implementing the Livable Region Strategy proved difficult because it relied upon the voluntary compliance of member municipalities. The cooperation of the federal and provincial governments was also required to fund capital intensive projects such as Light Rapid Transit. The Strategy was intended to complement the Official Regional Plan, which still had regulatory authority over the designation of land use.

GVRD's work on the Livable Region Strategy delayed efforts towards defining the terms of reference for reviewing the Lower Mainland ORP. The GVRD wanted the cooperation of the other regional districts in implementing the concept of regional town centres. This would require changing

the status of lands reserved for urban purposes in some areas to less developed land use categories to encourage densification. The GVRD appeared to be using the ORP review as a way of obtaining more control over land use in its outlying municipalities (Pawsey 1987).

Many proposals for improving the effectiveness of regional planning were developed as the terms of reference for the ORP review were being formulated. For example, a proposal for the creation of a regional intelligence centre, to monitor development trends and evaluate the impacts of amendments to the plan, briefly surfaced but was never developed. Another concept which failed to win support was the idea of first 'reserving' environmentally sensitive areas, then allocating urban land uses to the remaining areas. This concept was rejected partially because it did not provide 'positive' directions for urban development (Pawsey 1987). The other reason was that social and economic factors needed to be included in the criteria in order to develop a "coherent spatial pattern for further development" (Pawsey 1987: 211).

Most discussion centred on the style of planning, comprehensive or incremental, for the review and subsequent implementation of the plan. The wishes of the GVRD, having the greatest number of planners and largest planning budget, won out. According to the 1978 terms of reference, the plan was to be incremental, with each regional district preparing their own plan. A Technical Liaison Committee would review the individual plans and ensure that they were linked.

Revisions to the ORP went through three drafts. The final revisions were adopted by August of 1980. Environmental policies played a fairly prominent role in the first draft, with statements such as "the air and water quality will be maintained". In the final draft, environmental policies were ". . . no longer to directly protect the environment, but to support the plan's land use designation and development strategy policies" (Pawsey 1987: 240).

In general, the ORP of 1980 was weaker than that of 1966. The LMPRP had less authority to implement the plan while municipalities had greater freedom to make changes. In addition, the land use designations were more general and less prescriptive. With a weakened LMRPR, the implementation of the plan between 1980 and 1983 was increasingly subject to local interests.

The elimination of regional planning powers in 1983 meant the GVRD had to try a different approach to implementing the Livable Region Strategy. The Development Services function of the GVRD, formerly the Planning Department, attempted to build support for a regional growth strategy through economic development planning. In 1984, following the recession, they produced a report entitled The Context for a Greater Vancouver Economic Strategy. This document focused on job creation as a means of regional development.

This document is reminiscent of the approach suggested at a regional economic development seminar seven years earlier. Brian Calder, at that time the Chair of the Vancouver Economic Advisory Committee, talked about the role of regional planning. He made the following statements.

> The Commercial Floorspace study about to be published is another example of the practical application of planning by the GVRD staff. It is essential that land use planning, transportation planning and economic planning go forward together if we are to achieve a measure of orderly development. (GVRD Planning Department 1978: 32).

He commented further that the GVRD should be a one stop shop for information about development, for example: land costs, population data, and municipal attitudes towards industrial and commercial development.

Planning efforts for the GVRD became slightly more broad-based with the publication of Challenges for a Contemporary Statement of the Livable Region Strategy, in 1987. This document, prepared by the Technical Advisory Committee (TAC, a committee composed of municipal planning directors) attempted to reformulate the 1975 goals of the Livable Region Strategy based on current issues. The goals proposed by TAC were: a region in nature, an economy of growth and change, mobility for people, goods, and services, a healthy and safe region, an equitable region, and an efficient region.

In 1989 and 1990, these goals were revised and evaluated through a planning process called "Choosing Our Future". This time, the public had more limited access to the planning process than with the development of the Livable Region Strategy. The public was invited to comment on the strategy once the goals and priority issues were identified by bureaucrats and politicians. The goals finally adopted by the GVRD Board of Directors in 1990 are listed in Table 6.

These priorities are supported by 54 actions that the region can take. These actions are written at a fairly general level, probably to avoid the criticism of infringing on the authority of municipalities and senior levels of government. The region will again rely upon the cooperation of the municipalities to implement the actions.

Table 6. Choosing Our Future Priorities (1990)

1. Maintaining a healthy environment.
2. Conserving our land resource.
3. Serving a changing population.
4. Maintaining the region's economic health.
5. Managing our region.

Source: GVRD 1990

Managing Cumulative Effects

Major initiatives taken to manage the cumulative effects from urbanization in the region are described in a somewhat chronological order in the following section. Figure 3 presents some of the actions regarding cumulative effects and environmental issues taken by the provincial, regional, and local governments (columns 1, 2, and 3, respectively). The following descriptions of these actions are by no means comprehensive and are primarily intended to highlight the progression toward a regional focus for managing issues such as pollution control and open space protection. Most descriptions focus on the actions of the GVRD but major initiatives from the Province and individual municipalities are also included.

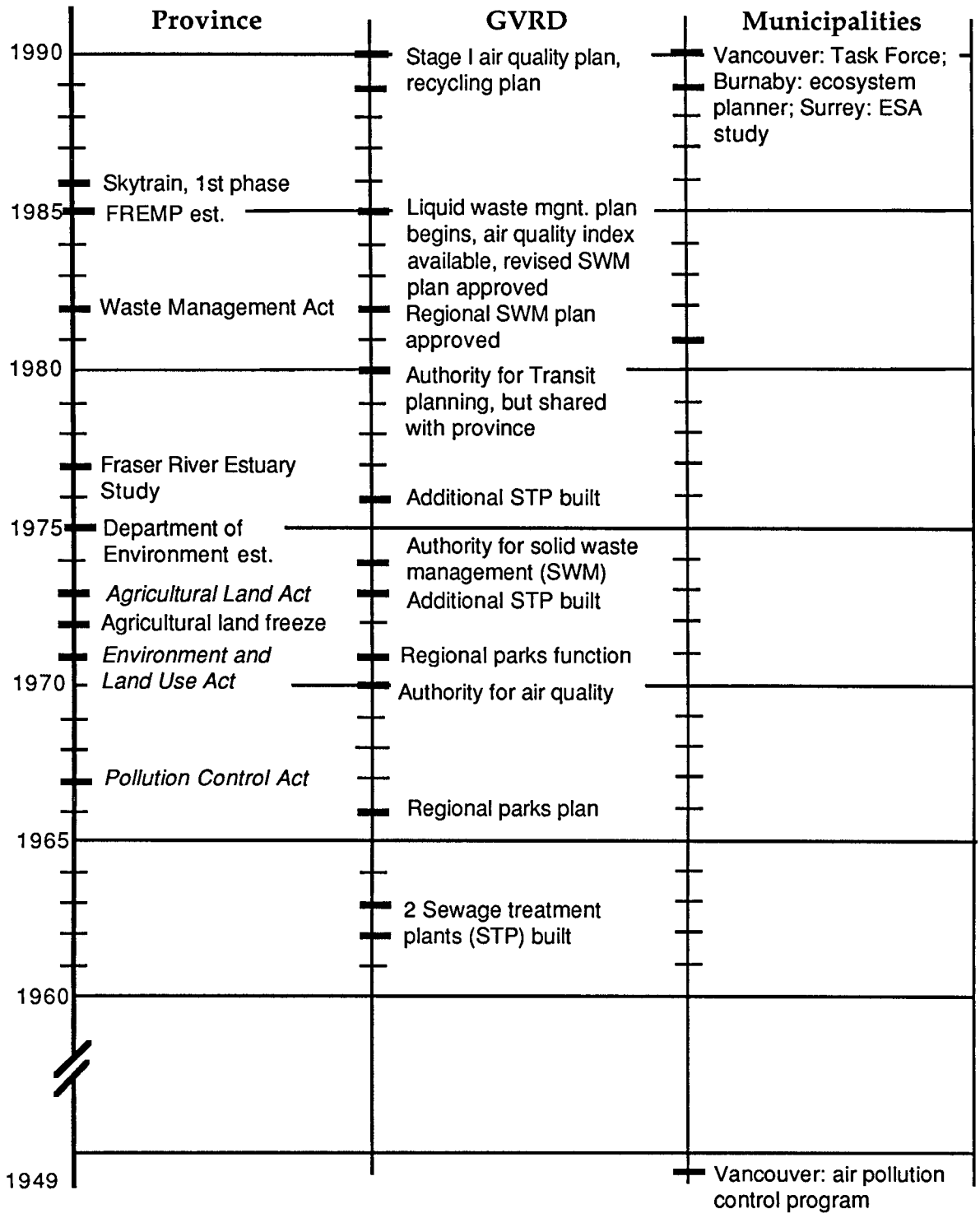

Figure 3. Major activities by provincial, regional, and local governments to manage cumulative effects in the Greater Vancouver region.

Regional Actions

- Air Pollution Control Programs An air pollution control program originally began in 1949 with a City of Vancouver initiative. That program was extended to three other municipalities by 1959. Over ten years later, in 1970, the province changed the Pollution Control Act 1967, to establish the GVRD as the single authority for air pollution in the region. This was the same year that the province created a permitting system for air pollution.

  An air quality index was made available to the public in 1985 through a phone-in service. The information for the index is generated from an extensive air quality monitoring program that continuously inputs data to a central computer from several stations across the region. The regional district is currently preparing an Air Quality Plan (Concord Scientific Corp. and B.H. Levelton & Assoc. 1989). It includes emission reduction initiatives such as a vehicle emission inspection and maintenance program to replace the system eliminated by the Province several years ago. In addition, a Regional Task Force has recently recommended measures to reduce the use of chlorofluorocarbons and halons in the region. In 1990, the GVRD won an award from the Air and Waste Management Association for being the most progressive and active air quality management group in Canada (The Vancouver Courier 24/10/90).

- Liquid Waste Treatment The first sewage treatment plants (primary treatment only) in the region became operational in 1962 and 1963, serving the North Shore, Vancouver, and Burnaby. Two more sewage treatment plants were added to the region in 1973 and 1976.

  The preparation of a Liquid Waste Management Plan finally began in 1985 in response to the 1982 change in the provincial pollution control strategy and legislation. By 1986 construction had begun on extending a sewage outfall into the ocean to reduce foreshore pollution. The first stage of the Liquid Waste Management Plan, approved in 1989, emphasizes source control as well as capital improvements to the drainage and sewage system. The estimated cost of this program over the next decade or so is approximately $1.5 billion at current dollars.

- Solid Waste Management Program The regional district obtained the authority for solid waste management in 1974.

  A regional Solid Waste Management Program was approved by the GVRD Board in 1982. It included plans to build an incinerator, find alternate sites for landfills, and encourage and support recycling. By 1985, solid waste disposal was a critical problem because a new landfill site had not yet been found. The incinerator and a resource recovery plant were under construction, however. By 1987, two new landfill sites had been found, one within the region and the other at Cache Creek, approximately 340 km north of Vancouver.

  A detailed recycling plan for the region was completed in 1990, with the goal of reducing solid waste by 33% in five years. Currently, about 15% of solid waste is recycled. The plan, which was developed through public consultation, will be implemented through individual municipal programs.

- Regional Parks A regional parks plan, indicating areas for acquisition and protection, was prepared in 1966. The function for regional parks was added to the GVRD in 1971 and a major acquisition program has been in place ever since. The Parks Department is now moving into a development and management phase. Regional parks encompass areas with ecological significance and include heritage values in many cases.

- Transit In 1980, the Province transferred authority for transit planning in the region to the GVRD but responsibility was still shared with the Urban Transit Authority. In 1983, the Province created a new crown corporation, BC Transit Authority, which incorporated all transit planning and management functions under one organization.

  An elevated Automated Light Rail Transit (ALRT) system, called SkyTrain, was opened in time for EXPO 86, linking downtown Vancouver, and the SeaBus Terminus (to the North Shore), with New Westminster. An extension across the Fraser River to Surrey was completed in 1990. Debate is now underway to determine the final location of the next major transit axis to Richmond.

Provincial Actions

- Agricultural Land Reserve The regulatory protection of agricultural land became a provincial matter in 1972 with the imposition of an agricultural land freeze by Order-In-Council. Politicians wanted to halt the increasingly frequent conversion of prime agricultural land to urban uses. The next year the Land Commission (now the Agricultural Land Commission) was established to administer the Agricultural Land Commission Act.

- Fraser River Estuary Studies regarding the Fraser River Estuary were initiated in 1977 due to public concern regarding deteriorating environmental conditions in the lower Fraser River. Through these studies, undertaken as a joint project of the federal and provincial governments, a management plan was to be developed with the goal of balancing human needs (economic and otherwise) with protection of the ecological integrity of the estuary. The work occurred in three stages.

  During the first stage (1977-1979), work groups investigated four "interactive" issues: land use, transportation, and port development; water quality; recreation; and habitat. These issues were estuary-wide and had no clearly defined management authority. Another work group explored new management options based on institutional and legal constraints. Information about activities on the estuary, and the ecology of the estuary, was scarce and poorly organized. By the end of this stage, however, the work groups had synthesized existing information and identified gaps in data and understanding.[11]

  The second stage (1979-1982) was characterized by a wider range of involvement by groups outside the federal and provincial governments (Harvey, Mellship, and Toner 1982). Representatives from the public, industry, and municipal and regional governments defined a range of issues and concerns through a varied program of public participation. This information, together with technical data, led to the formulation by the study group of a vision, policies, area plans, activity programs, and a management system for the estuary. In

addition, several technical reports regarding various aspects of water quality and options for management strategies were published.

From 1982 to 1984, a Federal-Provincial Review Committee evaluated the recommendations from the previous stage and designed an implementation strategy. Their final report (O'Riordan and Wiebe 1984) proposed a simplified management structure and program of core activities called the Fraser River Estuary Management Program (FREMP). The inter-governmental agreement for FREMP was finalized in 1985.

- Fraser River Estuary Management Program The third stage of the Fraser River Estuary Study, the implementation stage, is referred to as FREMP. Under a federal-provincial agreement, FREMP has been in place from 1985 to 1990. The Management Committee operates at a strategic level of implementation, the Committee members at large direct activities at the operational level, while the actual activities are performed at the program level. The following activities of FREMP are particularly noteworthy.

  - The Coordinated Project Review Process provides a single "window" approach for developers seeking approval from the multitude of agencies that have jurisdiction in the estuary. A Central Project Registry provides a publicly accessible record of applications in the estuary.

  - FREMP is working with municipalities to encourage the incorporation of area designations for the foreshore and river (similar to zoning districts) into Official Community Plans.

  - The Recreation Activity Work Group is instituting an innovative plan for the estuary that goes beyond the conventional definition of limiting recreation to parks. The plan proposes that public lands, municipal and regional parks, and industrial areas adjacent to the foreshore be linked by a concept of "exploring the Fraser" that encourages an interpretation of both the natural and built environment. This concept reduces the necessity for the outright purchase of lands and encourages people to become more familiar with the industries that use the river.

Individual Municipal Initiatives

Local governments are looking for ways to manage growth and incorporate environmental considerations into their planning processes. The following descriptions provide some examples of such initiatives.

- Surrey: Study of Ecologically Sensitive Areas The municipality of Surrey commissioned a study of the environmentally sensitive areas (ESAs) within its boundaries in 1989-1990. This study has produced two products: (1) a detailed map of ESAs, with descriptions of important physical, biological, and archaeological and historical features, and (2) a list of strategies and policies to protect such areas (Abs 1990).

- Burnaby: Hiring an Ecosystem Planner The municipality of Burnaby, adjacent to Vancouver, has established the position of Ecosystem Planner to coordinate activities between departments, evaluate area plans and new proposals from an ecosystem perspective, and educate the public. This is not attached to any one department and, thus, can provide assistance to all departments. Other related initiatives by Burnaby include the formation of an Environment and Waste Management Committee, a requirement for environmental assessments for proposals in undeveloped and environmentally sensitive areas, and a by-law requiring the recycling of CFCs in air conditioners.

- Vancouver: Task Force on Atmospheric Change A Task Force was appointed in 1990 by Vancouver's City Council to study the issues related to air pollution and the greenhouse effect, solicit public input, and recommend specific actions the City and its citizens could take regarding these issues. The final report, Clouds of Change, made 35 recommendations including the establishment of a Lower Mainland regional air management authority, phasing out the use and sale of chlorofluorocarbons (CFCs), and encouraging planning by proximity to reduce the need for motorized transportation.

Chapter Conclusions

This chapter began with brief descriptions of the physical attributes of the study area, cumulative effects associated with development, and institutional arrangements for the regional district. The history of regional planning and environmental management was then described in terms of the evolution of authority for regional planning, major planning efforts, and efforts to manage cumulative effects. As a result of this review, several observations can be made about regional planning in Greater Vancouver.

- From the 1940s until the present, the desire of municipalities to operate autonomously from the Province has limited the authority for regional planning and regional governance.
- Authority for regional planning is also dependent on political will at the provincial level.
- Funding has not been consistent for regional planning.
- Regional planning has more often been a voluntary arrangement than a legislated function of the region.
- Process has been emphasized more than plans; regional development strategies that evolve over time have been emphasized rather than specific land use designation maps.
- The GVRD has increasingly favoured incremental over comprehensive planning in the context of planning for the Lower Mainland.
- In terms of managing environmental quality, air quality was one of the first areas to be addressed and is currently the furthest along in developing a management plan, closely followed by a Liquid Waste Management Plan. Solid waste management, until recently, was usually a response to crises. Regional Parks are very popular with the public and provide a unique opportunity to learn about the ecological, community, and heritage values of the region.
- Agricultural lands and valuable natural habitats are still being converted to urban uses.
- Local governments are beginning to address environmental issues not being addressed by the region.

CHAPTER FIVE: AN EVALUATION OF REGIONAL PLANNING IN GREATER VANCOUVER

In this chapter, the regional planning experience of the Greater Vancouver region will be evaluated in terms of the nine principles for planning identified in Chapter Three. A four-part subjective scale of poor, fair, good, and excellent is used to rate the experience compared to the principles. Then, based on this evaluation, the question of whether regional planning has contributed to the assessment and management of cumulative effects in the Greater Vancouver region will be addressed. This question cannot be answered with a simple yes or no. While the region has taken some significant steps to manage cumulative effects, many problems remain. The successes and problems are discussed under each principle. The chapter ends with a summary of the ratings for each principle.

Planning Goals

Many people in Greater Vancouver and the Lower Mainland have expressed concern for years over what are now called environmental issues: sprawling suburbs, loss of farmland, and loss of natural habitat. Resolving these issues by addressing their root causes has rarely been a central goal for regional planning. The "preservation of open space" or "maintaining a healthy environment" is the closest the region gets to focusing on ecological concerns.

The database of the GVRD also gives a strong indication where the priorities are in regional development. Greater Vancouver Key Facts (GVRD Development Services 1989b), a statistical profile of the region, lists over 25 types of information, ranging from Business Licences Issued in 1988 to the Number of Ground-Oriented Households. No information is listed on the environmental constraints to development in the region or the environmentally sensitive areas. The land use data base was maintained until 1983, when regional planning powers were eliminated. The regional monitoring system only deals with demographic, economic, and development indicators.

1) Maintain Ecological Integrity

The region is attempting to maintain environmental quality, a more general goal than maintaining ecological integrity. In the long term, this approach is like eating junk food but compensating with

vitamin pills when what is really needed is to eat well to begin with. Maintaining environmental quality implies there is still a separation between the economy and environment. The physical environment is seen as a support for economic growth, rather than the source of economic growth. Maintaining ecological integrity implies there is a close integration of the economy and the environment which is mutually beneficial.

The difference between maintaining environmental quality and maintaining ecological integrity can best be illustrated through the following example. The first goal of the GVRD's 1989 economic development strategy is that "Greater Vancouver's economy should continue to contribute to, and draw its greatest strength from, our livable region" (GVRD Development Services 1989a: 19). This goal views the physical environment as a scenic backdrop to economic activity. If the focus changed to maintaining ecological integrity, this economic goal would be revised as follows:

- Making Greater Vancouver an environmentally sustainable community would be an economic opportunity in itself. Economic development initiatives could include recycling technologies; retro-fitting houses and businesses to increase energy efficiency; small-scale, intensive agriculture; and so on. Local governments could assist the development of such initiatives through preferential taxation; local purchasing; and the linking of appropriate markets and sources. The knowledge gained through these efforts could then be marketed world wide.

Open space planning is often identified as a way of maintaining ecological integrity. While the regional parks function is doing well in terms of acquiring valuable lands and minimizing development within their boundaries, the other components of open space, agricultural lands and natural habitats outside of parks, are not faring as well in terms of being protected.

It is difficult to maintain the ecological integrity of the region when jurisdictions are split according to land versus water or when administrative boundaries rarely match ecological or biophysical boundaries. As an example of the latter situation, GVRD's authority for managing air quality ends at the eastern borders of Langley and Coquitlam. Yet, the Fraser Valley, as far east as Hope, experiences concentrations of ground level ozone that are at times higher than the concentrations in Vancouver (Cave 1990). The three regional districts east of the GVRD have met

with the provincial Minister of Environment with their concerns and the Ministry is promising to install two monitoring stations in the Valley. The City of Vancouver Task Force on Atmospheric Change (1990) recommended that a regional air quality management authority be created. Ideally, the jurisdictional boundaries of this regional agency would coincide with the physical airshed.

2) Reduce Consumption of Resources and Energy

This is a new goal for regional planners and administrators. It is beginning to take hold in programs that deal with waste (see next section) but is not evident in economic development strategies or in the design of communities. The recent redevelopment of Burnaby's town centre, MetroTown, is a definite move away from this principle. The "town centre" consists of three large shopping malls with various community and social facilities located throughout and adjacent to the shopping complex. Building a sense of community and encouraging less consumption in this context, which caters to individual needs, will be very challenging.

Implementing the principle of reducing consumption will be difficult because the economy of B.C. is built on the harvest and recovery of natural resources. Governments are therefore unlikely to avidly support programs to reduce the consumption of resources. Until people start to create an alternative economy that is not reliant on the expanding consumption of resources, this goal will continue to take a very low priority in planning.

In the description of the principle of reducing consumption, energy use and loss of agricultural lands to urbanization were noted as two key areas where regions could reduce consumption. The GVRD has dealt with these issues in the following ways.

Awareness of energy use was mentioned in the update of the Livable Region Strategy (GVRD Planning Department 1980) but was not part of the Choosing Our Future report (GVRD 1990a). This omission is disturbing given that the concept of energy conservation is becoming more important because of the close relationship between the use of fossil fuels and cumulative effects like climate change. Currently, the GVRD is only concerned with the atmospheric effects of energy, not with conservation. The regional district may become more concerned with energy conservation once

measures such as minimum energy efficiency standards in the Provincial Building Code, as proposed by the Provincial Ministry of Energy, Mines and Petroleum Resources, come into effect.

Concern about the loss of farmland has been expressed by both the public and politicians since the 1940s. The first attempt to control the loss of farmland through regional planning was to designate an agricultural zone in the 1966 ORP. The loss of farmland continued. The province stepped in with an agricultural land freeze and legislation in 1972 and 1973, respectively. Various changes in legislation over the past seventeen years has weakened the protection of agricultural lands, however.[12] Now, the region no longer has an ORP. The loss of farmland to urban land uses continues.

In the latest effort at developing a regional strategy, the Choosing Our Future process, one out of 54 regional action statements related to agriculture. It was recommended that a conference be held in 1991 to select initiatives for the long term protection of the agricultural community (GVRD 1990a: 15). It is difficult to see how one conference can make decisions that politicians, farmers, bureaucrats, and the public have been unable to make over the past forty years. Unfortunately, the Choosing Our Future report did not mention exploring the land economics and decision making structures which encourage the conversion of agricultural land to urban uses.

3) Minimize Waste

This is the area of managing cumulative effects where the GVRD has the greatest amount of control and therefore the greatest success, relatively speaking. The solid waste and liquid waste programs are just starting to look at source control as a way of reducing demand for services. A blue box recycling program is in place in most municipalities in the region but only after an incinerator was built and the City of Vancouver made arrangements to have its solid waste trucked to Cache Creek, up the Fraser Valley.

Many studies have been completed for the region's sewage and drainage system and state of receiving waters. Although all sewage has been intercepted and treated since 1976, water quality in 14 out of 21 major water bodies is rated as poor or fair (GVRD 1988). Three of the four sewage

treatment plants were cited for non-compliance of their pollution permit in 1989 (Vancouver Sun, 1990). The Liquid Waste Management Plan process is currently grappling with this and other problems.

The air quality management program has suggested reducing emissions through greater use of public transit and also by reducing the overall demand for transportation.

Changes in provincial pollution control legislation, the B.C. Waste Management Act (1982), requiring the preparation of disposal plans was probably the main reason why the GVRD became more active in developing the liquid and solid waste management plans. The case of air quality is slightly different. Perhaps because the authority for air quality is more well defined and has been in place since 1971, the region monitors air emissions daily and is currently developing an air quality management plan.

Summary

Regarding the three principles that concern planning goals, the region has only a fair record in setting goals related to environmental concerns. The most recent regional strategy demonstrates that while the biophysical environment has a prominent place in the strategy, the environment is still seen as the background for economic development, not an integral component of development. In addition, there continues to be a bias towards anthropocentric issues; the protection of wildlife habitat for its own sake, part of the goal of maintaining ecological integrity, is low on the list of priorities. The principle of reducing consumption has not been consistently addressed.

The region has been most successful in moving to reduce waste. The air quality management program, with the daily air quality index, is an good model for assessing cumulative effects and increasing people's knowledge about the issue. Much remains to be done, however. While there is a greater awareness of the need to reduce solid and liquid waste, the solutions tend to become part of another problem; for example, the trucking of solid waste to Cache Creek and the non-compliance of sewage effluent with pollution permits have each led to the expression of public concern.

Planning Process

In general, planning processes in the Greater Vancouver region have been an extension of urban planning processes. There is less emphasis on rural planning, such as developing strategies to maintain viable agricultural areas, and greater emphasis on how best to accommodate urban growth. This urban emphasis is explained in more detail below in the evaluation of Greater Vancouver according to the principles concerning the planning process.

4) Employ a Strategic Planning Perspective

Referring back to the description of this principle in Chapter Three, strategic planning has several key characteristics: it is visionary, proactive, long-term, and provides a context for local decision-making. Overall, regional planning efforts in the Lower Mainland have taken a strategic approach since the publication of a report entitled Looking Ahead (LMRPB 1952). In that report, the planners recommended developing a process plan with guiding principles rather than a blueprint plan. A strategic approach has only been loosely applied to the recent Choosing Our Future process.

A vision for the region, "a series of cities in a sea of green", was identified in the Chance and Challenge (LMRPB 1963) report. The Livable Region report (GVRD 1975) built on this concept and gave a detailed description of what the region could look like in 10 to 20 years if the Livable Region Strategy was implemented. This description helped pull the pieces of the strategy together into a coherent vision. In the most recent regional development strategy, Creating Our Future, the vision of the region is more abstract and concerns values more than a physical reality. Overall, there is a regional vision for Greater Vancouver that has remained fairly consistent over the past three decades. That vision places a high priority on maintaining the physical environment surrounding the urbanized areas. The most recent version of this vision is less clear, however, perhaps reflecting the loss of a sense of place as the region rapidly becomes a "world-class" city.

With the emergence of the Livable Region Strategy in the 1970s, regional planning attempted to take a proactive role in managing development. After the demise of regional planning in 1985,

what is now called "Development Services" has taking more of a reactive role in relation to economic development and planning. Other aspects of regional governance are following a strategic approach, however.

Transportation planning is one such example. In terms of content, transportation is being linked to air pollution issues, land use, and regional development. In terms of approach, the federal, provincial, and local governments are starting to work together towards common regional transportation objectives.

The timeframe for the Livable Region Strategy was given as ten years, a reasonable timeframe for undertaking a process of regional development. The timeframe of the Choosing Our Future strategy is less precise, being ". . . a map guiding us into the 21st Century" (GVRD 1990a). Some of the recommendations within this recent strategy have a well-defined timeframe but most are indefinite with few priorities assigned to the recommended actions. This "soft" approach makes implementation more difficult and increases the likelihood that the strategy will not be followed.

5) Undertake Comprehensive Planning

Comprehensive planning is becoming less evident in the development of regional development strategies. With the demise of regional planning powers in the GVRD, fewer mechanisms exist to encourage the integration and coordination of activities for planning and environmental management. While the severity of cumulative effects grows, the means of dealing with such issues are, in some cases, becoming increasingly fragmented and incremental. This observation is especially relevant to land-based issues such as the loss of wildlife habitat and the loss of agricultural lands.

For example, Boundary Bay is one of the most significant wildlife habitats in the region, yet no coordinated efforts to protect this area are evident. The provincial Parks plan, Parks Plan '90, initially omitted this area from consideration. Only after public meetings and other lobbying was the area included as a possibility for study. The Municipality of Delta attempted to initiate a multi-sector governmental task force in the fall of 1989 to look into land use issues, but bureaucratic

and political conflicts regarding the project's purpose and lack of government funding stalled the project (Partington 1990). A portion of the project, a bibliographic review, is the only part which has gone ahead (Roseland and Melliship 1991).

The 1975 description of the Livable Region Strategy used a systems approach in describing relationships between the five parts of the growth management strategy (GVRD Planning Department 1975). The report also described the impact of the strategy in each sub-area of the GVRD, to illustrate what changes would be expected.

The 1990 version of the Livable Region Strategy does not take a systems view. Instead, it is a collection of actions, grouped under five general headings, with little indication of the relationships or interaction between variables. This trend towards incremental planning is in keeping with the desire of municipalities to retain their autonomy.

Outside of regional planning, a systems-orientation is evident in transportation planning. Politicians and planners are expressing greater awareness about the linkages between land use planning, transportation, and air quality.

The second major aspect of a systems-orientation in relation to urban areas is the concept of reducing risks from development. In the 1975 GVRD report there was some discussion of the risks from building in the floodplain. Concerns about building in areas sensitive to seismic disturbance (e.g., Richmond and North Delta) or landslides were not mentioned. Risks from development are not mentioned at all in the Choosing Our Future strategy (GVRD 1990a). Now that the dyking system has been improved in the Lower Mainland, people are less concerned about flooding (until it actually happens).[13] The recent work of a committee regarding the transportation of hazardous goods was not mentioned either. In the absence of an explicit discussion of risk, it appears that the onus is still on the public and special interest groups to "prove" there are negative consequences associated with urban development.

6) Ensure the Planning Process is Adaptable

As previously defined, adaptive planning in the context of managing cumulative effects means integrating environmental assessment with project and policy design. It also means using feedback and monitoring mechanisms to evaluate the effectiveness of management activities.

An environmental assessment of the regional development strategy for the GVRD has not been undertaken to date. The implicit assumption behind the current strategy is that once the air, water, and solid waste management plans are in place, regional development will have minimum impact on the physical environment. Unfortunately, from this viewpoint, the form of urban areas is never questioned. An environmental assessment of various economic development strategies for the Greater Vancouver region would help to inform people about the relation between cumulative effects and forms of development (e.g., a fossil fuel based economy versus one using alternative energy sources).

Monitoring is an activity mentioned in the development strategies for the region but somehow is never fully implemented, with the exception of economic, air quality, and transportation databases. The air emissions inventory, conducted in 1985, is the first of its kind in Canada and provides the basis for developing an air quality management plan (Concord Scientific Corporation and B.H. Levelton & Associates 1989). As noted by Cave (1989: 2), regional planning in the Lower Mainland has been focused on regulating land use rather than monitoring ". . . the many important and subtle parameters of emerging urbanization." After describing the state of monitoring in the four regional districts, Cave (1989) concludes that although there is a significant amount of raw data, there is no coordinated information on urbanization trends in the region.

One very good reason for the lack of monitoring activities is that very little theory or experience exists about monitoring in an urban planning context (Sutton 1979). Even less information exists on how to relate urban development trends to environmental impacts. This was the main conclusion in a review of the environmental literature concerning Boundary Bay (Roseland and Mellship 1991). In the monitoring system proposed by Cave (1989), environmental data would consist of solid waste

disposal activities, air pollution values, water pollution, and parkland acreage. No mention was made of environmentally sensitive areas, carrying capacity of the water or air, food production capability, energy use, or extent and type of native flora and fauna.

7) Involve the Public Throughout the Planning Process

The number of opportunities for public participation in regional planning processes has increased since the 1970s. The context for policy formation has been shifting from being based in the bureaucracy, as it was in the 1960s, to involving a wider range of views, primarily through public meetings and widely publicized planning processes. Some of these opportunities are becoming more limited in scope, however, primarily due to the amount of funding available for planning. The Livable Region Strategy was partially funded by the now non-existent federal Urban Affairs Department whereas the Choosing Our Future program had to solicit corporate sponsorship. The opportunities for involvement in the Choosing Our Future program were more limited.

In the 1970s, citizens were invited to participate on an advisory committee to review the public participation program associated with the Livable Region Strategy, in addition to identifying goals and policies. The inclusion of the public in the planning process for the Livable Region Strategy helped to extend ownership of the issues, goals, and policies to a much wider audience. Extensive meetings between staff and politicians likely helped to win political support for the initiative.

In 1990, public involvement for the Choosing Our Future program was limited to commenting on pre-defined goals and issues. The public program began after the Board of Directors approved the goals identified by staff and after issues had been identified through a series of seminars attended by bureaucrats and professionals. The final seminar in the Choosing Our Future process was televised through cable stations across the region and included telephone call-in sessions. The economic development strategy for the region, which is integrally related with the regional development strategy, was developed by consultants without consulting the public or interest groups (GVRD Development Services 1989a).

Other opportunities for public involvement include participating in the planning processes to formulate waste management plans. Advisory committees to the Liquid Waste Management Plan have representation from 34 federal, provincial, and municipal agencies, industry and public interest groups (GVRD 1988). In the case of participating on committees, meetings are often held during regular working hours and funds for research are not generally available to the public. Additional opportunities for learning about the region include visiting the demonstration forest in the Seymour watershed, public tours of sewage treatment plants, and exploring regional parks.

Although people experience the environmental consequences of urban life on a daily basis, only a small number of the public or special interest groups get involved in sitting on committees or making presentations to the Board of Directors. Contributing factors to this apathy may be lack of time and resources, consumer advertising which focuses people's attention away from community issues, the convenience of urban life, the political system which leads to disempowerment, and the slow, incremental rate of change which is difficult to notice. Creating the public and political will to deal with cumulative effects from urbanization will require a great deal of effort to overcome these negative factors.

More opportunities for public participation in environmental planning processes do not necessarily translate into more effective participation. Evaluating the quality of public participation requires research that is beyond the scope of this thesis. However, continuing criticism from interest groups about the degree to which their concerns and ideas are ignored in final plans indicates there is room for improvement (L. Herb, pers. comm.).

Summary

The record of regional planning and environmental management in terms of the planning process principles has been mixed. In terms of being strategic, the regional planning process has been good until recently. Now with the Choosing Our Future strategy, there seems to be a move away from being visionary and proactive.

The principle of comprehensive planning is also becoming less evident. The Livable Region Strategy was good in terms of being comprehensive in approach and was also systems-oriented so that the components of the strategy targeted key areas for change. In Creating Our Future, the regional strategy while being comprehensive, does not employ a systems approach. Therefore, the recommendations for action are like a shotgun blast rather than being a coherent strategy. In contrast, the plans for air quality management and the liquid and solid waste plans appear to be moving in the direction of being more comprehensive and systems-oriented. In each case there is a greater reference to the context in which the planning is taking place. For example, the air quality management plan is suggesting that linkages be made between transportation planning and air pollution (Concord Scientific Corp. and B.H. Levelton & Associates 1989).

The principle of being adaptive is not well reflected in practice, with the exception of air quality management and, to some degree, liquid waste management. The air quality management program is applying the information gained through monitoring in the development of management strategies. The air quality index is useful in developing awareness among the public about the seriousness of air pollution in the region. In contrast, urbanization trends and changes in key environmental areas (e.g., natural habitat) are not monitored on a regular basis. As well, solid waste management programs appear to be more a response to a crisis than a program of managing waste.

While regional planning continues to exhibit the principle of being somewhat open to public participation, current practice appears to treat public input in a superficial manner. Opportunities for public involvement in planning and environmental management processes have increased in quantity but declined in quality. For this reason, the Greater Vancouver region rates good, but moving to fair, in terms of the principle of public involvement.

Governance and Institutional Concerns

Planning activities tend to focus on the content of plans, but the institutional context in which plans are formulated and carried out is also critical to the success of a plan. The history of regional

governance in the Greater Vancouver region has been a constant struggle of balancing local priorities with regional goals. The following evaluation of regional planning provides more details.

8) Give Regional Districts the Authority and Fiscal Capacity to Implement Decisions

Regional districts have authority to provide services on a cost-recovery basis to municipalities and electoral areas. Within this mandate they tend to operate in a reactionary mode, providing services wherever development pressures are greatest. Regional districts do not have direct authority to manage environmental quality as a whole, rather they have specific authorities assigned by the province, such as solid waste disposal or sewage treatment. In the case of the Greater Vancouver region, the regional district appears to be most effective in assessing and managing cumulative effects when the region has explicit authority for management, as it does for air quality and, to a lesser degree, liquid waste disposal.

Where authority for implementing decisions is shared between governments, management is less effective. Water quality in the Fraser River estuary is a case in point. The federal government is responsible for fisheries habitat, the provincial government is responsible for pollution control of industrial and municipal effluents, and the regional district is responsible for operating sewage treatment plants in accordance with conditions specified in their permits. Government agencies cooperate and liaise through a number of studies and projects regarding water quality, but pollution continues to be a problem. In the Green Plan recently released by the federal Minister of Environment, the Fraser River is again targeted as a high priority for clean-up.

Assessment and management of cumulative effects in the Greater Vancouver region has been least effective where land-based issues are concerned. The regional district's authority for land use planning has changed from first being voluntary, then being legislated between 1969 and 1983, then returning to being voluntary again. The province appears willing to assign authority for land use planning so long as the region does not "interfere" with development. In disagreements with the region over land use designations, the province has either backed a development proponent or a local council. Having authority for regional land use planning did not necessarily translate into better controls over development, however. Individual municipalities continued to apply for

incremental amendments to the Official Regional Plan, with the result that the ORP required substantial revision seven years later. This experience suggests that the problem of gaining control over development, and its associated cumulative effects, might be better addressed through a process other than designating land uses.

One of the major reasons why authority over land use is so controversial is that land plays a pivotal role in the creation of wealth in our economy. Because decisions at a regional level put social concerns above those of individuals, the move to regional authority over land use decisions is usually resisted by local politicians and economically influential community leaders. When efforts are made to address land-based cumulative effects issues, the emphasis is usually on anthropocentric issues such as agriculture as opposed to an ecocentric issue such as the maintenance of raptor habitat.

Three major issues related to authority are evident. First, the region often lacks authority to implement the tools at hand for managing cumulative effects (e.g., land use zoning, policies to support agricultural activities, providing a coordinating and planning function, etc.). Second is the question of what additional tools can be used to achieve the desired objectives and who should use them. Third is the mismatch of jurisdictional boundaries and ecological boundaries of various issues, described earlier under the principle of maintaining ecological integrity. The airshed boundaries of the Lower Mainland extend beyond the authority of the GVRD. The authority of the GVRD ends at the boundary of the high tide level in the estuary where the responsibility of FREMP for information coordination begins. Yet many land-based activities impact on water quality and foreshore activities can influence upland activities.

The fiscal capacity to implement decisions is an issue affecting governments everywhere in Canada. The public want less government while demanding more services from government. At the same time, greater proportions of budgets are servicing interest payments on debt, reducing the overall budget available for services. This situation also exists for the GVRD where 33% of the 1988 budget went to operating costs while 61% went to debt charges (GVRD 1990b).

The GVRD receives its funds from member municipalities who collect property taxes. Because local governments, who collect the taxes, generate a higher income from developed land as opposed to undeveloped land, there is a bias towards development. In terms of resources for planning, more urbanized areas will have greater resources, thereby introducing an urban bias into regional planning. This occurred in the early 1970s when the Lower Mainland was divided into four regional districts. During the discussions about the terms of reference for the 1980 revised regional plan, the wishes of the GVRD won out over the other regional districts which had much more rural lands (Pawsey 1987).

A potential solution to this problem of development bias is to have inter-regional transfer payments among municipalities. This idea was raised in a regional seminar in 1978 but was never pursued (GVRD 1978). It could provide the means to help "preserve" certain land uses in municipalities with large agricultural areas or wetlands.

One reason that regional planning may not be very effective, in addition to the lack of authority given to it, is the relatively small budget it receives. In the 1988 operating budget for the GVRD, development services received 1.8% of the over $49 million budget, while water operations, sewerage and drainage, and solid waste disposal received 76.5% of the budget. Air quality management received 3.8% of the budget.

Given the choice of technology for sewerage, and the distance that potable water is delivered within the region, capital costs will continue to increase. The forecasted cost to bring sewage treatment up to provincial standards and control runoff could be as much as $1.5 billion (GVRD 1988). This represents a significant opportunity cost to the region given the need to address other important issues such as air quality.

As more municipalities in the Central Fraser Valley and Dewdney Allouette Regional Districts join the GVRD to obtain water and sewage services, the capital and debt costs of extending services continue to increase. Perhaps the region has already exceeded a size where the economies of scale

in maintaining the infrastructure are exceeded. Unless the basic assumption of always providing services to development is questioned, serious fiscal problems could result.

A problem specifically related to regional planning is the lack of attention given to defining the costs of implementing the Livable Region Strategy and assigning responsibilities for those costs. The 1975 strategy (GVRD 1975) did not mention costs at all. In the 1990 Choosing Our Future strategy, the last of 54 recommendations is to "develop and implement a capital expenditure and debt management plan which provides a framework for investment to respond to the region's environmental, social and physical needs" (GVRD 1990a: 26). How this daunting task will be undertaken is not specified.

9) Make Regional Districts Accountable to Their Citizens

Regional government across B.C. is one step removed from voters, unless one lives in an electoral district where regional directors are elected directly. Because Directors are appointed by the mayors, the Directors are accountable to their municipal governments, rather than directly to the citizens.

The linkages between the Board of Directors and the staff of the GVRD are much stronger than linkages between the Board and citizens. With this separation between citizens and regional government, people's knowledge of regional government tends to be limited. Board meetings are not broadcast on television and are rarely reported in local newspapers. When plans such as the Livable Region Strategy are not implemented, it is difficult to assign responsibility for the failure.

This situation may be changing. Vancouver Alderman Libby Davies, a recent appointee to the GVRD Board, was quoted as saying, "All the board's positions are appointed so the accountability back to the people isn't there. I'd like to see that change." (Truscott 1990). With the recent shift in power to the political left in many municipalities, Ms. Davis may have the company of similar-thinking politicians on the GVRD Board.

As demonstrated in the case of Greater Vancouver, the area has a history of political autonomy at the local level which is difficult to overcome. This situation has prevented regional planning from

being effective, even when the region theoretically had authority for planning. The issues which have brought the region together in the past--floods, agricultural land loss, urban sprawl, and commuting--are again rising to the top of the political agenda, so perhaps there will be a resurgence of interest in having these problems resolved at the regional level. It is important to note that authority and accountability go hand in hand.

Summary

In practice, the Greater Vancouver region is fair in terms of illustrating the principles of governance and institutional concerns. Regional planning in Greater Vancouver has been most effective when authority for management is explicit, clearly defined, and not shared with other levels of government. This is the case for air quality management. Transportation planning is showing improvement in this area, moving from fair to good, as a result of greater cooperation between the province and the regional district as well as greater cooperation among the municipalities. As a result, the regional district's role in transportation planning is becoming more well-defined.

Regional authority over land-based issues--the traditional domain of regional planning--is currently non-existent. The consequence is that the new regional strategy is very conceptual and fragmented to avoid interfering with municipal jurisdictions. The mismatch of boundaries between agencies as well as between administrative jurisdictions and ecological boundaries is also problematic. Funding for the GVRD has an inherent bias--developing land to generate taxes--which limits the region's capacity to implement decisions in support of cumulative effects management. This situation favours development over no development decisions. An inherent bias also exists towards capital projects, stemming from the regional mandate to provide services, which historically have been physical (e.g., sewers, water supply, hospital construction, etc.). Planners and bureaucrats have only a fair record in breaking down programs into their component parts to determine costs; therefore, funding is often not secured and plans are not implemented.

The principle of accountability is gaining popularity with politicians and interested members of the public. For this reason, the region can be rated as moving from fair towards good in terms of meeting this principle.

Chapter Summary

Overall, in comparison with the principles of regional planning, the case of regional planning in Greater Vancouver rates as follows (see Table 7):

- fair, in terms of setting relevant planning goals;
- good but moving to fair, in terms of being strategic and comprehensive, but only fair in terms being adaptive and participatory; and
- fair to good, in terms of demonstrating the principles of governance and institutional concerns.

Table 7. A summary of the evaluation of Greater Vancouver in terms of the principles of regional planning.

Principle	Rating	Comments
Maintain ecological integrity	2	the environment is mainly seen as the backdrop for economic development
Reduce consumption of resources and energy	2	some concern about urban sprawl but energy conservation not mentioned in latest regional strategy
Minimize waste	2 => 3	air quality planning well underway; developing plans for solid & liquid wastes
Employ a strategic planning perspective	3 => 2	regional plans are becoming less visionary
Undertake comprehensive planning	3 => 2	systems approach used in Livable Region Strategy but not evident in latest regional planning strategy
Ensure the planning process is adaptable	2.5	regional monitoring of trends is limited; air quality monitoring is very good
Involve the public throughout the planning process	3 => 2	processes are tending to be less participatory and more consultative
Give regional districts the authority and fiscal capacity to implement decisions	2	best when authority is clear; worst when authority is split. Bias towards development to raise taxes; political and bureaucratic bias towards capital projects
Make regional districts accountable to their citizens	2 => 3	more politicians and public are supporting this principle

Rating: 1 - poor, 2 - fair, 3 - good, 4 - excellent, => means the rating is in transition.

CHAPTER SIX: CONCLUSIONS

In this chapter, some conclusions are drawn regarding how well the current practice of regional planning in the Greater Vancouver region supports the assessment and management of cumulative environmental effects associated with urbanization and where improvements to planning practice could be made. Conclusions are also drawn about the usefulness of the nine principles in analysing the case study. These conclusions are followed by some general observations about the literature concerning cumulative effects in an urban-based region. Finally, this chapter presents some implications for further research.

Cumulative Effects and Regional Planning in Greater Vancouver

The case of regional planning in Greater Vancouver was examined in light of the following question:

> Has the assessment and management of cumulative effects been a part of regional planning concerns in the Greater Vancouver region?

This question can now be answered in the affirmative, based on the results of the evaluation. The ways in which cumulative effects are addressed in Greater Vancouver are primarily through the delivery of services to "clean-up" the environment and the maintenance of open space by establishing regional and local park systems, as well as by maintaining agricultural lands. Regional development strategies, such as encouraging the development of regional town centres, are used to a lesser degree. Citizens and politicians of Greater Vancouver are beginning to recognize, however, that these efforts are not sufficient to reduce the negative environmental effects of urbanization.

To move the regional district from a role of managing environmental quality to a more active role of managing the cumulative impacts of urbanization is a big step requiring substantial changes in current approaches to regional planning. Descriptions of some of these changes, as well as an overview of some of the constraints and opportunities surrounding the changes, are presented in the following section.

Planning Goals

Shifting the goal of regional planning to the maintenance of ecological integrity would require the Greater Vancouver region to reexamine and change its economic development policies and forms of urban development. Minimizing consumption of resources and energy would also significantly affect the region's economy in the short and medium term. The least amount of change would be required in terms of minimizing waste.

A major constraint to moving in this direction is that strategies or techniques for integrating environmental and economic issues are still poorly understood. For example, the conversion of agricultural lands and wetlands to urban uses continues because most "protection" measures do not address the basic pressures which lead to conversion. These pressures include powerful market forces that induce land conversion at urban fringes; an emphasis on short time frames that benefit development decisions, rather than the long time frame that benefit agricultural decisions; and changing social values that tend to disregard or trivialize the role of farming and agricultural self-sufficiency in society.

The opportunity is that in spite of imperfect knowledge about how to integrate environmental and economic concerns, people are trying to move in the direction suggested by the planning principles. There is already a shift in attitudes towards accepting the goal of minimizing waste as demonstrated in the development of management plans for air quality and solid and liquid waste. The goal of maintaining ecological integrity, which requires changes to economic development policies and the form of development, may be achieved indirectly. One way is through the spread of the concept of community economic development. This activity can support the shift to managing cumulative effects by reducing the scale of economic activity and often redirecting the focus to ecologically sustainable activities. Another way is through experiments with urban form, which lead to increased density in urbanized areas, thereby reducing sprawl. The goal of reducing consumption is a large hurdle to overcome but as awareness about the loss of valuable agricultural lands and natural habitat continues to grow, people may begin to accept this goal. Protecting the lands around Boundary Bay from urban development would be a proactive step in this direction.

Planning Processes

The process of regional planning in the Greater Vancouver region compares more favourably with the principles but substantial changes would still be necessary to assess and manage the impacts of urbanization. The shift towards being less strategic and comprehensive would need to be reversed. While the monitoring of "hard" variables such as air emissions is good, the monitoring of fuzzy concepts such as urbanization trends is basically non-existent and requires substantial work. Although the number of opportunities for public participation and social learning seem to be increasing, the quality of participation may be decreasing. More effort, financial resources, and time would need to be dedicated to designing opportunities for public participation.

These suggested changes to the practice of regional planning are constrained by several factors. One key factor is the lack of trained people to work on environmental problems in an urban context. Regional planners know little about cumulative environmental effects and environmental assessment practitioners tend to avoid political and urban issues. These two groups of "experts" need to find ways of working together, and learning from each other, as they can each contribute only half the solution.

This lack of relevant training for planners is related to other constraints. Tools and techniques to deal with many of these issues are either not well known or simply not developed. Land use zoning and population projections--traditional tools of urban planning--are inappropriate tools on their own for dealing with the complex, value-laden issues facing regions. Another aspect of planning where training is lacking concerns the choice of public participation processes. Currently, planners are relying on a public relations approach rather than building social learning into their programs.

Overcoming the lack of appropriate training for planners and appropriate planning approaches will take time and financial support for research. This constraint can be overcome if there is political will and creative financing. A start can be made on skills training and research by having the regional district link up with federal and provincial state of environment reporting programs. These monitoring programs can be a way of evaluating alternative management strategies and also

monitoring the conditions of regional environmental variables. Public participation is another area that is full of opportunities for change. With increasing cynicism about government and bureaucracies, many people are looking for meaningful ways of becoming involved in planning and decision-making. Planners could experiment with alternative strategies for public participation.

Governance and Institutional Concerns

Over the next decade, all levels of government will be concerned with how to best resolve environmental issues stemming from urban development in the Greater Vancouver region. Some basic changes in regional governance would be necessary given that the transition to developing sustainability requires substantial changes in nearly every aspect of urban life. Currently, the regional district only has authority to deliver services to member municipalities: it does not have authority to govern or manage cumulative effects.

An institutional constraint to giving governing authority to the regional districts in areas such as land use planning, or overall environmental quality, is the ongoing contest for power between levels of government, be it in the form of federal-provincial, provincial-regional, or regional-local debates. The governance of resources will probably always exhibit a dynamic tension between these entities, especially in B.C. Until the Canadian constitution is revised to reflect a late 20th century understanding of natural resources, the opportunity and challenge will be to continue building on the new ways of forming working relationships between levels of government and among government agencies (e.g., FREMP, various task forces on special issues).

A constraint to managing cumulative effects is that no one agency can take a comprehensive approach to defining and resolving cumulative effects issues because the mandates of agencies are limited by fragmented jurisdictions in terms of environmental components (e.g., fish, freshwater, agricultural lands) and by area. Therefore, any one level of government, and any one agency within that government, is limited in the range of the programs it can develop and implement. Of course intergovernmental cooperation is possible, as demonstrated by programs such as FREMP, but such arrangements take years to evolve. Although this program has its problems, it shows that it is possible for agencies with different agendas to establish working relationships and overcome

jurisdictional barriers. The reality of working towards common goals, such as maintaining ecological integrity or reducing energy use, can be used to coordinate the work of various agencies.

A related constraint is that environmental management remains compartmentalized according to traditional administrative responsibilities that are based on particular disciplines. Engineers work on waste management problems, planners work on land based issues, and transportation engineers look at transportation problems. This situation results in different aspects of issues being treated separately and without coordination. With some issues, such as transportation, the barrier of disciplines is being bridged.

Another change is that alternate methods of funding the regional districts will be necessary to overcome the development bias inherent in relying on property taxes. At the basis of the issue of property taxes is the high value our society places on private property. But in Greater Vancouver, where housing prices are high, people are starting to re-evaluate their values and look to alternative forms of development such as cooperatives, land trusts, and government funded housing (i.e., Vancouver Properties Limited). These alternatives will further the goal of managing cumulative effects only if the developments are higher density and integrated with other land uses. This type of development is more likely to occur when the potential residents are involved in planning the development. Another opportunity related to property taxes concerns the current debate between local and provincial governments on the appropriate level of taxation. Here is an opportunity to create a system of taxation that is not as reliant on the full development of the landbase.

In terms of governance, attitudes are beginning to change at the political level with regards to accountability. The public's increasingly cynical attitude towards government and bureaucracies is already fostering a move towards having the regional district become directly accountable to its citizens. In addition, individual municipalities are beginning to see the benefits of cooperating on regional issues.

The Next Steps

To overcome many of the constraints to managing and assessing cumulative effects in Greater Vancouver, one of the key initiatives would be to greatly increase the level of public participation in planning and decision-making at the regional level. Spread throughout the population are people with the values and ideas which are needed to make the changes necessary to manage cumulative effects. The input of these people is invaluable. Increased levels of public participation can lead to greater support for regional governance and other institutional reforms. An attentive and involved public can also hold politicians and bureaucrats accountable for their decisions. Public participation means more than creating spaces in committees. It also means dedicating financial resources for research and the time spent by members of the public on committees. People cannot be expected to immediately take advantage of the opportunities for public participation, however. The regional governance system has to create a context where people want to be involved and feel their input is useful.

Another key initiative would be to initiate a region-wide system of monitoring environmental variables. This system would provide planners and the public with more information about the changing nature of the region and help to begin defining the "region". It would also provide an opportunity for the range of government agencies in the Greater Vancouver region to work collaboratively on a project, helping to bridge jurisdictional and discipline-related barriers.

Cumulative Effects and Regional Planning in General

This thesis has explored the role of regional planning in assessing and managing cumulative effects in urban-centred regions. A major premise underlying this exploration is that the practice of regional planning and CEA are both ready for change. Environmental conditions and the social context for development are rapidly shifting. To remain relevant, regional planning requires new goals while the emerging field of CEA needs an appropriate context. It was suggested that the technique of CEA be replaced by regional planning, which has as its central purpose, the management of the region's ecological integrity.

In the case of the Greater Vancouver region, regional planning is already addressing cumulative effects. The approaches used are primarily based on conventional methods of pollution control and open space planning. The comprehensive, scientific-based analyses suggested by the literature on cumulative effects assessment are only marginally evident. In spite of the split jurisdictions across geographic areas and environmental components, some progress is evident in managing the negative environmental impacts of urbanization. Although it is only one case, this evaluation suggests that regional planning has the capability to address cumulative effects in an urban-based region. This case may be unique, however, because of the omnipresence of "nature" (in terms of scenic views and biological and geographical diversity) and a heightened consciousness in the population towards environmental issues. Nonetheless, regional planning appears to provide an appropriate context for assessing and managing cumulative effects.

Reflections on the Principles for Regional Planning

The principles concerning planning goals appeared to help distinguish between efforts to maintain environmental quality and efforts to maintain ecological integrity. The assumption (and bias) inherent in this distinction is that an emphasis on maintaining environmental quality will not move society in the direction of developing sustainability. This assumption is also implied in the principles relating to planning practice. Elucidating the difference between these two views of quality versus integrity and making the difference explicit in the principles is another suggestion for improvement.

The Issue of Cumulative Effects in an Urban-Based Region Revisited

The issue of how to manage cumulative environmental effects in an urban-based region is central to this thesis. Through examining the literature in this area, it became apparent that there is really no field or discipline that deals directly with this issue. Cumulative effects assessment does not distinguish between urban sources of impacts and other sources and is biased towards the natural sciences in assessing and managing cumulative effects. Regional planning is only just starting to focus on environmental issues. This leaves urban growth management as the one field which is

trying to explore environmental issues in an urban context, but the regional focus is absent. This is because most research is from the United States where regional governance systems are almost non-existent.

The results of research into growth management point to a critical lack of relevant information. Basically, the researchers conclude that "after 20 years of experience with growth management, it must be said that we know very little about how to manage urban development" (Brower, Godschalk, and Porter 1989: vi). This thesis also comes to the same conclusion. People now have a greater understanding of what the problems are and where they should be going, but the means of reaching the goals are basically unknown. The scientific approach has been applied extensively to learn about how the world "out there" works but has not been applied to discovering how human behaviour can be influenced and guided. In addition, current institutional arrangements, which were largely established at the turn of the century, are becoming a constraint to effectively managing cumulative effects.

These issues of how to influence human behaviour and the design of institutional arrangements are within the field of policy analysis. Unfortunately, policy analysis does not have much to offer in terms of identifying and describing successful or unsuccessful approaches to environmental management in urban areas. The policy implications of environmental assessment have only recently become a topic of research, basically limited to the effects on bureaucratic decision-making in natural resource oriented agencies (Bartlett 1989).

In the absence of applied research in this area, local governments are forging ahead with putting various regulations and policies into place in the hopes of at least mitigating some of the environmental impacts of development. Most of these efforts are not documented and are not structured in a way that can be monitored and evaluated. As a result, urban areas are not learning from one another. This is the area where cumulative effects assessment could become more applied, especially in terms of transferring skills to urban and regional planners about monitoring and evaluating programs.

Implications for Further Research

The primary direction for further research suggested by this thesis concerns the integration of cumulative effects assessment with regional planning. As noted by Sonntag et al. (1987: 27), there has been "little cross-fertilization of ideas or methods" between practitioners in planning and environmental assessment. This thesis has indicated that regional planning can, in theory, provide a supportive context for the management of cumulative effects in urbanized regions. More detailed studies can provide direction for how to bring the current practice of regional planning closer to the ideal.

A good place to start would be to initiate a pilot project with the GVRD for a monitoring program to track cumulative effects such as the conversion of agricultural lands, natural habitats, energy use and so on. This type of project has a secondary benefit of bringing regional planners and practitioners of environmental assessment together in working relationships. This monitoring project could be linked with federal and provincial projects on state of environment reporting.

With a monitoring program in place, regional planners could then work with social scientists to develop strategies for consulting with the public about cumulative effects issues. Getting the public involved in resolving these issues is a key factor in developing sustainability. Curbside recycling programs and turning off lights are only the beginning of the effort required to improve environmental quality. The next level of challenge will be getting people out of their cars and developing local economic development strategies which are environmentally sustainable.

The emphasis on integrating regional planning and cumulative effects assessment leads to the question of how to develop appropriate methods for planning and assessment. The reference guide on CEA methods developed by Lane et al. (1988) for the Canadian Environmental Assessment Research Council is deficient in defining the context in which CEA would occur. Therefore, the suggestion of using checklists, matrices, and overlays is quite limiting and more appropriate for project-specific assessment. From a regional planning context, the approaches to assessing and managing cumulative effects could be greatly expanded. Case study descriptions of interactive GIS

(geographic information systems) applications for planning, intergovernmental programs such as FREMP, and various public consultation programs such as the Livable Region Strategy would provide a more realistic and relevant guide to developing effective approaches to assessing and managing cumulative effects.

Reaching for the Ideal

The current practice of regional planning, as illustrated by the case of Greater Vancouver, appears to be far removed from the ideal which would support the assessment and management of cumulative effects. Currently, regional planning is directed much more at facilitating economic development than it is at resolving critical environmental issues, which are ultimately connected to global change.

Many of the problems and constraints that were identified are not limited to the regional level of governance. These problems concern all levels of government in countries with similar economic and political institutions. To move in the direction of developing sustainability, governments must make a basic choice. Do they first improve their economic situation to afford the environmental protection measures which are necessary to improve the quality of life? Or do they improve the ecological integrity within regions as a way of creating a better life for everyone? The concept of sustainable development, as defined by the Brundtland Commission (WCED 1987), favours the first choice . Alternative definitions, such as that developed by Rees (1989), lead to the viewpoint that the second choice is the only rational course to take.

Can scientific rationality be used to help cut through the quagmire of values and opinions surrounding this choice? Unfortunately not entirely. Scientific analysis has been very useful in helping us understand the linkages between human activity and the quality of the natural environment. Science has also brought us the image of a beautiful planet floating in space. We are beginning to realize that life as we know it is reliant on the conscious will of people for its continued existence (Berry 1987). Making the choice of how to develop sustainability is more than a scientific problem; it requires a fundamental re-evaluation of our values and aspirations. The challenges are

not simply finding better tools for analysis but also finding better ways of living together on this planet.

Regional planning can play a special role in this regard. Suspended between local action and global issues, the region can take strategic actions on important issues. Planning at the regional scale is seen as one of the best ways to counteract the incremental decisions which lead to cumulative effects. It is also an appropriate scale for integrating ecological, economic, and social concerns. Most importantly, at the regional scale, governance systems are brought closer to the people who are affected by policies. As noted by Weaver (1978: 407), ". . . regional planning is above all an ethical-political question."

FOOTNOTES

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1 These research efforts concerning area-wide assessments and carrying capacity were described in Chapter One, page 7.

2 Throughout the history of environmental assessment, research has focussed primarily on improving methods and practice (i.e., Holling 1978; Duinker and Beanlands 1983; MacLaren and Whitney 1985; and Westman 1985). A limited amount of research is directed at evaluating institutional arrangements (Rees 1981; Wallace 1981). Only recently have researchers taken a detailed look at the ethical basis of the scientific methodology (Shrader-Frechette 1985) and the policy implications (Bartlett 1989; Rees and Boothroyd 1987a, b) of environmental assessment.

3 People are beginning to recognize the limitations of a process which is directed at assessing project-specific impacts. One direction for broadening the scope of environmental assessment is social impact analysis (SIA). Initially, the incorporation of SIA met with resistance by practitioners, but now it is generally accepted (Rees 1983). The trend for SIA in Canada is away from predicting the effects of development to assisting the impacted communities in gaining greater control over their environment and economic development (Rees and Boothroyd 1987b). Technology assessments and risk assessments are also loosely linked with environmental assessments.

4 This definition of adaptive is taken from Holling (1978).

5 According to Friedmann (1987), the roots of social learning begin with the writings of John Dewey in the early 1900s. A contemporary proponent of social learning theory is Donald Schon who applies this concept to organizational development.

6 Residents in the Ottawa-Carlton region are involved in compiling their own report on environmental conditions in their region. For a complete description see Environment Canada's State of Environment Reporting, Newsletter No. 5, January 1990, pp. 1-2.

7 This is the conclusion Armour (1988) came to after evaluating past experiences with social monitoring programs for impact assessments. It is difficult to draw statistically valid conclusions from social monitoring, but the same information is an excellent source of qualitative information about residents feelings about their community. This type of information is a valid input to any planning process.

8 BC contains .95 million ha of class 1-3 lands. The changing quality of agricultural lands is described in Hursin and Sanford (1988).

9 The committees are: Executive, Water and Environment, Park, Electoral Areas, Housing, Development Services, and Hospital. These committees make recommendations to the Board of Directors, based on the analysis and recommendations of staff.

10 Institutional arrangements for regional districts were described in the above section.

11 Information in this section is based on Fraser River Estuary Study Steering Committee. 1978. Fraser River Estuary Study Key Findings and Recommendations. Victoria: Environment Canada and B.C. Ministry of Environment. August.

12 Such changes included allowing direct appeals to Cabinet to remove land from the Agricultural Land Reserve (ALR) and, most recently, allowing golf courses as a permitted use in the ALR.

13 Up the Valley, the City of Chilliwack is still resisting provincial floodplain designations that would limit development within city limits. This position is especially puzzling given that this is the second year in a row that Chilliwack has experienced serious flooding.

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